Published in final edited form as:

J Pain. 2007 January ; 8(1): 75–84.

Pain in Aging Community-Dwelling Adults in the United States: Non-Hispanic Whites, Non-Hispanic Blacks, and Hispanics

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Abstract

Racial and ethnic disparities in healthcare persist in the U.S. Although pain is one of the most prevalent and disabling symptoms of disease, only a few studies have assessed disparities in pain in large racially and ethnically diverse, middle- to late aged community samples, thus limiting the generalizability of study findings in broader populations. With data from the 2000 Health and Retirement Study, we assessed the prevalence and impact of pain in a community sample of aging (≥ 51 years old) non-Hispanic whites ($n = 11,021$), non-Hispanic blacks ($n = 1,804$), and Hispanics ($n = 952$) in the U.S. Pain, pain severity, activity limitation as a result of pain, comorbid conditions, and sociodemographic variables were assessed. Results showed that pain prevalence was 28%, and 17% of the sample reported activity limitation as a result of pain. Non-Hispanic blacks (odds ratio [OR], 1.78; 99% confidence interval [CI], 1.33-2.37) and Hispanics (OR, 1.80; 99% CI, 1.26-2.56) had higher risk for severe pain compared with non-Hispanic whites. Analyses of respondents with pain ($n = 3,811$) showed that having chronic diseases (2 comorbid conditions, OR, 1.5; 99% CI, 1.09-2.17), psychological distress (OR, 1.99; 99% CI, 1.54-2.43), being a Medicaid recipient (OR, 1.63; 99% CI, 1.17-2.25), and lower educational level (OR, 1.45; 99% CI, 1.14-1.85) were significant predictors for severe pain and helped to explain racial/ethnic differences in pain severity.

Perspective—This study, which used a large racially and ethnically diverse community sample, provided empirical evidence that racial/ethnic difference in pain severity in aging community adults in the U.S. can be accounted for by differential vulnerability in terms of chronic disease, socioeconomic conditions, and access to care.

Keywords

Pain; disparities; aging; epidemiology; race; ethnicity

Disparities in healthcare persist for racial and ethnic minorities in the United States. 26,50, 63 Racial/ethnic minorities are at a higher risk for poorer health and shorter survival,18,22, 31 have poorer access to healthcare services,33,52 and have lower quality of healthcare.4,25 Despite the fact that pain is one of the most frequent and devastating symptoms of disease, studies on racial/ethnic differences in pain are limited.11,39,40 Most studies of racial and ethnic disparities in healthcare come from studies of diseases such as cardiovascular diseases,9,17, 34 renal diseases,12,24 cancer,10,49,62 and human immunodeficiency virus/acquired immune

deficiency syndrome.^{21,48} The few studies that focus on racial/ethnic disparities in pain have used relatively small numbers of patients in clinical studies or small numbers of participants in community studies,^{6,7,19,31} thus limiting the generalizability of the study findings in broader populations.

In this study, we describe the prevalence and impact of pain in a racially and ethnically diverse, nationally representative sample of middle- to late-aged adults (older than 50 years) in the United States. Studies show that although the pattern of pain prevalence in older people is unclear,^{28,35} overall, aging populations are at increased risk for pain.^{14,58,59,74} It is generally accepted that increased pathologic load is an overriding factor contributing to increased pain complaint with advancing age,³⁵ with older adults at a greater risk for diseases that cause pain, such as arthritis and cancer. There is, however, limited information on the extent to which older racial and ethnic minorities are at higher risk for pain and its adverse impact on function relative to non-Hispanic whites in the U.S. Furthermore, only a few studies in older adults have assessed to what extent potential explanatory variables, such as the influence of socioeconomic factors, access to care, and coexisting medical conditions,^{55,66, 68,69} might also account for the observed racial/ethnic differences in the prevalence and impact of pain in aging populations.

By using the year 2000 data from the Health and Retirement Study (HRS), this study focused on racial/ethnic differences in the prevalence, severity, and activity limitation as a result of pain in a large sample of non-Hispanic whites ($n = 11,021$), non-Hispanic blacks ($n = 1,804$), and Hispanics ($n = 952$). Because the extent of treatment and management for pain is directly linked to pain severity outcomes, we also assessed to what extent potential explanatory variables such as sociodemographics, access to care, and clinical health status might also account for observed racial/ethnic differences in pain severity in this population. Information about factors associated with pain in a racially and ethnically diverse population of middle- to late-aged community-dwelling adults will help in the development of prevention and management strategies for pain in these populations.

Research Design and Methods

The data source for this study was the 2000 public release data of the HRS. Initiated in 1992, HRS is a population-based survey designed to study the health and well-being of aging Americans. HRS is sponsored by the National Institute of Aging and conducted by the Institute of Social Research at the University of Michigan. The study population comprises community-dwelling adults in the contiguous United States. HRS data consist of 4 sub-samples representing different age groups: those born in 1923 or earlier, those born in 1924 through 1930, those born in 1931 through 1941, and those born in 1942 through 1947. Both the age-eligible respondents and their spouses were interviewed. The study was approved by the Institutional Review Board (IRB) at the University of Michigan (UM Health Sciences IRB Protocol H03-00002774-M8; approved through 10/13/05) and has IRB exemption status under Exemption 45 CFR 46.101 (b) (4) (www.hhs.gov/ohrp/humansubjects/guidance/decisioncharts.htm#c5).

The 2000 health status (B-R), cognition (C-R), and demographics (A-R) and the preload (PR-R) files were used in these analyses.² Data for the year 2000 were collected by telephone. Overall response rate was 82%. For more details about the sub-samples and the sampling methodology, see <http://hrsonline.isr.umich.edu.2>

Study Variables

The variables from the HRS that were used in the present analyses include the following information.

Main Outcome Variables

Pain prevalence was defined by the response to the question, “Are you often troubled with pain?” We coded pain as “0” for a response of “no” and “1” for a response of “yes” to the same question. Pain severity was defined by the response (mild, moderate, or severe) to the follow-up question, “How bad is the pain most of the time?” Activity limitation as a result of pain was defined by the follow-up question, “Does the pain make it difficult for you to do your usual activities such as household chores or work?” We coded the response as “0” for “no” and “1” for “yes”. These question items have been used in population-based studies of pain in older adults.⁵⁸

Main Independent Variable

Race comprised American Indian or Alaskan Native, Asian, black or African American, Native Hawaiian or other Pacific Islander, and white. Ethnicity comprised Hispanic or Latino and non-Hispanic. These classifications are consistent with the Office of Management and Budget classification for race and ethnicity.¹ In this study, race and ethnicity were combined to create the following categories: (1) non-Hispanic white, (2) non-Hispanic black, and (3) Hispanic. Because of the small sample for categories such as American Indian or Alaskan Native, Asian, and Native Hawaiian or other Pacific Islander ($n = 248$), these were not included in this study.

Covariates

Sociodemographic characteristics include the variables age, gender, and education. We included these variables because studies have shown that the elderly, women, and those of lower socioeconomic status are at greater risk for pain.^{5,7,14,15,43,71} Our age cut points included “middle-aged adults” for those 51 to 64 years, “older adults” for those 65 to 74 years, “old-old” adults for those 75 to 84 years, and “oldest-old” for those 85 years and older. Population studies have shown that the prevalence rates for chronic pain peaked in the middle-age groups (45 to 65 years)^{35,72} and then decreased above 65 years of age.¹⁶ Educational level was categorized as having less than secondary education (high school) <12th grade or ≥ 12 th grade.

Health status was defined by using questions pertaining to chronic disease conditions and psychological distress. Disease conditions were assessed by using the question “since we last talked with you (two years previous to the date of interview), has a doctor told you that you have (diabetes, heart conditions, hypertension, cancer, lung disease, stroke, arthritis)?” (To capture the information on ongoing chronic conditions, if the respondent was interviewed in previous years, the question was phrased to include “Our records from your last interview show that you have...”). We collapsed disease conditions to create a summary scale indicating the reported number of conditions, with a minimum score of 0 for not reporting any of the diseases to a maximum of 7 for reporting all of the diseases. We created a summary scale for chronic diseases because we are mainly interested in assessing whether having a number of disease conditions, rather than the presence of a specific condition, is associated with pain outcomes.

We included psychological distress by using the Center for Epidemiologic Studies (CESD) scale. The 20-item CESD scale measures a continuum of psychological distress (symptoms of depression and anxiety), rather than determining the presence of psychiatric disorders. The HRS study collected only 8 items (ranging from 0 to 8, with “0” indicating no depression) from the 20-item CESD scale. HRS suggests the use of a score of 4 as a cutoff on the basis of psychometric analyses of their data.² This variable was included because studies have shown the association of pain with psychological distress and depression.^{36,53,54,64,73}

Access to care was measured by respondent's report of having a medical insurance, either having Medicare (insurance based on social security benefits for those 65 years or older or having a disability) and other government insurance and/or private supplemental insurance; having Medicaid (insurance for the poor and disabled); or not having any insurance. (For specifics on Medicare and Medicaid, see <http://www.cms.hhs.gov/>).

Statistical Analyses

We used descriptive statistics to summarize data. Chi-square analyses were conducted to determine associations between race/ethnicity and pain severity, and other variables. To control for type I error rates, we used a modified Bonferroni approach with the level of significance adjusted from the customary .05 to .007 (.05/7), given the number of tests conducted.

In assessing the factors for severe pain, we dichotomized pain severity by combining mild pain and moderate pain versus severe pain, thus resulting in a sample size of 3,811. We conducted multivariate logistic regression analyses by using severe pain as the dependent variable. The first model included all the variables found significant at $P < .20$ in the univariate level of analysis. (A P value of .20 was used as the cutoff because using a more traditional level [$P < .05$] often fails to identify variables known to be important.¹³) Further variable selection in the model was conducted by using backward elimination. With the goal of having the most parsimonious model, only variables with $P < .05$ were included in the final model. Colinearity diagnostics were also performed. We used 99% confidence limits to assess for significance in the logistic regression analyses. STATA's survey command (Stata Corporation, College Station, TX) was used to adjust for the effect of the sampling design.

Results

The sample consisted of 13,777 respondents. Eighty percent were non-Hispanic whites, 13% were non-Hispanic blacks, and 7% were Hispanics. Fifty-three percent were men. Fifty-one percent were in the ≤ 61 years old group, 29% were 65 to 74 years old, 17% were 75 to 84 years old, and 3% were 85 years or older. Thirty-three percent had 2 or more chronic conditions. Thirteen percent of the sample reported psychological distress (CESD). Table 1 shows statistically significant differences in racial and ethnic distribution for the study variables. There were more non-Hispanic whites with greater than 12th grade education and with Medicare or other form of insurance compared with non-Hispanic blacks and Hispanics.

Pain Prevalence, Pain Severity, and Activity Limitation as a Result of Pain

Table 2 shows pain prevalence, pain severity, and activity limitation as a result of pain overall and stratified by pain severity for non-Hispanic whites, non-Hispanic blacks, and Hispanics. We observed statistically significant differences in pain prevalence by racial/ethnic categories, with higher pain prevalence observed for Hispanics (non-Hispanic whites, 27%; non-Hispanic blacks, 28%; Hispanics, 33%; $P < .003$). In terms of pain severity, more than one fourth of non-Hispanic blacks and Hispanics reported having severe pain most of the time, compared with only about 17% of non-Hispanic whites ($P < .0001$).

Activity limitation as a result of pain was reported by 17.4% (2403/13,777) of the total sample. We also assessed racial/ethnic differences in reports of activity limitation as a result of pain and by levels of pain severity. More than 60% of those with pain for all racial/ethnic categories reported activity limitation as a result of pain (62% non-Hispanic whites, 70% non-Hispanic blacks, 61% Hispanics; $P < .005$). Stratified by levels of pain severity, racial/ethnic differences were only observed at mild levels of pain severity, with Hispanics (35%) reporting significantly lower rates of activity limitation relative to non-Hispanic whites (39%) and non-Hispanic blacks (51%).

Predictors of Pain Prevalence and Pain Severity

Table 3, panel A shows the prevalence of pain for selected variables for the whole sample. We observed statistically significant differences in the prevalence of pain by gender, educational level, insurance status, and comorbid medical conditions. Women, those with lower educational level, and those on Medicaid had higher pain prevalence. We also observed a trend for higher pain prevalence with increasing number of comorbid conditions. Of the chronic conditions, lung disease was associated with the highest prevalence of pain. Except for the variable of age, the differences in pain prevalence for the study variables were all statistically significant.

Table 3, panel B shows the prevalence of pain for the different racial/ethnic categories, stratified by potential explanatory variables. Statistically significant racial/ethnic differences in the prevalence of pain were observed among those 51 to 74 years old, among women, those on Medicare, and those with one chronic comorbid condition.

Because the extent of treatment and management for pain is directly linked to pain severity outcomes, we also assessed whether there are racial and ethnic differences in pain severity, and if so, whether this could be explained by other explanatory variables (sociodemographics, access to care, clinical health status). Table 4 shows prevalence of severe pain for selected variables at the univariate level of analyses. The prevalence of severe pain was observed to be higher for Hispanics and non-Hispanic blacks relative to non-Hispanic whites. Women, those with lower educational levels, the older age group, those on Medicaid, those with more chronic diseases, and those reporting psychological distress had higher prevalence of pain (all statistically significant at $P < .0001$).

Table 5 shows the results of multivariate logistic regression analyses conducted to assess whether race/ethnicity versus other potential explanatory variables (sociodemographics, access to care, clinical health status) accounted for pain severity in this population. The model suggests (Table 5) that after adjusting for the influence of age, sex, educational level, insurance status, chronic diseases, and psychological distress, non-Hispanic blacks and Hispanics do not have greater risk for severe pain, relative to their non-Hispanic white counterparts. In fact, the number of chronic comorbid conditions (odds ratio [OR], 1.5), psychological distress (OR, 1.99), being a Medicaid recipient (OR, 1.63), and lower educational level (OR, 1.45) were found to be the significant predictors for severe pain.

When we assessed for any potential interaction between race and other covariates such as age groups (race/ethnicity by age interaction), the number of chronic diseases (race/ethnicity by chronic disease interaction), or type of insurance (race/ethnicity by insurance interaction), these interaction terms were not significant.

Discussion

Pain is prevalent in this community population of middle- to late-aged adults. Approximately 1 in 3 reported being often troubled with pain, with 19% of those with pain reporting their pain as severe most of the time. More than 60% of those with pain (~17% of the entire sample) reported difficulty in doing their usual activities such as household chores or work because of pain, pointing to the profound impact of pain on the daily lives of the middle- to late-aged adult population.

We did not observe age-related differences in pain prevalence in this older adult community sample. Several community-based studies of pain suggest that pain increases in prevalence from the early adult years up to approximately 60 years of age,^{20,35} thereafter reaches a plateau, and might even decline in extreme old age.^{28,35} Our sample, however, is already

restricted to the older age group (all older than 50 years), possibly explaining our negative finding in age-related differences in pain prevalence.

We observed racial and ethnic differences for pain prevalence, pain severity, and activity limitation as a result of pain, with the greatest magnitude of racial/ethnic difference observed for pain severity. Of those with pain, a greater proportion of Hispanics and non-Hispanic blacks reported severe pain, in contrast to non-Hispanic whites. This is an important finding that might be viewed as an indicator of the widespread under-recognition and undertreatment of pain, especially in minority populations.

Hispanics and non-Hispanic whites reported lower rates of activity impairment as a result of pain relative to non-Hispanic blacks. More non-Hispanic blacks reported functional impairment as a result of pain compared with non-Hispanic whites and Hispanics, a result that approached statistical significance at mild levels of pain severity. Other studies have similar findings. In studies of chronic pain conditions, African Americans reported more pain severity and disability than other racial/ethnic groups.^{23,32,46,55,60,65} Although these differences might be reflective of undertreatment, over-reporting, or differences in pain sensitivity, an implication of this finding is the importance of assessing not just the severity of pain but also its impact on function.

As shown in the multivariate model for pain severity, when sociodemographic factors, access to care, and clinical health status were taken into account, Hispanics and non-Hispanic blacks were no longer at a greater risk for severe pain compared with non-Hispanic whites. Specifically, those with chronic conditions, psychological distress, a lower level of education, or receiving Medicaid were shown to be at greater risk for severe pain, suggesting the need for better pain management for these high-risk groups. This is consistent with the study by Portenoy et al.⁵⁵ In a nationally representative sample of 454 whites, 447 African Americans, and 434 Hispanics, they found that neither race nor ethnicity predicted disabling pain. However, racial/ethnic minorities had more characteristics identified as predictors of disabling pain such as income of \$25,000 or less (OR, 2.54), less than a high school education (OR, 1.59), and being unemployed (OR, 1.50). They concluded that although race and ethnicity contribute to clinical diversity, socioeconomic disadvantage is the more important predictor of disabling pain.

The experience of pain is greatly influenced by clinical health status such as disease severity, disease duration, and the effectiveness of treatment provided for these diseases. Patients from older age groups typically present with existing physiologic decline and coexisting medical conditions; thus, symptom management can be a considerable challenge.^{29,56,57} In this study, we have found that those with more comorbidities were at a greater risk for pain. This is not surprising because chronic diseases such as cancer,⁵¹ arthritis,⁴² diabetes,^{26,44} and cardiovascular disease⁴¹ are associated with painful conditions. In fact, pain was, and still is, largely known as a “symptom” of disease. Because about one third of this middle- to late-aged community sample reported 2 or more chronic conditions, an important implication is pain’s enormous impact on public health.

Those with psychological distress were twice as likely to have severe pain. Several studies have addressed the relationship of depression and pain and have found depression as having either a causal or a mediating effect on pain. One study found a strong correlation between pain severity and depression for older age patients, whereas a weak and insignificant correlation was found between these 2 variables in younger patients.⁷⁰ Although the causal relationship remains debatable, at least in primary care settings, studies have shown that medical symptoms such as pain are associated with depressive disorders or psychological distress and anxiety.^{47,53,54} In this study, we were unable to assess the directionality of the relationship between

psychological distress and severe pain because of the cross-sectional nature of our dataset. Among the important implications of this finding, however, is the need to incorporate the assessment of both pain and emotional distress in clinical practice and research. Importantly, health programs for pain should incorporate interventions for depression and anxiety.

There are limitations to this study. The pain prevalence we found is lower than that found in most studies of pain in older adult populations. Other studies have found pain prevalence in older adults ranging between 40% and 83%.^{27,37,38,45,61,67} The methods of pain measurement as well as the design of the studies might be among the reasons for the inconsistent results. It could be argued that using a 1-item question to measure pain might have been an inadequate representation of the construct of pain, and that cross-sectional prevalence studies of pain cannot take into account many of the common but short-lived pain problems.³⁵ In addition, the variables used for this study were all based on self-report, thus socially desirable responses might have been given. Recall bias is also a possibility especially for questions on past events. Also, because information on chronic diseases was based on self-report and the question asked was “if they have ever been told by a physician to have...,” misclassification (grouping those with active versus past/treated diseases) is a distinct possibility. In addition, the validity of a disease diagnosis based on self-report is questionable (eg, it is common for practitioners to ascribe pain to arthritis in older adults for lack of another diagnosis) and might therefore lead to a bias in the findings.

Many have argued that the association between race/ ethnicity and poor health is due in large part to the poor socioeconomic conditions of racial and ethnic minorities.^{4,6,8,30} Our findings support this assertion. The multivariate model showed that the relationship between race/ ethnicity and pain diminished significantly when educational level and insurance status were controlled for in the analyses, showing that Medicaid recipients and those having less than a high school education were at a greater risk for severe pain. This finding is consistent with studies showing that racial and ethnic minorities, the underserved, and those with lower educational levels^{52,55} are less likely to receive adequate treatment. In a recent study, Nguyen et al⁵² found that Hispanics were significantly less likely to have consulted a primary care practitioner for pain (70%) than whites (84%) or African americans (85%). A lower likelihood of consultation also was associated with speaking Spanish, being male, being relatively young (18 to 34 years) or single, having limited education, and not being employed. They concluded that race and ethnicity, along with other demographic and socioeconomic factors, influence access to care for chronic pain.

We recognize that there is a complex relationship between race/ethnicity and pain. The influence of other putative factors on racial/ethnic differences in pain^{25,39,40,63} was not assessed in the study. A report from the Institute of Medicine³ suggests that factors such as stereotyping and bias on the part of the healthcare provider, the clinical appropriateness of care, and persistent racial and ethnic discrimination are among the reasons for racial/ethnic disparities in healthcare. Literature also documents racial and ethnic differences in patients' attitudes toward medical care.³¹ The nature of our dataset (existing dataset), however, limits our ability to further explore the impact of these factors. Additional studies are needed to further clarify this complex relationship.

Critical in understanding the relationship between race/ethnicity and pain is the recognition that racial and ethnic minorities remain at a greater risk than non-minorities for severe pain. Although the association between race/ethnicity and pain disappeared when socio-demographics, clinical health status, and access to care were controlled for, racial and ethnic minorities have a higher prevalence for chronic conditions, are disproportionately represented in the lower socioeconomic ranks, and have less access to care, factors this study has shown to be important in predicting poor pain outcomes.

In conclusion, this study provides empirical evidence that severe pain is prevalent and has an adverse impact on daily function, especially among aging ethnic and racial minorities. We have also shown the influence of several factors—sociodemographic variables, access to care, and clinical health status—that are relevant in understanding pain as it relates to population health in general and minority health in particular. The findings also highlight the important role of the primary care provider in providing appropriate pain assessment and treatment.

Acknowledgements

Supported by a Public Health Service grant KO7 CA109043-01 from the National Cancer Institute.

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Table 1

Profile of Study Population, HRS 2000

	Overall Total, N = 13,777 (100%)	Racial/Ethnic Categories		
		Non-Hispanic Whites, n = 11,021 (80%)	Non-Hispanic Blacks, n = 1804 (13%)	Hispanics, n = 952 (7%)
Gender *				
Male	7309 (53)	6044 (55)	767 (43)	498 (52)
Female	6468 (47)	4977 (45)	1037 (57)	454 (48)
Education *				
>12th grade	10,183 (74)	8825 (80)	969 (54)	389 (41)
≤12th grade	3594 (26)	2875 (20)	835 (46)	563 (59)
Age (y) *				
51–64	7040 (51)	5419 (49)	1067 (59)	554 (58)
65–74	4023 (29)	3340 (30)	428 (24)	255 (27)
75–84	2257 (17)	1896 (17)	242 (13)	119 (12.5)
≥85	457 (3)	366 (3)	67 (4)	24 (2.5)
Insurance status *				
Medicare and other insurance	11,466 (83)	9662 (88)	1288 (71)	516 (54)
Medicaid	950 (7)	428 (4)	311 (17)	211 (22)
No insurance	1361 (10)	931 (8)	205 (11)	225 (24)
Number of chronic diseases *				
0	4321 (31)	3585 (32)	403 (22)	333 (35)
1	4939 (36)	3937 (36)	664 (37)	338 (35)
2	2913 (21)	2276 (21)	451 (25)	186 (20)
3 or greater	1604 (12)	1223 (11)	286 (16)	95 (10)
Psychological distress (CESD) *				
0–4 (no)	11,021 (80)	9274 (84)	1394 (77)	691 (73)
5–8 (yes)	1804 (13)	1747 (16)	410 (23)	261 (27)

* $P < .0001$.

Table 2

Pain Prevalence, Pain Severity, and Activity Limitation by Racial/Ethnic Categories, Cross-Sectional Analyses (HRS 2000)

Variable	Non-Hispanic Whites, n = 11,021 (80%)	Non-Hispanic Blacks, n = 1804 (13%)	Hispanics, n = 952 (7%)	P Value
Pain prevalence: Are you often troubled with pain?	3003 (27)	506 (28)	312 (33)	.003
* Pain severity: How bad is the pain most of the time?				
Mild	825 (28)	124 (25)	79 (25)	.0001
Moderate	1665 (56)	248 (49)	149 (48)	
Severe	504 (17)	134 (27)	83 (27)	
Activity limitation: Does the pain make it difficult for you to do your usual activities such as household chores or work?				
Yes	1860 (62)	352 (70)	191 (61)	.004
Mild pain	320 (39)	63 (51)	28 (35)	.028
Moderate pain	1100 (66)	169 (68)	96 (64)	.726
Severe pain	432 (86)	120 (90)	67 (81)	.190

* Does not equal 100% because of rounding error.

Table 3
Prevalence of Pain by Selected Variables (Panel A) and Racial/Ethnic Differences in Pain by Selected Variables (Panel B), HRS 2000

Variables	Panel A		Panel B		
	Total Sample, N = 13,777 (100%)		Non-Hispanic Whites, n = 11,021 (80%)	Non-Hispanic Blacks, n = 1804 (13%)	Hispanics, n = 952 (7%)
Pain	3821	27.7%	3003	506	312
Age (y)					
51–64	1988	28.2%	1496*	308	184
65–74	1047	26.0%	858*	106	83
75–84	643	28.5%	537	71	35
≥85	143	31.3%	112	21	10
Gender					
Male	1844	25.2%	1517	190	137
Female	1977	30.6%	1486†	316	175
Education					
>12th grade	2601	25.5%	2244	247	110
≤12th grade	1220	33.9%	759	259	202
Insurance status					
Medicare and other insurance	2978	26.0%	2538*	297	143
Medicaid	447	47.1%	197	151	99
No insurance	396	29.1%	268	58	70
Number of chronic diseases					
0	1319	19.9%	722	69	69
1	933	26.7%	1030†	164	125
2	709	32.0%	720	148	65
3 or greater	860	44.2%	531	125	53
Hypertension					
No	1563	23.1%	1330*	113	120
Yes	2258	32.2%	1673†	393	192
Heart disease					
No	2647	24.8%	2055†	348	244
Yes	1174	37.8%	948*	158	68
Stroke					
No	3515	27.1%	2764†	453	298
Yes	306	37.3%	239	53	14
Diabetes					
No	3044	26.1%	2480	348	216
Yes	777	36.4%	523	158	96
Cancer					
No	3307	27.4%	2572*	454	281
Yes	514	30.0%	431†	52	31
Lung					
No	3269	26.1%	2546†	434	289
Yes	552	43.5%	457*	72	23
Arthritis					
No	680	12.0%	553	65	62
Yes	3141	38.6%	2450†	441	250
Psychological distress					
No	2470	21.7%	2018	285	167
Yes	1351	55.9%	985	221	145

NOTE. Panel A: all $P < .001$ except for the variables age ($P < .01$) and cancer ($P < .01$), Panel B:

* $P < .05$.

[†] $P < .005$.

Table 4
Prevalence of Severe Pain by Selected Characteristics, HRS 2000 (N = 3811)

Variable	Mild to Moderate Pain, n = 3090 (%)	Severe Pain, n = 721 (%)
Race/ethnicity		
Non-Hispanic whites	(83)	(17)
Non-Hispanic blacks	(74)	(26)
Hispanics	(73)	(27)
Gender		
Male	(83)	(17)
Female	(79)	(21)
Education		
>12th grade	(85)	(15)
≤12th grade	(73)	(27)
Age (y)		
51–64	(82)	(18)
65–74	(81)	(19)
75–84	(79)	(21)
≥85	(76)	(24)
Insurance status		
Medicare and other insurance	(83)	(17)
Medicaid	(65)	(35)
No insurance	(80)	(20)
Number of chronic diseases		
0	(87)	(13)
1	(84)	(16)
2	(78)	(22)
3 or greater	(73)	(27)
Psychological distress (CESD)		
0–4 (no)	(86)	(14)
5–8 (yes)	(72)	(28)

NOTE. All $P < .0001$.

Table 5
Logistic Regression Model for Severe Pain, HRS 2000 (N = 3811)

Variable	Odds Ratio	99% Confidence Limit
Number of chronic diseases		
0	Reference	
1	1.15	0.83–1.62
2	1.53	1.09–2.17
3 or greater	1.87	1.31–2.68
Psychological distress (CESD)		
No (score 0–4)	Reference	
Yes (score 5–8)	1.99	1.54–2.43
Insurance status		
Medicare and other insurance	Reference	
Medicaid	1.63	1.17–2.25
No insurance	1.54	1.22–1.95
Education		
<12th grade	Reference	
≥12th grade	1.45	1.14–1.85

NOTE. Candidate variables included race/ethnicity, age, sex, educational level, insurance status, chronic diseases, psychological distress.