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Pain Quality Descriptors in Community-Dwelling Older Adults with Nonmalignant Pain

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Abstract

This study aimed to characterize the prevalence of various pain qualities in older adults with chronic non-malignant pain and determine the association of pain quality to other pain characteristics namely: severity, interference distribution, and pain-associated conditions. In the population-based MOBILIZE Boston Study, 560 participants aged≥70 years reported chronic pain in the baseline assessment, which included a home interview and clinic exam. Pain quality was assessed using a modified version of the McGill Pain Questionnaire (MPQ) consisting of 20 descriptors, from which 3 categories were derived: cognitive/affective, sensory and neuropathic. Presence of ≥2 pain-associated conditions was significantly associated with 18 of the 20 pain quality descriptors. Sensory descriptors were endorsed by nearly all older adults with chronic pain (93%), followed by cognitive/affective (83.4%) and neuropathic descriptors (68.6%). Neuropathic descriptors were associated with the greatest number of pain-associated conditions including osteoarthritis of the hand and knee. More than half of participants (59%) endorsed descriptors in all 3 categories and had more severe pain and interference, and multi-site or widespread pain than those endorsing 1 or 2 categories. Strong associations were observed between pain quality and measures of pain severity, interference, and distribution (p<.0001). Findings from this study indicate that older adults have multiple pain-associated conditions which likely reflect multiple

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physiological mechanisms for pain. Linking pain qualities with other associated pain characteristics serves to develop a multidimensional approach to geriatric pain assessment. Future research is needed to investigate the physiological mechanisms responsible for the variability in pain qualities endorsed by older adults.

Introduction

Chronic nonmalignant pain is a highly prevalent condition affecting between 45% and 80% of older people in the community and in institutionalized settings [38]. Often, chronic geriatric pain cannot be linked to any one specific etiology due to the high prevalence of multiple pain-associated comorbidities, including musculoskeletal and neurological conditions, creating a complex syndrome for researchers to study and clinicians to assess and treat. Most pain research to date, however, has used a diagnosis-based approach, sampling individuals with one particular condition which is less clinically relevant to the experience of chronic geriatric pain [58].

Pain perception is also more complex in those aging with chronic pain [18]. The effect of aging on pain perception remains an area of contention, but largely evidence suggests that among older adults the pain threshold increases, possibly reflected in a plateau effect in the prevalence of chronic pain in individuals over age 65 years [7,45]. This plateau effect could also represent under-reporting of pain in some elders further complicated by issues of communication barriers, cognitive impairment, or increased stoicism and perceived myths that having pain is a “natural” consequence of aging [23]. Furthermore, diminished pain sensitivity may not be indicative of less pain, but rather emphasizes that moderate pain in this population could represent severe underlying pathology as well as an increased risk for serious consequences including impaired cognitive and physical function, falls, depression, sleep disturbance, diminished socialization, increased healthcare use and costs [33,45]. Thus, the traditional approach to pain assessment focused on pain severity as a primary basis for clinical decision making, may be less relevant to the experience of chronic geriatric pain.

Pain quality, however, has been a relatively underappreciated characteristic in the overall experience and assessment of chronic geriatric pain. Pain quality is assessed using verbal pain descriptors that characterize how pain may feel. According to the Gate Control Theory, the plasticity associated with nerve transmission in pain pathways changes how pain is experienced, effectively creating different kinds of pain experiences [10]. The ability of pain qualities to discriminate between neuropathic (resulting from nerve injury or abnormal nerve functioning) and nociceptive (resulting from tissue injury) pain has been established using a diagnosis-based approach [11,36,43,56]. Further support for the relationship between pain quality and mechanisms of pain has been demonstrated by preferential improvement of specific pain qualities by pharmacological treatment [19,20]. Pain quality assessment for chronic geriatric pain, about which little is known, could capture information on mechanisms of pain in the setting of multiple pain-associated conditions and age-related effects on pain perception to develop more targeted prevention and intervention strategies.

The primary aim of this study was to determine the prevalence of pain qualities and their relation to other pain characteristics including: severity, interference, distribution of pain and

pain-associated chronic conditions prevalent in old age. It was hypothesized that individual pain quality descriptors and categories of descriptors would be associated with varying levels of severity, interference, pain distribution, and pain-associated chronic conditions.

Methods

Participants and Procedures

The MOBILIZE Boston Study (MBS) is a population-based cohort study of 765 older adults recruited door to door within a 5-mile radius of the study clinic at Hebrew Rehabilitation Center (HRC) in Boston from September 2005 to January 2008. Inclusion criteria were: aged 70 and older (or ≥65 years if living with a study participant), able to walk 20 feet without help from another person, able to communicate in English, and expecting to stay in the area for at least 2 years. Individuals were excluded if they had moderate or severe cognitive impairment (Mini-Mental State Examination (MMSE) score <18) [17] or had a diagnosis of terminal disease. Assessments were conducted in two parts, a home visit and subsequent clinic examination conducted within 2 weeks at the HRC. Participants provided written informed consent at the start of the home visit. The institutional review boards of the HRC and collaborating institutions approved all protocols and consent procedures for the study. Details of the study methods and recruitment were published previously [34,49].

Measures

Pain Quality

The verbal descriptors used in the MBS were compiled from the short-form McGill Pain Questionnaire (SF-MPQ) with 2 additional descriptors: “like a bruise” and “stiffness” identified as the most commonly endorsed pain quality descriptors by older adults with chronic pain based on the expertise of study investigators and experts in chronic geriatric pain [42]. Participants who reported having any pain, based on the Brief Pain Inventory severity subscale, were asked the following: “Now I will read a list of several words that describe how pain may feel. After I have read each word, please say No or Yes if that word applies to your pain. As a reminder, I am referring to any chronic pain you may have and not pain that is new in the past week or so.” Each MBS pain quality descriptor represents a binary outcome of participants endorsing/ not endorsing a specific descriptor.

Pain Severity and Interference

Global pain severity and interference were assessed using the pain severity and pain interference subscales of the Brief Pain Inventory (BPI) [8]. Pain severity was referred to as “pain in the past week that has lasted more than a week or two,” and the pain severity score was calculated as the average of 4 separate items for worst pain, least pain, pain on average, and pain now, referring to an 11-point numeric rating scale (NRS), with 0 indicating “no pain” and 10 indicating “severe or excruciating pain as bad as you can imagine.” The pain interference subscale was the average of 7 items that rate the degree to which pain interferes with general activity, mood, walking ability, normal work, relations with other people, sleep, and enjoyment of life, again using a 0-to-10 NRS. For these interference items, 0 represents “does not interfere” and 10 indicates “interferes completely.” The BPI has been validated for

use in chronic nonmalignant pain [29,51]. Reliability has been demonstrated over short intervals using test–retest item correlations (correlation coefficient = 0.59–0.93)[29].

Distribution of Pain

Originally described in the Women's Health and Aging Study (WHAS), body distribution of musculoskeletal pain was assessed using a 13-item joint pain questionnaire, assessing pain in the hands and wrists, shoulders, back, hips, knees, or feet lasting 3 or more months in the previous year and present in the previous month [15,21,57]. Responses were categorized into four groups: no pain; single-site pain; more than one pain site (multisite pain), and widespread pain [35]. Classification of widespread pain was based on a modification of the American College of Rheumatology (ACR) criteria: pain above and below the waist, pain on the right and left sides of the body, and axial pain (back pain) [57]. The criteria were modified because laterality was not assessed.

Presence of chronic conditions

Self-reported pain-associated chronic conditions included report of physician-diagnosed rheumatoid arthritis (RA), and spinal stenosis or disc disease. Peripheral neuropathy was assessed using Semmes-Weinstein monofilament testing [46]. Peripheral arterial disease (PAD) was assessed as an ankle-brachial index of less than 0.90 and PAD according to the Rose Intermittent Claudication questionnaire [48]. Research nurses were trained to assess the clinical criteria for the diagnosis of osteoarthritis (OA) of the knees and hands defined by the American College of Rheumatology [1,2].

Other self-reported physician-diagnosed chronic conditions included asthma and lung disease and stroke. Presence of heart disease was based on report of heart attack, congestive heart failure, angina pectoris, pacemaker, or cardiac arrhythmia. Presence of diabetes mellitus was assessed using an algorithm based on laboratory measures including random blood glucose (≥200 mg/dL) and glycosylated hemoglobin (≥7%), use of antidiabetic medications, and self-reported diabetes mellitus. Depression was assessed using a modified version of the 20-item Centers for Epidemiologic Studies Depression Scale [13,47].

Sociodemographic and Health Characteristics

Demographic characteristics included age, sex, race, years of education, and income. MMSE score (range 0–30) was used to assess cognitive function [17]. Body mass index (weight in kilograms divided by height in meters squared) was calculated from measured height and weight. Visual deficit was defined as lowest quartile score of distant vision using Good Lite Box. Daily analgesic used defined as use of 1 or more analgesic medications at least daily in the previous 2 weeks. Analgesic medications included opioid and non-opioid analgesics and daily use was determined from dose and frequency information recorded by the interviewer at the home visit. Daily or less than daily use of low-dose aspirin was not included as an analgesic.

Statistical Analysis

In order to reduce the variance and determine the potential for latent constructs, a exploratory factor analysis on the MBS pain quality descriptors was conducted on 3 proposed categories of descriptors (cognitive/affective, sensory and neuropathic) based on review of prior literature, original MPQ categories, and clinical theory [12,41,42]. Several procedures were performed on a series of models with increasing factors to determine the appropriate number of factors, including eigenvalues and scree plot analysis [9,52]. The final procedure used was the interpretability of the model based on clinical theory and prior literature. To identify descriptors that primarily loaded on each factor, factor loadings that equaled or exceeded 0.40 were considered to be substantial loadings, and loadings between 0.20 and 0.39 were marginal loadings, and less than 0.20 were low [9,52]. Because of the overlap among the factors, a factor analysis alone was not sufficient to determine the existence of discrete latent constructs measured by groups of pain quality descriptors. Therefore a conceptual approach was used to derive categories of qualities, rather than discrete latent constructs. Categories of pain qualities were binary variables with participants who endorsed at least one descriptor in the specified category compared with those who endorsed any other categories. Analyses regarding the number of categories were also binary comparing participants endorsing 1-2 categories with those endorsing all 3 categories.

Descriptive statistics were presented as mean and standard deviations for continuous variables such as pain severity and interference scores, and proportions for categorical variables such as pain quality descriptors and pain sites. Independent t-tests were used to compare means for continuous variables. Chi-square tests were used to determine differences among categorical variables. The relationships between individual pain qualities and pain-associated conditions adjusted for age and sex were determined using odds ratios (ORs) and 95% confidence intervals (CIs) derived from logistic regression modeling adjusted for age and sex [40,59]. All analyses were performed using SAS v.9.3 (SAS Institute, Cary, N.C.).

Results

Sample

Of 765 MBS participants, the 560 participants who were included in this study rated their pain as greater than 0 (range 1-10) on the BPI pain severity subscale and endorsed at least one pain quality descriptor. Twenty three participants rated their pain as greater than 0, but did not endorse any of the descriptors. Based on the assumption that all pain can be characterized using pain quality descriptors, these 23 participants may have had an associated quality to their pain but none of the descriptors included in the instrument accurately described their pain, thus they were excluded. All other participants were generally able to provide a yes/no response to each descriptor because less than 1% of responses were missing for each quality descriptor, except for “gnawing” for which 10% were missing.

Overall the sample (n=560) was 67.7% female, 23.1% nonwhite, 63.5% were college educated, and 23.4% had an income <$15,000 (Table 1). For the age distribution, 32.0%

were between the ages of 70-74, 32.1% between the ages of 75-79, and the remaining 35.2% were aged 80 and older. Nearly half of the participants (45.4%) met clinical criteria for hand or knee osteoarthritis (OA), 12.9% had neuropathy by physical examination, and one quarter of participants had multiple pain-associated conditions, specifically 2 or more of the following conditions: peripheral arterial disease, peripheral neuropathy, rheumatoid arthritis (RA), osteoarthritis (OA) and spinal stenosis or disc disease.

Pain Qualities

The average number of descriptors endorsed by participants was 7.3 (S.D. 4.1) out of a possible 20. Among the pain quality descriptors, “aching” was the most prevalent (70.1%) followed by “stiffness” (64.4%) and “soreness” (57.7%), while “unbearable” was the least prevalent (14.1%) preceded by burning (17%) and stabbing (18.9%) (Table 2). “Unbearable” was associated with the highest pain severity compared to other descriptors (BPI severity score, 4.7 S.D. 2.2), along with “miserable,” “exhausting,” “penetrating,” “throbbing” and “shooting” which were all associated with moderate to severe pain (rating > 4.0) (Table 2). “Stiffness” was associated with the lowest pain severity (3.3 S.D. 1.9) followed by “aching,” (3.4 S.D. 2.0). “Exhausting” was associated with the most pain interference (BPI interference score, 4.3 S.D. 2.3), followed by with “unbearable” (3.9 S.D. 2.6) and “miserable” (3.7 S.D. 2.4), while “aching” and “stiffness” were associated with the least interference (2.5 S.D. 2.2). “Numb” and “shooting” were associated with the highest prevalence of multi-site or widespread joint pain, 43.5% and 41.8% respectively, and “aching” with the lowest multi-site or widespread joint pain at 35.4%.

After adjusting for age and sex, older adults with peripheral arterial disease were 3.6 times more likely to report “tiring” pain compared to those without PAD (adj OR 3.3, 95% CI 1.9-5.6), which was a higher odds than with any other descriptors (Table 3). Rheumatoid arthritis was also strongly associated with “tiring” pain. Participants with RA were 3 times more likely to endorse “tiring” pain (adj OR 3.0, 95% CI 1.5-6.0) as well as “miserable” pain (adj OR 2.9, 95% CI 1.4-5.9). Compared to participants without osteoarthritis, those with osteoarthritis were more likely to endorse “stiffness” (adj OR 2.7, 95% CI 1.9-3.9). Spinal stenosis or disc disease was strongly associated with “nagging” pain (adj OR 3.7, 95% CI 2.3-6.0). Peripheral neuropathy was associated with “throbbing” (adj OR 2.4, 95% CI 1.4-4.2), “numb” (adj OR 2.2, 95% CI 1.3-3.8), and “penetrating” pain (adj OR 1.8, 95% CI 1.0-2.9). Multi-morbidity, defined as 2 or more of the aforementioned pain-associated chronic conditions, was significantly associated with 18 of the 20 descriptors, all except “gnawing” and “like a bruise.” Participants with multi-morbidity were much more likely to endorse “aching” pain (adj OR 4.0, 95% CI 2.3-6.9) than their counterparts with 1 or no pain associated conditions.

Categories of Pain Qualities

Among the 3 categories of descriptors (cognitive/affective, sensory and neuropathic), the most prevalent descriptor in the cognitive/affective category was “troublesome” pain (63.6%), “aching” (70.1%) in the sensory category, and “sharp” (38.9%) in the neuropathic category (Table 1). Of the three categories, the most prevalent pain category was sensory (93%), followed by cognitive/affective (83.4%); neuropathic (68.6%) had the lowest

prevalence. Regarding sociodemographic and health characteristics, endorsement of neuropathic qualities was associated with lower education, lower income, and non-white race (Table 1). Endorsement of cognitive/affective descriptors or neuropathic descriptors was associated with daily analgesic use. Comparing prevalence rates among the categories, greater percentages of women and those who had fallen in the past year endorsed cognitive/affective descriptors, while those with lower income and daily analgesic use endorsed neuropathic descriptors. Endorsing all three categories was associated with being female, having lower education and income, lower MMSE score, and daily analgesic use.

The neuropathic category was also associated with more severe pain compared to other descriptor categories (Table 4). Pain interference followed a similar trend, as well as pain location, with a prevalence of 60.8% of combined widespread and multi-site pain in neuropathic category compared to 56% in cognitive/affective category, and 53% in the sensory category. Among those endorsing all 3 categories the prevalence of combined multi-site and widespread pain was 64.2%, with greater pain interference and severity than any single category (Table 4).

Of the three categories, the neuropathic category was associated with the greatest number of chronic conditions including spinal stenosis or disc disease, osteoarthritis (OA), diabetes, stroke, heart disease, rheumatoid arthritis (RA), peripheral neuropathy and PAD (Table 5). The cognitive/affective category was associated with spinal stenosis or disc disease, OA stroke, RA, and PAD. The sensory category was associated with the fewest chronic conditions, specifically OA, RA, and PAD. The presence of spinal stenosis or disc disease, OA, depression, RA and PAD were associated with endorsement of all 3 categories, however no association was found with peripheral neuropathy (Table 5). A third of participants (32.8%) endorsing all 3 categories also had multiple pain-associated conditions.

Discussion

Our findings point to the high prevalence of complex pain problems in older adults. The interpretation of the categories of pain qualities was primarily informed by the MPQ and SFMPQ [41,58]. The cognitive (termed evaluative in the MPQ) and affective descriptors were grouped into a single category because they both reflected the meaning an individual gives to their pain and/or negative emotions associated with pain, whereas sensory and neuropathic descriptors are more representative of physical sensations of pain. The division between sensory and affective categories is consistent with prior studies [19,26,42,55]. Repeated studies have reported certain pain qualities, i.e. “burning”, “shooting” are more prevalent in neuropathic versus non-neuropathic conditions, though not reported in samples comprising only older adults [6,11,27].

Validity of the measure was also evidenced by good comprehension in that less than 1% of responses were missing, except for “gnawing” for which 10% had missing responses. Of the 20 individual pain quality descriptors, “unbearable” was associated with the highest pain severity score. Those with clinically assessed peripheral neuropathy were more likely to endorse “numb” and “penetrating” pain, descriptors typical of neuropathic pain. The neuropathic category was the only category associated with both peripheral neuropathy and

diabetes as clinically assessed conditions, not reliant on self-report. Participants with OA, also clinically assessed, were more likely to endorse “stiffness” than any other descriptor, a cardinal sign of arthritis.

Though the factor analysis yielded 3 factors, the factors were not interpreted as latent constructs, but rather categories of descriptors due to the degree of overlap between categories. Close to 60% of participants endorsed descriptors in all 3 categories, and those individuals also had more severe pain and interference, and multi-site or widespread pain. This finding supports other recent studies that demonstrate the variability in the experience of chronic geriatric pain with the focus shifting from site-specific pain or pain severity to number of sites, with up to 75% of older adults reporting multisite pain usually at 3 or more locations, a strong predictor of disability and falls [15,16,33,45].

Variability in pain quality could also represent an age-related diminished sensitivity to pain which could cause an inability to discern or distinguish between specific pain qualities in this older population. Age-related changes such as a decrease in the transmission speed of nerve impulses, impairment of the inflammatory cascade, and changes in the skin and cortices have been posited as potential causes of age-related changes in pain perception based on laboratory investigations of experimental pain or animal studies [7,18,25,31]. Overall sensory deficits common with advancing age such as vision and olfaction have also been posited as evidence for reduced sensory discriminative abilities [18,25,53]. These factors may contribute to more diffuse experience of pain, with more areas of pain and less specific sensations of pain. Whether age-related physical changes can be directly linked to the physiological mechanisms responsible for the experience of chronic geriatric pain remains unclear due in part to the limitations of experimental pain studies. Daily analgesic use, associated with all 3 categories, can also affect pain perception, however, only 30% of participants with chronic pain reported daily analgesic use, and in a prior study of the MBS sample, 20% of those with persistent pain reported not using any pain treatment including non-pharmacologic approaches [50].

Another factor that could account for the variability in pain qualities is multi-morbidity of pain-associated conditions. One quarter (24.9%) of the overall sample and nearly a third (32.8%) of those endorsing descriptors in all 3 categories having multi-morbidity suggests multiple physiological mechanisms for geriatric pain. A number of other chronic or episodic pathological conditions associated with pain are common in this population and could also contribute variability in pain quality, including inflammation, infection (pneumonia, urinary tract infections, skin infections, dental problems), headaches, incisions, fractures, positioning, bladder distention or kidney stones, skin breakdown, ulcers or irritation, gout, and constipation [3].

OA is a highly prevalent pain-associated chronic condition affecting approximately one-third of adults aged 65 and older and one of the leading causes of disability in non-institutionalized adults [32]. Although joint damage and inflammation are widely recognized as major contributing factors, the pathophysiology of pain associated with OA remains relatively poorly understood [22]. The nearly universal use of sensory descriptors (93%) along with the observation that OA pain was associated with neuropathic descriptors are

important findings because they call into question the idea that pain qualities can be used to discriminate between different physiological mechanisms for pain, specifically nociceptive pain (resulting from tissue injury) and neuropathic pain (resulting from nerve injury or abnormal nerve functioning) in older adults.

Despite attention to the role of articular cartilage in the degenerative process of OA, there is physiologic evidence to suggest that a connection exists between joint disease and changes in nerve morphology: the morphology of nerve fibers that re-innervate healing tissue following ligament injury are similar to those following nerve injuries [39]. This suggests that neuropathic pain can be triggered by joint injury. Subchondral bone, periosteum, periarticular ligaments and muscle, synovium and joint capsule are all richly innervated and could be sources of OA pain [25]. The idea that OA pain could be neurogenic is further supported by animal research reporting the efficacy of gabapentin, a neuropathic pain analgesic, in reducing afferent nerve firing in normal and inflamed knee joints [24].

Few studies have investigated pain qualities associated with OA. In a small study (n=97), comparing pain quality descriptors associated with RA, localized OA, and generalized OA, those with generalized OA were more varied in their selection of descriptors [54]. In another pain quality study using pretreatment data from clinical trials of topical lidocaine for chronic pain, the authors proposed that because OA pain was more diffuse, it could be more difficult to describe, while focal pain might be more discriminative of pain quality measures [27,28]. These reports are consistent with our finding that older adults who endorsed descriptors in all 3 categories had a higher prevalence of multi-site and widespread pain. Investigation of the physiological mechanisms responsible for pain qualities endorsed by older adults and the association of pain quality to disability are topics for future study.

Limitations

A limitation of the present study relates to generalizability. In 2011, Massachusetts had one of the highest rates in the US of adults aged 65 and older with a graduate or professional degree of 13.8% compared to 9.8% nationally [44]. Comparisons of the MBS cohort's demographic characteristics with U.S. Census population data for the Boston metropolitan area supports the representativeness of the cohort, although it is likely that higher levels of education are associated with greater participation in research even with population-based recruitment. In the past, studies of pain quality, though not exclusively of older adults, have generally used a diagnosis-based approach limiting the sample to exclude all other comorbidities [11,36,43,56]. The population-based MBS cohort may better reflect the typical pattern in older adults with chronic pain as having multiple chronic conditions that could contribute to pain.

Despite the evidence for good comprehension of the pain qualities, cultural variations in pain perception and communication could be an important issue in reporting of pain qualities and requires further study. In addition, the day to day frequency or time of onset was not accounted for in this study and warrants additional research. The variability in pain quality could suggest that older adults experience a myriad of pain qualities simultaneously, or that individual pain qualities are experienced sequentially for either fixed or variable

amounts of time, which could also be a consideration in future research [14]. Although the day to day frequency of pain and time of onset were not assessed, chronicity was defined as "lasting 3 or more months in the previous year and present in the previous month" which is a widely accepted definition for chronic pain [23]. This definition was meant to capture a current problem of chronic pain, as opposed to history of chronic pain. The variance in pain duration and frequency among older adults with chronic pain along with age-related decline in neurological, cognitive, and immune function adds to the complexity of perception of sensory, cognitive/affective and neuropathic pain quality and dynamic nature of chronic geriatric pain [4,5,30,37].

Conclusion

Although pain researchers may agree that pain is a multidimensional experience, questions remain on how best to assess and treat pain in a growing aging population in whom the burden of chronic pain is increasing. Findings from this study suggest that a multidimensional approach to chronic geriatric pain requires not only assessment of multiple pain characteristics but interpretation of those findings in context of the unique aspects of chronic geriatric pain, namely multi-morbidity, potential age-related effects on pain perception, and characteristic variability in distribution of pain. Assumptions regarding physiological mechanisms associated with specific pain qualities may not be representative of the experience chronic geriatric pain. Future studies are needed to better understand the potential differences in the functional impact related to pain quality in order to develop more targeted and effective treatment strategies.

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Table 1

Sociodemographic and Health Characteristics according to Descriptor Categories in Older Adults (%) (n=560)

Characteristic		Overall Sample (n=560)	Cognitive/Affective (n=467)	Sensory (n=538)	Neuropathic (n=384)	All 3 categories (n=333)
Age, mean (SD)		77.8 (5.3)	77.9 (5.3)	77.9 (5.3)	77.9 (5.4)	77.8 (5.4)
				Percent		
Women		67.7	70.1**	68.1	69.3	72.7**
Education						
<high school		12.2	13.3	12.4	15.6	16.2
H.S. graduate		24.3	22.5	24.3	22.9	23.1
college graduate		63.5	64.2*	63.3	61.5**	60.7**
Income <$15,000/yr		23.4	23.9	23.8	27.3**	27.9**
Race	White	76.9	77.1	76.8	72.9	72.6
	Black	16.8	17.3	16.9	20.1	21.1
	Other	6.3	5.6	6.3	7.1***	6.3**
BMI[a]	<25	28.5	29.0	28.0	26.9	27.5
	25-29.9	42.6	41.5	43.0	41.6	40.7
	≥ 30	28.9	29.5	29.1	31.5	31.8
Smoking	never	44.2	44.7	44.2	46.4	47.5
	past	52.2	51.7	52.2	49.7	48.7
	current	3.6	3.6	3.5	3.9	3.9
Visual deficit[b]		23.4	24.2	23.4	24.2	24.6
MMSE < 24[c]		12.3	12.4	12.1	14.3*	14.7*
Fell in past year		39.8	41.2	39.3	40.6	40.8
Daily analgesic[d]		30.7	33.8***	30.8	35.4**	38.1***

Table 2

Prevalence of Pain Quality and its relation to Pain Severity, Interference and Multi site/Widespread Pain in Older Adults (n=560)

Pain Quality Category	Pain Quality Descriptor	Prevalence (%)	Pain Severity[a] mean ±SD	Pain Severity ≥4 (%)	Pain Interference[a] mean ±SD	Multi-site or Widespread Pain[b] (%)
Cognitive/Affective	Troublesome	63.6	3.5 ± 1.9	40.0	2.7 ± 2.3	34.3
	Nagging	55.6	3.5 ± 2.0	39.8	2.8 ± 2.3	34.2
	Tiring	38.4	3.9 ± 1.9	47.8	3.4 ± 2.3	39.9
	Miserable	37.5	4.2 ± 1.9	53.9	3.7 ± 2.4	35.9
	Gnawing	26.9	3.6 ± 2.0	42.1	2.9 ± 2.4	36.3
	Exhausting	23.5	4.5 ± 1.9	58.1	4.3 ± 2.3	38.7
	Unbearable	14.2	4.7 ± 2.2	63.4	3.9 ± 2.6	35.4
Sensory	Aching	70.1	3.4 ± 2.0	36.7	2.5 ± 2.3	35.4
	Stiffness	64.4	3.3 ± 1.9	34.5	2.5 ± 2.2	34.3
	Soreness	57.7	3.5 ± 2.0	42.0	2.7 ± 2.4	34.5
	Tender	41.7	3.7 ± 2.1	42.9	2.9 ± 2.4	36.1
	Cramping	21.8	4.0 ± 2.0	50.8	3.3 ± 2.5	32.5
	Throbbing	21.5	4.4 ± 2.1	59.8	3.6 ± 2.5	32.8
	Like a bruise	21.4	3.5 ± 2.0	39.0	2.7 ± 2.5	39.8
	Sharp	38.9	3.9 ± 2.0	49.6	3.1 ± 2.5	37.0
	Penetrating	33.7	4.2 ± 2.0	54.4	3.4 ± 2.5	37.1
Neuropathic	Numb	22.5%	3.8 ± 2.0	42.3	3.1± 2.5	43.5%
	Shooting	19.1%	4.1 ± 1.9	50.9	3.4 ± 2.5	41.8%
	Stabbing	18.9%	3.7 ± 2.1	42.6	3.2 ± 2.6	32.4%
	Burning	17.0%	4.0 ± 2.0	50.5	3.3 ± 2.3	36.4%

Note. Pain quality descriptors listed in order of highest to lowest prevalence by category.

[a]Global pain severity and interference was assessed using Brief Pain Inventory.

[b]Multisite pain defined as pain in one or more sites based on joint pain assessment (pain in hands and wrists, shoulders, back, hips, knees, or feet lasting 3 or more months in the previous year and present in the previous month). Widespread pain included pain above waist, below waist; and axial skeletal pain (back pain).

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Table 3

Association of Chronic Conditions with Pain Quality Descriptors in Older Adults (n=560)

Pain Quality Category	Pain Quality Descriptor	Multiple chronic conditions[a]	Peripheral arterial disease[b]	Osteoarthritis[b]	Spinal stenosis or disc disease	Rheumatoid arthritis	Peripheral neuropathy[b]
Cognitive/Affective	Troublesome	2.0 (1.3 – 3.0)	2.7 (1.4 – 5.0)		3.1 (1.9 – 5.1)		
	Nagging	2.2 (1.5 – 3.3)			3.7 (2.3 – 6.0)		
	Tiring	2.5 (1.7 – 3.6)	3.3 (1.9 – 5.6)		2.4 (1.6 – 3.7)	3.0 (1.5 – 6.0)	
	Miserable	2.6 (1.7 – 3.8)	3.2 (1.9 – 5.4)	1.6 (1.2 – 2.3)	2.2 (1.4 – 3.3)	2.9 (1.4 – 5.9)	
	Gnawing[c]		1.9 (1.1 – 3.4)				
	Exhausting	2.3 (1.5 – 3.5)	2.9 (1.7 – 4.9)	1.5 (1.0 – 2.3)	1.6 (1.0 – 2.5)		
	Unbearable	2.2 (1.3 – 3.6)	2.6 (1.4 – 4.8)			2.1 (1.0 – 5.0)	
Sensory	Aching	4.0 (2.3 – 6.9)		2.5 (1.7 – 3.6)	3.3 (1.9 – 5.8)	2.5 (1.0 – 6.1)	
	Stiffness	2.6 (1.7 – 4.2)	2.0 (1.1 – 3.7)	2.7 (1.9 – 3.9)	2.7 (1.7 – 4.4)		
	Soreness	2.1 (1.4 – 3.1)	1.7 (1.0 – 3.0)	1.5 (1.1 – 2.1)	1.7 (1.1 – 2.7)	2.6 (1.2 – 5.7)	
	Tender	2.0 (1.3 – 2.9)		1.8 (1.3 – 2.6)			
	Cramping	1.8 (1.2 – 2.8)	2.3 (1.3 – 3.9)	2.1 (1.4 – 3.2)			
	Throbbing	2.5 (1.6 – 4.0)	2.8 (1.6 – 5.0)				2.4 (1.4 – 4.2)
	Like a bruise			1.5 (1.0 – 2.3)			
	Sharp	2.2 (1.5 – 3.2)	2.4 (1.5 – 4.1)	1.9 (1.4 – 2.7)	1.6 (1.1 – 2.4)		
	Penetrating	2.6 (1.7 – 3.8)	2.2 (1.3 – 3.6)		2.0 (1.3 – 3.1)	2.4 (1.2 – 4.7)	1.8 (1.0 – 2.9)
Neuropathic	Numb	2.7 (1.8 – 4.2)	2.5 (1.4 – 4.2)	1.6 (1.1 – 2.3)	1.9 (1.2 – 3.0)	2.3 (1.1 – 4.7)	2.2 (1.3 – 3.8)
	Shooting	2.2 (1.4 – 3.5)	1.9 (1.1 – 3.4)	1.8 (1.2 – 2.8)	2.0 (1.2 – 3.2)		
	Stabbing	2.5 (1.6 – 3.9)	1.8 (1.0 – 3.3)	2.0 (1.3 – 3.1)	2.8 (1.8 – 4.5)		

Pain Quality Category	Pain Quality Descriptor	Multiple chronic conditions[a]	Peripheral arterial disease[b]	Osteoarthritis[b]	Spinal stenosis or disc disease	Rheumatoid arthritis	Peripheral neuropathy[b]
	Burning	2.0 (1.3 – 3.3)	3.3 (1.9 – 5.8)	1.7 (1.1 – 2.6)	1.8 (1.1 – 2.9)		

Note. Pain quality descriptors listed in order of highest to lowest prevalence by category.

Separate logistic regression models, adjusted for age and sex, were performed to determine odds ratios (OR) and 95% confidence intervals (CI) for the association of chronic conditions (independent variable) and endorsement of each specified pain quality descriptor (dependent variable). Only significant associations ($p<.05$) are presented in the table.

[a] Multiple pain-associated conditions were defined as >1 of the aforementioned conditions, the reference group was none or 1 chronic condition.

[b] Peripheral arterial disease, osteoarthritis, and peripheral neuropathy were clinically assessed conditions, the other conditions were self-reported.

[c] Less than 1% of data was missing for each quality, except for “Gnawing” for which 10% of the data were missing.

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Table 4

Pain Characteristics According to Descriptor Categories (n=560)

Pain Characteristic	Cognitive/Affective (n=468)	Sensory (n=538)	Neuropathic (n=384)	All 3 categories (n=333)
Pain severity[a]				
<1.5	26.1	32.0	23.5	19.0
1.5-3.67	36.4	34.6	35.8	36.5
>3.67	37.5	33.5	40.7	44.6
Pain interference[a]				
<0.71	26.4	32.2	25.4	20.5
0.71-2.50	33.7	33.0	31.4	31.3
>2.50	39.9	34.8	43.2	48.2
Joint pain distribution[b]				
No pain	17.4	19.9	15.1	13.8
Single site	26.6	27.1	24.0	21.9
Multi-site	33.7	33.1	36.8	36.9
Widespread	22.3	19.9	24.0	27.3

Note. Categories based on endorsement of any one descriptor in the specified category. Categories were not mutually exclusive.

Chi-square test for trend (category endorsement vs. no category endorsement, reference group not shown), and (1-2 category endorsement vs. 3 category endorsement) (1df) p<.0001 for all comparisons, except for pain severity of sensory (n=538) vs. non-sensory endorsement (n=22).

[a]Global pain severity and interference was assessed using Brief Pain Inventory (BPI) severity subscale, and calculated as the average score of 4 items (range 0-10).

[b]Sites of joint pain were hands and wrists, shoulders, back, hips, knees, or feet lasting 3 or more months in the previous year and present in the previous month. Sites were then grouped into 4 categories. Widespread pain included pain above waist, below waist; and axial skeletal pain in back or chest.

Table 5

Chronic Conditions According to Descriptor Categories (%) (n=560)

Chronic Conditions	Overall Sample (n=560)	Cognitive/affective (n=468)	Sensory (n=538)	Neuropathic (n=384)	All 3 categories (n=333)
Spinal stenosis or disc disease	20.9	23.8***	21.3	24.5**	26.7***
Osteoarthritis[a]					
Neither site	54.6	53.8	54.3	50.3	50.5
Hand only	13.6	13.9	13.8	14.1	14.4
Knee only	21.8	21.0	22.3	22.7	21.6
Both	10.0	11.4	9.7	13.0***	13.5**
Depression[b]	8.6	9.6*	8.7	9.9	11.1*
Heart disease[c]	42.3	44.0*	41.9	45.1*	45.7*
Diabetes[d]	20.9	20.9	20.2	23.7*	22.5
Asthma/lung disease	17.7	18.0	18.2	18.6	18.7
Stroke	9.5	11.1**	9.3	11.5*	12.6**
Rheumatoid arthritis	6.3	6.8	6.3	7.6**	8.1*
Peripheral neuropathy[e]	12.9	12.7	13.0	23.8*	14.8
Peripheral arterial disease[f]	12.0	14.1**	12.1	14.6**	16.5***
Multiple pain-associated conditions[g]	24.9	27.4**	25.3	31.1***	32.8***

Note. Categories based on endorsement of any one descriptor in the specified category. Categories were not mutually exclusive.

Chi-square test for between group differences (category endorsement vs. no category endorsement, reference group not shown)

[a]Clinically assessed osteoarthritis according to the American College of Rheumatology criteria.

[b]Depression assessed with Eaton method, modification of Centers for Epidemiologic Studies Depression scale.

[c]Heart disease included self report of: heart attack, congestive heart failure, angina, pacemaker, or cardiac arrhythmia.

[d]Diabetes defined from algorithm of: self-report, use of anti-diabetic medications, random glucose, and hemoglobin A_{1C}.

[e]Peripheral neuropathy was assessed with Semmes-Weinstein monofilament testing.

[f]Peripheral arterial disease defined from algorithm of: ankle-arm index and Rose Intermittent Claudication questionnaire.

[g] Multiple pain-associated conditions includes 2 or more of the following conditions: peripheral arterial disease, peripheral neuropathy, rheumatoid arthritis, osteoarthritis, and spinal stenosis or disc disease.

* p<.05

** p<.001

*** p<.0001.