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Mental Health Service Use by Older Adults: The Role of Chronic Pain

Jennifer Brennan Braden, M.D., M.P.H.^a, Lily Zhang, M.S.^b, Ming-Yu Fan, Ph.D.^a, Jürgen Unützer, M.D., M.P.H.^a, Mark J. Edlund, M.D., Ph.D.^c, and Mark D. Sullivan, M.D., Ph.D.^a

^aDepartment of Psychiatry & Behavioral Sciences, University of Washington School of Medicine, Seattle, WA

^bDepartment of Psychiatry and Biobehavioral Sciences, University of California at Los Angeles, Los Angeles, CA

^cDepartment of Psychiatry, University of Arkansas for Medical Sciences, Little Rock, AR

Abstract

Objective—Mental health disorders commonly co-occur in patients with chronic pain, but little is known about the role of chronic pain in mental health service use. In this study, we explored the role of chronic pain in mental health service use by adults according to age group.

Design—Cross-sectional analysis of survey data from the second wave of the Healthcare for Communities telephone survey, collected in 2000 to 2001.

Setting—Randomly selected U.S. households.

Participants—U.S. civilian adults (N=6629)

Measurements—Common mental disorders were assessed using the short-form versions of the World Health Organization's Composite International Diagnostic Interview (CIDI-SF). Chronic pain conditions and mental health services received were identified by self report. Physical and mental functioning were assessed using the Short Form-12.

Results—Adults older than age 60 had higher rates of chronic pain and lower rates of mental health service use compared to those age 18 to 60 years. In multiple logistic regression models, an interaction effect was found between age and chronic pain (OR 3.0 [1.1-8.0]), with chronic pain significantly increasing the odds of any mental health care in the past year in adults older than 60 years of age.

Conclusions—Chronic pain increases the likelihood of mental health service use among older adults. Chronic pain may facilitate the presentation of distress in medical settings for these adults.

Keywords

pain; mental health; health services; geriatrics

Mental health disorders commonly co-occur in patients with chronic pain. Reported 12-month prevalence rates in population-based samples range from 7-28% for depression, 4-17% for

Corresponding Author: Jennifer Brennan Braden, MD, MPH Department of Psychiatry and Behavioral Sciences, Box 356560 University of Washington School of Medicine 1959 N.E. Pacific Street Seattle, WA 98195-6560 Phone: (206) 616-0952 Fax: (206) 221-5414 Email: jkbrenn@u.washington.edu.

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anxiety disorders and 0.8-5% for substance use disorders.¹⁻⁵ In primary care clinic samples, rates of depression may be as high as 46% in individuals with pain conditions.² Individuals with chronic pain conditions have high rate of primary care and emergency room visits,⁶⁻⁹ but little is known about mental health service use in individuals with chronic pain and co-morbid mental health disorders. In a survey of 409 adults with self-reported osteoarthritis or rheumatoid arthritis, 42% reported not receiving needed mental health services.¹⁰ A survey of veterans in the VA Connecticut Healthcare System found that pain was associated with a higher use of outpatient medical services but was not related to use of outpatient or inpatient psychiatric services.¹¹

An analysis of the Healthcare for Communities survey data from 1997-1998 found the presence of a chronic pain condition in persons with depression to be associated with a 20% increase in number of medical visits and a 21% lower likelihood of receiving any mental health specialty care relative to individuals without chronic pain.¹² A separate analysis of this same data, focusing on age effects, found that adults 65 years or older meeting criteria for a mental disorder were also less likely to receive specialty mental health care or counseling or referrals for specialty mental health care from primary care providers than those less than 65 years of age.¹³ The elderly are more likely to experience chronic pain, but some studies suggest that older persons with chronic pain are less likely to experience severe psychological distress or depressed mood than younger individuals with chronic pain.¹⁴⁻¹⁶

In this study, we sought to obtain a more in-depth look at the role of chronic pain conditions in mental health service use according to age group using data from the 2000-2001 Healthcare for Communities Survey. Specifically, we sought to answer the following questions:

1. Do the rates of co-morbidity between chronic pain and mental disorders differ for those over and under 60 years of age?
2. How does co-morbidity of chronic pain affect access to, utilization of, and satisfaction with mental health services for those over and under 60 years of age?

On the basis of these prior studies suggesting lower rates of mental health service use in the elderly and in patients with chronic pain, we hypothesized that rates of mental health service use would be lower in elderly with chronic pain relative to younger patients with chronic pain or individuals of any age without chronic pain.

METHODS

Data Source

Data are from the second wave of Healthcare for Communities (HCC2), a part of the Robert Wood Johnson Foundation's Health Tracking Initiative conducted in 2000-2001. HCC was a nationwide telephone survey designed to track the effects of the changing health care system on individuals at risk for alcohol, drug abuse, and mental health (ADM) disorders.¹⁷ The HCC respondents were a stratified probability sample of participants in the Community Tracking Study (CTS), a nationally representative study of the U.S. civilian population.¹⁸ Details of the sampling design are described elsewhere.¹⁷ HCC2 followed all individuals who responded to the initial HCC survey conducted in 1997-1998 (HCC1). Of the 14,985 respondents selected for HCC1, 9,585 complete interviews were obtained, yielding a response rate of 64%. A total of 6,659 of the 9,585 HCC1 respondents (70.9%, weighted) completed the HCC2 survey. Excluding cases with missing values for questions assessing the presence of a chronic pain condition left a total sample size of 6629 for this study. Informed consent was obtained verbally before the interview, and the study was approved by the institutional review boards at UCLA and RAND.

Variables

The presence of common mental disorders in the past 12 months (major depression, dysthymia, generalized anxiety disorder (GAD), and panic disorder) was assessed using short-form versions¹⁹ of the World Health Organization's Composite International Diagnostic Interview (CIDI-SF),²⁰ based upon the Diagnostic and Statistical Manual Third Edition-revised (DSM-III-R)²¹. Chronic pain conditions, other chronic conditions, and mental health service use were identified by self-report. The HCC survey asked about 17 different chronic conditions ("Here is a list of health problems some people have. Please indicate if you now have any of these problems."), four of which were defined for this analysis as chronic pain conditions: arthritis, chronic back problems, migraine/chronic headaches, and 'other' chronic pain condition. Rates reported in this study refer to current prevalence of chronic pain and other chronic medical conditions, and 12-month prevalence of mental health, problem drug or alcohol use, and mental health service use.

Problem alcohol use was defined as an Alcohol Use Disorders Identification Test (AUDIT) core total score of eight or higher.²² Problem drug use was defined as a positive answer to either of two questions, adapted from the CIDI, assessing tolerance or emotional or psychological problems as a result of drug use. The Physical Component Summary-12 (PCS-12) and Mental Health Summary-12 (MCS-12) from the Short Form-12 (SF-12)²³ were used as aggregate measures of physical functioning and mental health functioning. Both PCS-12 and MCS-12 summary scores have a mean of 50 and a standard deviation of 10 in the general U.S. adult population, with a higher score indicating better functioning. Level of pain interference with the respondents' daily activities was derived from the SF-12 pain interference item (extremely/a lot versus moderately/a little bit versus not at all).

Guideline-consistent counseling was defined as at least four visits with a mental health specialist or four visits with a primary care provider that included some counseling (five or more minutes per visit) for mental health problems, in the past 12 months. This criteria is more conservative than that used in the National Comorbidity Study (8 visits).²⁴ A similar counseling definition to the one used in this study was used in the Medical Outcomes Study, where appropriate counseling or medication use was found to be associated with improved 2-year functional outcomes in depression.²⁵ HCC respondents were asked about all prescribed medications which they had taken "at least several times a week for a month or more" in the past 12 months. Respondents were asked to read the names directly off of their pill bottles to the interviewers for all of their medications. These medications were later grouped into therapeutic categories by study staff. Guideline-consistent antidepressant therapy was defined as any antidepressant taken at an adequate dose for at least two months in the past 12 months. Appropriate pharmacotherapy was based upon Agency for Health Care Policy and Research and other published guidelines, and included parameters for the type of medication, dosage, and duration of treatment.²⁶

Satisfaction with mental health treatment was assessed by a single item with five potential responses: Very satisfied, satisfied, neither satisfied nor dissatisfied, dissatisfied, very dissatisfied. Data are presented in this paper for percent reporting either satisfied or very satisfied (labeled as "Satisfied with mental health care").

Data Analysis

Sample weights were used to weight the data to make them representative of the U.S. population and adjust for the probability of selection, non-response, and the number of households in the CTS survey that did not have a phone. Statistical differences were assessed with chi square statistic for categorical variables and t-statistic (comparison of age group differences) or F statistic (comparison of differences between the four chronic pain/age categories) for

continuous variables. We opted to use age 60 as the dividing point for the two age categories rather than the traditional 65 in order to increase the sample size of older individuals. A comparison of socio-demographic and clinical variable frequencies using the two different cut points revealed no significant differences, other than a greater percentage of individuals 65 and older with Medicare as their main health insurance plan. Logistic regression analysis was used to estimate odds ratios for mental health care, based on risk factors while controlling for socio-demographic variables and mean physical and mental health functioning scores. Interaction terms concerning the presence of a chronic pain condition and age group, and presence of a mental health disorder and age group, were included to estimate the effect sizes for those older and younger than 60 years of age. All analyses were conducted using Software for the Statistical Analysis of Correlated Data (SUDAAN, version 9.01, Research Triangle Park, NC).

RESULTS

Demographics

Table 1 lists the socio-demographic characteristics of the 2000-2001 Healthcare for Communities (HCC2) population and for individuals with and without chronic pain, by age (18 to 60 years [N=4978] and older than 60 years of age [N=1651]). Data are consistent with that for the 1997-1998 survey presented elsewhere,^{12, 13} with the exception that the mean annual income was higher in the HCC2 population used for this analysis (\$54,296 versus \$39,765), likely due to a higher mean income in responders (\$50,239) versus non-responders (\$47,097) to the HCC2 survey.²⁷ Individuals older than 60 years of age were less educated, had a lower mean income, were more likely to be White, were more likely to have Medicare or Medicaid and less likely to be uninsured, and were less likely to have an unmarried partner than individuals age 18 to 60 years of age.

Clinical Characteristics

Table 2 lists clinical characteristics for the 2000-2001 HCC2 population, with or without chronic pain, by age (18 to 60 years, and older than 60 years of age).

Mental Health—Overall, individuals with chronic pain were more likely to have a mental health disorder than those without chronic pain. Individuals age 18 to 60 years with chronic pain were more likely to meet criteria for 12-month major depressive disorder, panic disorder, and generalized anxiety disorder than those older than age 60 with chronic pain (19.4%, 7.7% and 8.9% versus 6.9%, 2.9% and 2.8%, respectively). The prevalence of dysthymia did not differ between age groups with chronic pain. The mean number of mental health disorders was greatest in those age 18 to 60 years with a chronic pain condition and differed significantly by age group. The mean MCS-12 score did not differ significantly by age group.

Chronic pain Conditions and Physical Functioning—Among individuals with a chronic pain condition, arthritis was more common (86.1% versus 53.1%), and chronic headaches and other chronic pain condition were less common (10.3% versus 35.1%, and 16.8% versus 25.4%, respectively), in individuals older than 60 years of age relative to younger individuals. The prevalence of chronic back problems did not differ significantly by age group. Individuals older than 60 had a significantly greater mean number of chronic non-pain conditions than those age 18 to 60 years. Level of pain interference did not differ significantly by age group among those with a chronic pain condition, but was significantly higher in those older than 60 years of age, among those without a chronic pain condition. Physical functioning (as measured by mean PCS-12 score) was decreased in persons older than age 60 relative to younger individuals.

Mental Health Service Use

Table 3 describes mental health service use in the past 12 months among by individuals with and without chronic pain, by age group (18 to 60 years and older than 60 years), for the entire HCC2 sample (n=6629). Figure 1 illustrates differences in mental health service use in the past 12 months, ages 18 to 60 years versus older than 60 years, with and without a chronic pain condition, among those with a mental health disorder (n=1151).

Regardless of the presence of a chronic pain condition, individuals age 18 to 60 years were more likely than those older than age 60: to perceive the need for mental health care (22.3% versus 7.4% with chronic pain, 9.1% versus 2.0% without chronic pain), to have been screened by a primary care provider for a mental health or substance use disorder (37.8% versus 22.0% with chronic pain, 26.7% versus 17.1% without chronic pain), or to have received any mental health care in the past 12 months (12.5% versus 4.4% with chronic pain, 6.1% versus 1.0% without chronic pain), including mental health specialty care and guideline-consistent mental health/substance abuse counseling.

Logistic Regression Analyses

Table 4 lists the results of logistic regression analyses examining risk factors for mental health service use among the total HCC2 population (N=6629). The presence of a chronic pain condition did not significantly increase the odds of being screened by a primary care provider for mental health/substance abuse in the past year (odds ratio [OR] 1.2, 95% confidence interval [95% CI] 0.98-1.4). The fourth and fifth rows in the table list the interaction effects for age by pain and age by mental health disorder. A significant interaction effect existed between age and chronic pain for the variables 'any mental health care in the past year,' 'satisfaction with mental health care,' but not for 'mental health specialty visits in the past year' or 'received effective counseling or antidepressants in the past year.' A significant interaction effect was present between age and mental health disorder for the outcome 'satisfaction with mental health care'. In analyses stratified by age group (data not shown), a statistically significant association between the presence of a chronic pain condition and use of mental health services existed in those older than age 60 (any mental health care: OR 3.9, 95% CI 1.4-11.0, p=0.009, T=2.61, degrees of freedom (df)=1; mental health specialty visits: OR 4.2, 95% CI 1.1-17.1, p=0.042, T=2.04, df=1) but not in those 18 to 60 years of age. In contrast, the number of chronic non-pain conditions was not significantly associated with mental health service use for the full sample or for either age group in stratified analyses. Number of non-pain chronic conditions was significantly associated with being screened by a primary care provider for mental health/substance abuse in the full sample (OR 1.2, 95% CI 1.1-1.4, Table 4); when age groups were examined separately in stratified analyses, however, this relationship held true only for those 18 to 60 years of age (OR 1.3, 95% CI 1.1-1.5, p=0.0002, T=3.77, df=1).

CONCLUSIONS

This study confirms the high rates of chronic pain and low rates of mental health service use in those over 60 years of age that have been found in previous studies. Our results confirm previously documented findings of a high prevalence of common mental health disorders in individuals with chronic pain, increased disability among those with chronic pain and comorbid mental health disorders, and a significant degree of unmet need for mental health services among older adults. Contrary to our hypothesis and previous studies in mixed age populations, it suggests that the presence of a chronic pain condition increases the likelihood of receiving mental health care in those over 60 years of age.

In our study, more than half of individuals older than age 60 had at least one chronic pain condition, most typically arthritis. The prevalence of arthritis increased with age, while the

prevalence of chronic back pain remained stable and chronic headaches decreased. With increasing age, chronic pain is more common and less associated with mental disorders,²⁸ possibly due to a lower association of depression and anxiety with arthritis relative to other chronic pain conditions. Prior studies^{14, 15} also suggest that chronic pain affects emotional functioning less in older individuals. We found that individuals older than 60 with a chronic pain condition were less likely to have a mental disorder than those younger than age 60 with a chronic pain condition, although mean mental functioning (MCS-12 score) did not differ significantly by age group. Because the presence of chronic pain and associated physical limitations increase with age, they may be expected and better accepted by older individuals.

The lower use of mental health services in older versus younger individuals is consistent with prior population-based studies.^{24, 29, 30} In an analysis of Medical Expenditure Panel Survey data, 70% of adults age 65 and older with self-reported depression received any treatment, whereas only 49% received an adequate course (medication and/or psychotherapy).³¹ Fifty-three percent of adults age 65 or older with mental disorders surveyed in the 1997-98 Healthcare for Communities (HCC) survey received any mental health care in the prior year.¹³ In our study of the 2000-01 HCC data, treatment rates for those older than age 60 remained low, with the presence of a chronic pain condition more than tripling the likelihood of receipt of any mental health care in the prior year. This finding, in combination with the high rates of chronic pain in older adults, underscores the importance of adequate education and training of mental health providers, particularly those working with geriatric populations, regarding the diagnosis and treatment of chronic pain conditions and their relationship with mental health disorders.

The presence of chronic medical conditions could be a potential deterrent to identifying mental health needs in individuals in medical settings due to “competing demands”³² or alternatively, could increase the likelihood of recognition via increased contact and thus opportunity for diagnosis. Prior studies have shown mixed results, some finding number of chronic conditions to be associated with mental health service use^{29, 30} and others finding some conditions but not others associated with mental health care³¹⁻³³. In our study, the effect on mental health services was specific to chronic pain conditions.

Research on expectations of aging suggests a possible explanation for this finding. In a survey of community-residing adults aged 65 to 100 in the Los Angeles area,³⁴ 50% viewed depression as an expected development in aging, and those who attributed depression to aging were more likely to believe it was not important to discuss feeling depressed with a doctor³⁵. The presence of chronic pain in elderly individuals may prompt discussion of distress with health care providers and increase the opportunity for recognition of mental disorders. Further study is needed to verify this hypothesis.

Strengths of this study are its population-based study design and detailed information on mental health service use as well as information on both DSM-IV mental health disorders and chronic medical conditions. Limitations include the self-report nature of information on medical conditions and chronic pain conditions, limited data on substance abuse disorders, and the cross-sectional nature of the information obtained. While specified as “chronic” (or in the case of arthritis, assumed to be chronic based on the nature of the condition), the data on chronic pain did not include information on other variables such as duration of pain and adequacy of treatment that may influence the relationship with mental health disorder and likelihood of receiving mental health services. Post-traumatic stress disorder (PTSD), simple phobia, and social phobia were found to be significantly associated with arthritis and chronic spinal pain in the National Co-morbidity Study (original and replication),³⁻⁵ but were not assessed by Healthcare for Communities. The high degree of co-morbidity of anxiety disorders among each other and with depression, however, likely limits the number of individuals with other anxiety disorders missed in this assessment. The absolute number of older individuals with a mental

health disorder but no chronic pain condition was small (N=23), and may limit the generalizability of the results. In addition, while most of the significant effects noted in our findings were highly significant at the $p < 0.001$ level, the interaction effect of age and pain was significant only at the $p < 0.05$ level, likely a reflection of the additional power required to detect interaction effects. Hence, our results should be considered provisional, and analysis of other data sets is warranted to replicate our findings. Compared to the group with a chronic pain condition, older adults without a chronic pain condition had a lower mean number of chronic medical (non-pain) conditions and mental health disorders. It is possible that this group may not represent individuals who present for care in the outpatient setting. Further study would be required to confirm this hypothesis.

The Healthcare for Communities survey asked about chronic pain conditions commonly seen in primary care and included an “other chronic pain disorder” category, but did not ask specifically about neuropathic pain. Reported prevalence rates in cross-sectional studies of neuropathic pain in diabetics have ranged from 5% to 19%.³⁶⁻³⁸ In HCC2, 583 people reported having diabetes; of these, 88 (weighted percent = 12.0%) reported having “other chronic pain disorder.” It is not possible to know from this data what specific conditions are accounted for by the category “other chronic pain disorder.” The percent of individuals with diabetes reporting “other chronic pain disorder,” however, is consistent with the expected frequency of painful diabetic neuropathy.

In summary, our study shows that while rates of mental health service use among older adults are low regardless of the presence of co-morbid medical conditions, the presence of chronic pain increases the likelihood of mental health care, and suggests that those with a mental health disorder but no chronic pain may be at greatest risk of not receiving needed mental health services. Further research is needed to identify reasons for these findings and how to best address this area of unmet need.

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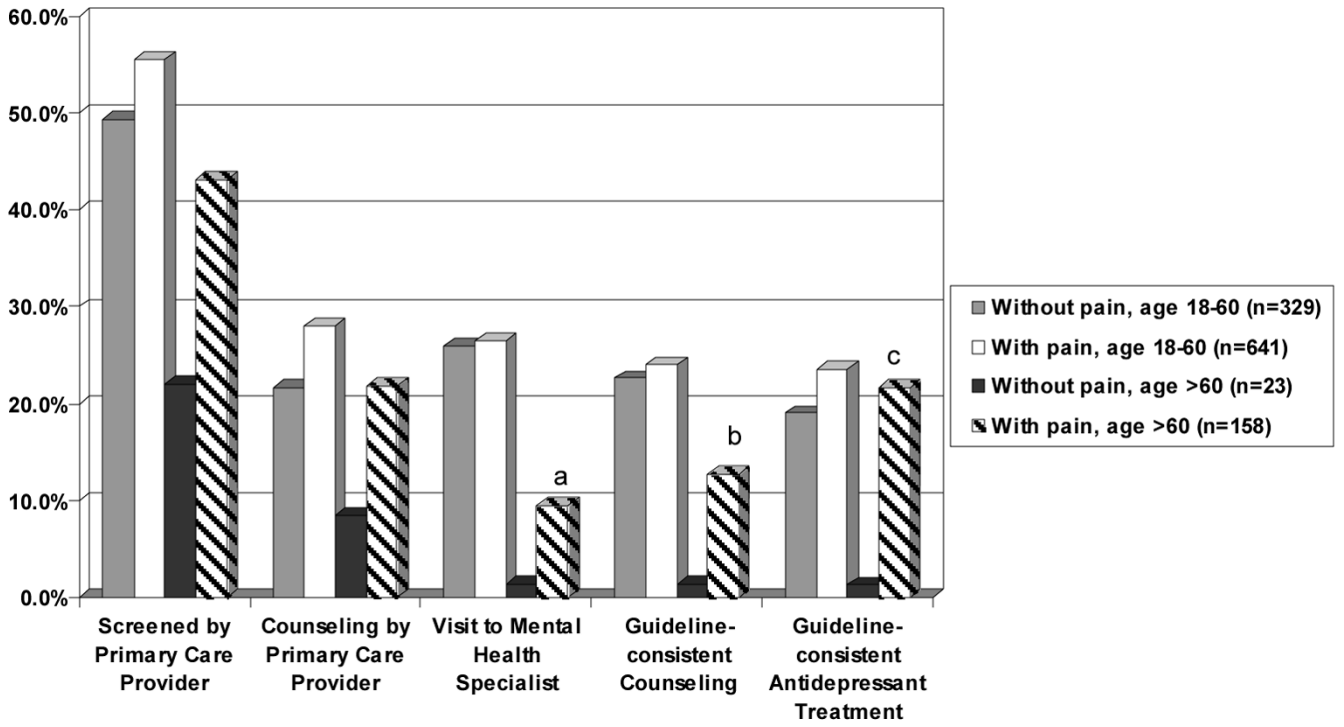


Figure 1. Percent of Those with a Mental Health Disorder Who Used Mental Health Services in the Past 12 Months, by Age and Presence of Chronic Pain
^ap<0.05 ^bp<0.01 ^cp<0.001 for difference between those with versus without chronic pain, age >60

Table 1
 Socio-Demographic Characteristics of Respondents with or without a Chronic Pain Condition, by Age Group

Sample Characteristics N(%)	With Chronic Pain (N=3135)			Without Chronic Pain (N=3494)			Chisq (df) P Value
	Overall (N=6629)	18-60 (N=2074)	Over 60 (N=1061)	18-60 (N=2904)	Over 60 (N=590)	Chisq (df) P Value	
Age							
Under 30	852 (13.8%)						
31 to 45	2117 (33.2%)						
46 to 60	2009 (25.2%)						
Over 60	1651 (27.8%)						
Gender							
Female	4122 (52.2%)	1396 (56.2%)	746 (64.3%)	1654 (46.4%)	326 (48.2%)	0.51 (1) p=0.476	
Race						29.54 (3) p<0.001	
White	5289 (75.4%)	1654 (74.7%)	910 (83.7%)	2227 (71.0%)	498 (83.3%)		
Black	740 (11.8%)	234 (12.1%)	98 (10.1%)	359 (13.2%)	49 (8.2%)		
Hispanic	401 (9.7%)	111 (10.0%)	31 (3.4%)	233 (12.9%)	26 (4.7%)		
Other	199 (3.1%)	75 (3.3%)	22 (2.8%)	85 (2.9%)	17 (3.8%)		
Marital Status						57.76 (2) p<0.001	47.76 (2) p<0.001
Married	3974 (62.1%)	1252 (60.4%)	545 (53.3%)	1829 (66.4%)	348 (61.5%)		
Single	2262 (32.5%)	667 (31.4%)	503 (45.8%)	862 (27.0%)	230 (37.9%)		
Unmarried partner	375 (5.4%)	148 (8.2%)	11 (0.8%)	206 (6.7%)	10 (0.7%)		
Education, N(%)						48.05 (2) p<0.001	33.95 (2) p<0.001
Less than high school	732 (13.2%)	205 (11.3%)	257 (27.5%)	166 (8.1%)	104 (16.2%)		
HS Grad or some college	3973 (61.3%)	1275 (64.3%)	628 (57.0%)	1719 (61.0%)	351 (62.5%)		
College or high	1924 (25.5%)	594 (24.4%)	176 (15.6%)	1019 (30.9%)	135 (21.3%)		
Total household income, Mean (SD)	\$54297 (56257)	\$55211 (47255)	\$31831 (37364)	\$63521 (60342)	\$48465 (71001)	125.32 (1) p<0.001	14.56 (1) p<0.001
Health insurance coverage						211.01 (4) p<0.001	177.31 (4) p<0.001
Medicare	1094 (17.7%)	134 (5.2%)	614 (60.1%)	49 (1.5%)	297 (49.7%)		
Medicaid	152 (2.3%)	77 (3.8%)	16 (1.8%)	57 (2.0%)	2 (0.6%)		
Private	4468 (66.4%)	1524 (74.1%)	348 (31.1%)	2355 (80.9%)	241 (42.1%)		
Other	224 (3.5%)	69 (3.5%)	50 (4.3%)	72 (2.6%)	33 (6.0%)		
Uninsured	648 (10.1%)	254 (13.4%)	31 (2.7%)	350 (12.9%)	13 (1.6%)		

Table 2
Clinical Characteristics of Individuals with or without a Chronic Pain Condition, by Age Group

Clinical Characteristics N(%)	With Chronic Pain (N=3135)			Without Chronic Pain (N=3494)		
	Overall (N=6629)	18-60 (N=2074)	Over 60 (N=1061)	18-60 (N=2904)	Over 60 (N=590)	Chisq (df) P Value
Mental health disorders, N(%)						
Major depressive disorder	783 (9.1%)	460 (19.4%)	91 (6.9%)	221 (5.9%)	11 (1.4%)	20.92 (1) p<0.001
Dysthymia	333 (3.8%)	185 (7.3%)	65 (5.2%)	81 (2.2%)	2 (0.04%)	25.50 (1) p<0.001
Panic	286 (3.3%)	179 (7.7%)	37 (2.9%)	68 (1.7%)	2 (0.06%)	27.94 (1) p<0.001
Generalized anxiety disorder	299 (3.9%)	184 (8.9%)	42 (2.8%)	66 (2.0%)	7 (1.6%)	0.29 (1) p=0.592
Number of mental health disorders, Mean (SD)	0.2 (0.7)	0.5 (1.0)	0.2 (0.6)	0.1 (0.5)	0.04 (0.2)	29.64 (1) p<0.001
Alcohol or drug problems (past year),N(%)	455 (6.7%)	176 (8.5%)	28 (2.5%)	233 (8.1%)	18 (2.8%)	21.57 (1) p<0.001
Chronic pain conditions, N(%)						
Arthritis/rheumatism	2019 (28.7%)	1110 (53.1%)	909 (86.1%)	148.11 (1) p<0.001		
Mental health disorders, N(%)						
Back problems	1340 (17.6%)	902 (41.8%)	438 (39.3%)	0.71 (1) p=0.340		
Chronic headaches	860 (10.9%)	748 (35.1%)	112 (10.3%)	116.19 (1) p<0.001		
Other chronic pain disorder	724 (9.5%)	541 (25.4%)	183 (16.8%)	14.03 (1) p<0.001		
Number of chronic pain conditions, Mean (SD)	0.7 (0.9)	1.6 (0.8)	1.52 (0.7)	0.56 (1) p=0.453		
Number of chronic conditions, excluding pain, Mean (SD)	0.8 (1.2)	1.0 (1.3)	1.7 (1.5)	108.18 (1) p<0.001	1.0 (1.1)	104.15 (1) p<0.001
Level of pain interference, N(%)						
High pain	752 (9.9%)	442 (18.7%)	233 (22.3%)	62 (1.9%)	15 (2.6%)	15.40 (2) p<0.001
Moderate pain	2580 (37.5%)	1103 (54.1%)	583 (55.5%)	694 (22.3%)	200 (34.2%)	
No pain	3297 (52.6%)	529 (27.3%)	245 (22.2%)	2148 (75.8%)	375 (63.3%)	
PCS-12 ^a , Mean (SD)	46.4 (6.3)	44.5 (6.7)	42.1 (7.4)	48.9 (4.3)	47.0 (5.7)	39.54 (1) p<0.001
MCS-12 ^a , Mean (SD)	45.6 (5.6)	44.4 (6.4)	44.6 (6.3)	46.5 (4.8)	46.6 (4.8)	0.21 (1) p=0.649

^aPhysical and mental health component summary scores from the Short Form-12 (SF-12)

Table 3
Mental Health Services Utilization in the Past 12 Months by Individuals with and without a Chronic Pain Condition, by Age Group

Mental Health Service Utilization, N (%)	With Chronic Pain (N=3135)			Without Chronic Pain (N=3494)		
	Overall (N=6629)	18-60 (N=2074)	Over 60 (N=1061)	18-60 (N=2904)	Over 60 (N=590)	Chisq (df) P Value
Perceived the need for mental health care	1005 (11.5%)	530 (22.3%)	96 (7.4%)	361 (9.1%)	18 (2.0%)	42.42 (1) p<0.001
Screened by primary care for mental health/substance use problem	2000 (27.7%)	842 (37.8%)	237 (22.0%)	824 (26.7%)	97 (17.1%)	11.68 (1) p=0.0006
Received any mental health care	658 (6.9%)	347 (12.5%)	61 (4.4%)	238 (6.1%)	12 (1.0%)	33.78 p<0.001
Primary care provided mental health/substance abuse counseling	530 (5.8%)	291 (10.6%)	48 (4.0%)	180 (4.7%)	11 (1.5%)	14.72 (1) p=0.0001
Visited a mental health care specialist	514 (5.2%)	267 (9.3%)	35 (2.0%)	202 (5.1%)	10 (0.7%)	37.50 (1) p<0.001
Guideline-consistent mental health/substance abuse counseling	424 (4.3%)	230 (8.2%)	32 (2.2%)	155 (3.7%)	7 (0.6%)	28.03 (1) p<0.001
Took psychiatric medications						
Antidepressants	808 (9.2%)	411 (15.1%)	130 (10.8%)	237 (6.4%)	30 (4.2%)	2.77 (1) p=0.096
Guideline-consistent antidepressants	596 (6.1%)	310 (10.7%)	83 (5.8%)	184 (4.3%)	19 (3.3%)	0.66 (1) p=0.415
Satisfied with mental health care	3571 (53.1%)	1114 (52.4%)	573 (54.0%)	1590 (54.6%)	294 (47.1%)	8.26 (1) p=0.004
Got less treatment than needed	273 (3.2%)	158 (7.2%)	21 (1.4%)	92 (2.2%)	2 (0.2%)	29.67 (1) p<0.001

Table 4
Logistic Regression Models: Odds of Mental Health (MH) Care in the Past 12 Months

	Any MH Care in past year	MH specialty visits in past year	Screened by primary care for MH/substance abuse in past year	Perceived need for MH Care	Received effective counseling or antidepressants in past year	Satisfied with MH Care
Risk Factors			Odds ratio (95% confidence interval) [P value, T test (df)]			
Presence of a chronic pain condition	1.0 (0.7, 1.3) [p=0.878, T(1)=-0.15]	0.8 (0.6, 1.2) [p=0.325, T(1)=-0.98]	1.2 (0.98, 1.4) [p=0.086, T(1)=1.72]	1.3 (1.0, 1.7) [p=0.025, T(1)=2.24]	1.0 (0.8, 1.4) [p=0.755, T(1)=0.31]	0.9 (0.7, 0.99) [p=0.037, T(1)=-2.09]
Presence of a mental health disorder	10.7 (7.9, 14.4) [p<0.001, T(1)=15.52]	10.6 (7.3, 15.2) [p<0.001, T(1)=12.70]	2.4 (1.9, 3.0) [p<0.001, T(1)=7.84]	13.1 (10.4, 16.4) [p<0.001, T(1)=21.70]	6.7 (5.0, 9.0) [p<0.001, T(1)=12.47]	1.2 (1.0, 1.5) [p=0.048, T(1)=1.98]
Age 60 years or older (reference 18-60)	0.2 (0.1, 0.5) [p=0.0006, T(1)=-3.43]	0.2 (0.1, 0.4) [p<0.001, T(1)=-5.05]	0.6 (0.5, 0.8) [p<0.001, T(1)=-4.11]	0.4 (0.3, 0.6) [p<0.001, T(1)=-4.46]	0.5 (0.4, 0.7) [p<0.001, T(1)=-4.61]	0.7 (0.5, 0.9) [p=0.0016, T(1)=-3.15]
Interaction effect of age and pain	3.0 (1.1, 8.0) [p=0.030, T(1)=2.17]	P=0.128 ^a	P=0.553 ^a	P=0.228 ^a	P=0.913 ^a	1.4 (1.0, 1.8) [p=0.031, T(1)=2.16]
Interaction effect of age and MH disorder	P=0.587 ^a	P=0.761 ^a	P=0.411 ^a	P=0.183 ^a	P=0.320 ^a	1.7 (1.0, 2.6) [p=0.030, T(1)=2.18]
Number of chronic conditions, excluding pain	1.0 (0.9, 1.1) [p=0.633, T(1)=-0.48]	0.9 (0.8, 1.1) [p=0.372, T(1)=-0.89]	1.2 (1.1, 1.4) [p=0.0002, T(1)=3.80]	1.0 (0.9, 1.1) [p=0.678, T(1)=-0.41]	1.0 (0.95, 1.2) [p=0.324, T(1)=0.99]	1.0 (0.95, 1.1) [p=0.481, T(1)=0.71]

^a Interaction effects not significant at the p<0.05 level were excluded from the final models presented

Appendix
Odds of Mental Health (MH) Care in the Past 12 Months: Logistic Regression Model Covariates

Covariates	Any MH Care in past year	MH specialty visits in past year	Screened by primary care for MH/substance abuse in past year	Perceived need for MH Care	Received effective counseling or antidepressants in past year	Satisfied with MH Care
	Odds ratio (95% confidence interval) [P value, T test (df)]					
Gender (reference male)	1.5 (1.1, 2.0) [p=0.008, T(1)=2.64] F _(1,3) =2.96, p=0.031	1.4 (1.0, 2.0) [p=0.053, T(1)=1.94] K _(1,3) =0.97, p=0.405	1.3 (1.1, 1.6) [p=0.0004, T(1)=3.54] F _(1,3) =4.85, p=0.002	1.8 (1.5, 2.3) [p<0.001, T(1)=5.38] F _(1,3) =4.53, p=0.004	1.7 (1.3, 2.3) [p=0.002, T(1)=3.72] F _(1,3) =7.42, p=0.0001	1.0 (0.9, 1.2) [p=0.836, T(1)=0.21] F _(1,3) =0.65, p=0.583
White (reference)	--	--	--	--	--	--
Black/African American	0.5 (0.3, 0.8) [p=0.005, T(1)=2.82]	0.6 (0.4, 1.1)	0.9 (0.7, 1.2) [p=0.563, T(1)=0.58]	0.5 (0.4, 0.8) [p=0.0004, T(1)=3.52]	0.4 (0.3, 0.6) [p<0.001, T(1)=4.61]	1.0 (0.8, 1.3)
Hispanic	0.6 (0.3, 1.3) [p=0.207, T(1)=1.26]	0.9 (0.4, 2.0)	1.7 (1.2, 2.3) [p=0.003, T(1)=2.96]	1.0 (0.7, 1.5) [p=0.947, T(1)=0.07]	0.7 (0.3, 1.3) [p=0.239, T(1)=1.18]	0.8 (0.6, 1.1)
Other race	0.8 (0.4, 1.5) [p=0.475, T(1)=0.71] F _(1,3) =0.54, p=0.583	1.1 (0.5, 2.2) F _(1,3) =1.91, p=0.148	0.5 (0.3, 0.9) [p=0.025, T(1)=2.24] F _(1,3) =2.42, p=0.090	0.7 (0.4, 1.2) [p=0.203, T(1)=1.27] F _(1,3) =3.38, p=0.034	0.6 (0.3, 1.1) [p=0.099, T(1)=1.65] F _(1,3) =1.71, p=0.181	1.0 (0.7, 1.5) F _(1,3) =1.62, p=0.198
Married (reference)	--	--	--	--	--	--
Single	1.2 (0.9, 1.6)	1.4 (1.0, 2.0)	0.8 (0.7, 1.0)	1.3 (0.98, 1.7) [p=0.065, T(1)=1.85]	0.9 (0.7, 1.2)	0.9 (0.7, 1.0)
Unmarried partner	0.9 (0.6, 1.5)	1.2 (0.7, 2.0)	0.9 (0.6, 1.3)	1.5 (1.0, 2.2) [p=0.026, T(1)=2.22] F _(1,3) =7.91, p=0.0004	0.6 (0.4, 1.0)	0.9 (0.6, 1.2)
Education	F _(1,3) =10.6, p<0.0001	F _(1,3) =18.4, p<0.0001	F _(1,3) =2.76, p=0.064		F _(1,3) =15.27, p<0.0001	F _(1,3) =13.89, p<0.0001
Less than high school (reference)	--	--	--	--	--	--
High school graduate or some college	2.0 (1.3, 3.1) [p=0.003, T(1)=2.96]	2.5 (1.5, 4.0) [p=0.0002, T(1)=3.68]	1.0 (0.8, 1.3)	1.2 (0.8, 1.8) [p=0.289, T(1)=1.06]	2.5 (1.8, 3.6) [p<0.001, T(1)=5.02]	0.6 (0.5, 0.8) [p<0.001, T(1)=3.91]
College or higher	3.2 (1.9, 5.4) [p<0.001, T(1)=4.46]	4.9 (2.9, 8.4) [p<0.001, T(1)=5.94]	1.3 (0.95, 1.7)	2.0 (1.3, 3.0) [p=0.003, T(1)=2.98]	3.0 (2.0, 4.5) [p<0.001, T(1)=5.34]	0.5 (0.4, 0.7) [p<0.001, T(1)=5.25]
Family income (log-transformed)	1.0 (0.96, 1.1) [p=0.552, T(1)=0.59] F _(1,3) =0.90, p=0.461	1.0 (0.9, 1.1) [p=0.866, T(1)=0.17] F _(1,3) =0.87, p=0.482	1.0 (0.97, 1.1) F _(1,3) =3.22, p=0.012	1.0 (0.9, 1.1) F _(1,3) =2.98, p=0.018	1.0 (0.98, 1.1) F _(1,3) =3.08, p=0.015	1.0 (0.97, 1.02) [p=0.805, T(1)=0.25] F _(1,3) =3.30, p=0.0106
Health insurance coverage	0.9 (0.4, 1.8)	1.5 (0.8, 3.0)	0.8 (0.5, 1.3)	0.4 (0.2, 0.7)	1.7 (0.9, 3.2)	1.4 (1.0, 1.9)
Medicare						

	Any MH Care in past year	MH specialty visits in past year	Screened by primary care for MH/substance abuse in past year	Perceived need for MH Care	Received effective counseling or antidepressants in past year	Satisfied with MH Care
Medicaid	1.5 (0.6, 3.8)	2.1 (0.8, 5.1)	[p=0.396, T(1)=-0.85] 1.0 (0.5, 1.8)	[p=0.002, T(1)=-3.08] 0.6 (0.3, 1.1)	[p=0.112, T(1)=1.59] 2.6 (1.2, 5.6)	[p=0.035, T(1)=2.11] 1.5 (0.9, 2.4)
Private	1.2 (0.7, 2.0)	1.3 (0.8, 2.4)	[p=0.919, T(1)=-0.10] 1.3 (0.9, 1.8)	[p=0.091, T(1)=-1.69] 0.7 (0.4, 0.96)	[p=0.015, T(1)=-2.44] 1.5 (0.9, 2.6)	[p=0.127, T(1)=1.53] 1.5 (1.2, 1.9)
Other	1.3 (0.7, 2.6)	1.8 (0.8, 4.1)	[p=0.196, T(1)=1.29] 1.0 (0.6, 1.7)	[p=0.030, T(1)=-2.17] 1.0 (0.6, 1.7)	[p=0.101, T(1)=1.64] 2.4 (1.4, 4.2)	[p=0.0005, T(1)=3.50] 1.7 (1.1, 2.7)
Uninsured (reference)	--	--	--	--	--	--
PCS-12 ^a	0.97 (0.95, 0.99)	0.96 (0.94, 0.98) ^b	0.99 (0.97, 1.01)	0.96 (0.94, 0.99)	0.95 (0.93, 0.97) ^c	0.99 (0.98, 1.01)
MCS-12 ^a	[p=0.003, T(1)=-3.00] 0.97 (0.95, 0.99)	[p=0.002, T(1)=-3.14] 0.97 (0.94, 0.99)	[p=0.311, T(1)=-1.01] 0.98 (0.96, 0.99)	[p=0.002, T(1)=-3.13] 0.95 (0.93, 0.97)	[p<0.001, T(1)=-4.93] 0.96 (0.94, 0.98) ^c	[p=0.373, T(1)=-0.89] 1.0 (0.99, 1.02)
	[p=0.005, T(1)=-2.84]	[p=0.012, T(1)=-2.53]	[p=0.007, T(1)=-2.69]	[p<0.001, T(1)=-5.17]	[p<0.001, T(1)=-4.17]	[p=0.229, T(1)=1.20]

^aPhysical and mental health component summary scores from the Short Form-12 (SF-12)