

Chronic Pain and Pain Management Experiences among Younger and Older Adults

Shinduk Lee, DrPH
Matthew Lee Smith, PhD, MPH, CHES, FAAHB
Deborah Vollmer Dahlke, DrPH
Nicole Pardo, MD
Marcia G. Ory, PhD, MPH, FAAHB*

Abstract

Chronic pain is pervasive among Americans. This study aims to understand how pain management experiences differ between younger and older adults. Online cross-sectional surveys (Nov 2017-Dec 2018) were collected from adults in the United States (U.S.) about their pain management experiences using Amazon Mechanical Turk. Data were collected from an online convenience sample of 202 adults (age 18 years and older) who were U.S. residents and had internet access. Multivariable logistic regression models were used to examine age differences in pain management experiences (i.e., referral to a pain specialist, receiving pain treatment information, being allowed to participate in decision-making). The multivariable logistic regression analyses excluded a participant who reported hardly ever experiencing pain over the past six months. Older adults were less likely to receive information about their pain treatment options (aOR = 0.40, 95% CI = [0.19, 0.82]). Still, they were more likely to perceive that they were sufficiently allowed to participate in their pain treatment decisions (aOR = 2.06, 95% CI = [1.07, 3.94]). No statistically significant differences were observed regarding pain specialist referrals or addiction concerns. Findings suggest differences in pain management experiences between younger and older adults. Further efforts are needed to examine the impact of differential patient involvement in pain treatment based on age. The study provides evidence of differential pain management experiences based on patients' age and offers potential explanations for these findings, along with implications for future research that can guide change in clinical practice.

Keywords: middle-age and older adult, chronic pain, pain management options, treatment information, treatment decision

*Corresponding author may be reached at mory@tamu.edu

Introduction

Chronic pain is a category of pain that describes persistent or recurrent pain past the time for normal tissue healing (e.g., typically 3 to 6 months) (Treede et al., 2015; U.S. Pain Foundation, 2022). About 50 million American adults had chronic pain, and two-in-five had high-impact chronic pain (Dahlhamer et al., 2018; Yong et al., 2022; U.S. Pain Foundation, 2022). Significant associations between chronic pain and

disability, worsened health status, and diminished functionality have been implied in extant literature (Pitcher et al., 2019; Ashton-James et al., 2022). In addition, the annual cost of pain to American society was estimated to range from 560 to 635 billion USD using the dollar value in 2010 (Simon, 2012; Gaskin & Richard, 2011); it is likely that this cost continues to increase. While chronic pain widely impacts the public, studies indicate that chronic pain prevalence increases with increasing chronological age

(Dahlhamer et al., 2018; Pitcher et al., 2019; Grol-Prokopczyk, 2017).

Pain can be characterized in terms of frequency, duration, intensity, and locations and sources of pain. As stated by the International Association for the Study of Pain (IASP), “pain is always a personal experience that is influenced to varying degrees by biological, psychological, and social factors” (Hollingshead et al., 2016). Age may be an important social determinant that shapes the biological, psychological, sociocultural, and environmental influences on pain and pain care experiences. Age-related musculoskeletal degeneration, decremented pain sensitivity, as well as physiologic changes related to pharmacokinetics and pharmacodynamics can cause differences in pain experiences among younger and older individuals (Bicket & Mao, 2015; Daoust et al., 2016; Zajacova et al., 2021). Decremental pain sensitivity may put older adults at a greater risk for delayed diagnosis and treatment by reporting less pain intensity than their younger counterparts with the same conditions (Daoust et al., 2016). Further, stigmas about pain among older adults (e.g., “pain is a natural part of getting older”) exist in both patients and physicians, and can influence response to pain among older adults in both clinical and non-clinical settings (Thielke et al., 2012; Nicola et al., 2021; De Ruddere & Craig, 2016).

It was estimated that nearly 21% of U.S. adults experienced chronic pain and 7% experienced high-impact chronic pain (i.e., chronic pain that results in substantial restriction to daily activities) with prevalence increasing with age (Rikard et al., 2023). In a recent study comparing pain experiences in younger (<65 years old) and older (≥ 65 years old) adults, the two age groups described how their pain impacted their lives differently despite similar ratings on the degrees of pain impact (You et al., 2022). While the study

finding indicates potential need for age-related considerations in pain care, the study did not discuss how pain care experience differed between the two age groups (You et al., 2022). More research is needed to understand the differences in how pain and pain management experiences vary between younger and older adults. Understanding age-related differences in attitudes and experiences related to pain management can have several important implications for practice and research.

While exploratory, this paper examines age-related differences in younger and older adults’ access to information about pain management options and their perceived level of feeling allowed to participate in decision-making related to their pain treatment. The research around the concept of patient activation suggests that an increase in patient ability (e.g., knowledge, skills, and self-efficacy) to make decisions about their health can improve their health behaviors and outcomes (Hibbard et al., 2004, 2007; Matthias et al., 2022; Cronin et al., 2019). For example, Matthias et al. (2022) demonstrated a negative association between patient activation and pain catastrophizing (i.e., “rumination, magnification, and helplessness cognitions about pain”) in veterans experiencing moderate or worse musculoskeletal pain lasting for three months or longer. This study also compares younger and older adults’ experiences with referral to a pain management specialist or pain clinic. A pain management specialist is a physician with additional medical training to evaluate and treat pain (Huntoon, 2013; American Society of Regional Anesthesia and Pain Medicine, n.d.). Access to a pain management specialist can be particularly important for patients with chronic pain, which typically involves complex etiology or uncertain causes. In addition, to reflect on the nationwide attention on the opioids issue (U.S. Department of Health and Human

Services, 2017), this study examined patients' concerns about opioids addiction. Prescription opioids were suggested as the main driver of the first wave of opioid overdose deaths increase started in 1999 (U.S. Centers for Disease Control and Prevention [CDC], 2024). While opioid overdose death rates related to commonly prescribed opioids have not further increased over the past decade, there has been an increase in the opioid overdose death rates related to synthetic opioids, such as Fentanyl (CDC, 2024). With different historical contexts of opioid epidemic that younger and older adults experience, these two age groups may have different degrees of concern toward prescription opioids.

Research Design and Methods

Study Design and Study Participants

This study used the existing data collected to guide its continuing education activity by the Texas A&M Opioid Task Force. Cross-sectional survey data were collected from an online convenience sample of adults (age 18 years and older) who were U.S. residents and had internet access at the time of assessment. The survey was collected through Amazon Mechanical Turk (MTurk) for a rapid response. MTurk is a crowdsourcing marketplace through which human intelligence from the “workers” can be outsourced for various tasks, such as survey participation. MTurk workers refer to the individuals who sign up to perform a list of eligible tasks for a pre-determined price by the requesters in the MTurk platform. MTurk has been widely used in research, and researchers (i.e., requesters) can set eligibility criteria to screen workers who can complete their surveys. To be eligible for this study, all participants were required to: (1) be age 18 years or older (i.e., based on self-reported information in the MTurk system), (2) reside in the U.S. (i.e., based on the

country or U.S. state in which those workers registered), (3) speak and read English, and (4) acknowledge the Institutional Review Board-approved Information Sheet, thus consenting to participate in the study. Two rounds of survey data were collected to ensure sufficient representation across age groups of interest. The first round of the survey was requested to be completed by U.S. residents aged 18 years and older (Nov-Dec 2017), and the second round of the survey was requested to be completed by U.S. residents aged 55 years and older (Dec-Jan 2018). MTurk workers who meet the eligibility criteria self-selected to complete the survey. A total of 202 participants completed the survey and were included in the study.

Measures

The measures assessed in this study include participants' sociodemographic characteristics, experiences and attitudes related to pain and pain management, and concern about addiction. Participants were asked whether their physician had “ever referred (them) to a pain management specialist or a pain management clinic” and whether they had “received any information or educational materials about their pain treatment or management options.” On a scale of 0 (not at all) to 10 (very much so), participants were asked to rate the extent “they were allowed to participate in decisions about their pain treatment or management” as much as they wanted. A higher score indicated a greater extent of being allowed to participate in the decision-making. On a scale of 0 (not at all) to 10 (very much so), participants were also asked to rate their concern “about addiction from taking opioid prescriptions for pain medications.” A higher score indicated a greater concern about addiction.

Given varied experiences of pain, pain measurement often involves the

characterization of multiple features of pain, such as pain frequency and duration, severity and life interference associated with pain, and pain locations (Amtmann et al., 2010; Salamon et al., 2014; Grimby-Ekman et al., 2015; dela Cruz et al., 2014). Pain characteristics examined in this study included frequency of chronic and acute pain, pain severity, and primary sources of pain. On a 6-point rating, participants were asked to describe how frequently in the past six months they experienced chronic pain that was not due to cancer: daily, 2-3 times per week, 1 time per week, 2-3 times per month, infrequently (1-2 times over the past six months), or hardly ever. On the survey, chronic pain was described as “pain that typically lasts more than 12 weeks.” Similarly, acute pain was assessed on a 6-point Likert-type item but was defined as “pain that typically lasts less than 12 weeks.” Pain severity was rated as mild, discomforting, distressing, very distressing, intensive, very intensive, or excruciating. Due to the small frequencies, the last two pain severity categories (very intense [$n=11$] and excruciating [$n=1$]) were merged into one category. Participants were asked to identify the primary source(s) of their pain (e.g., back, knee, other muscle or joint, dental, migraine headache, and other sources).

In addition to the pain management experiences, the online survey also asked participants’ usual place of care for pain (i.e., primary care doctor or health clinic, or others) and their prescribed or recommended pain treatment for non-opioid pain medication (e.g., ibuprofen, aspirin, or acetaminophen), opioids (e.g., codeine, hydrocodone, oxycodone, or morphine), and non-drug care (e.g., physical, psychological, or behavioral therapy; massage; exercise; or acupuncture). Among those who received any information about their pain treatment or management options, participants also specified if they received information through their doctors or

nurses, pharmacists, or printed materials. Although no specific timeframe was provided for individual survey questions, the survey began with an introductory statement indicating a reference period of “the past year.” Therefore, by design, participants answered all items in the survey in reference to the past year.

Sociodemographic characteristics examined in this study were age groups (response categories: 18-24, 25-34, 35-44, 45-54, 55-64, 65-74, and 75 years or older), race (White or non-White), ethnicity (Hispanic or non-Hispanic), education (at least bachelor’s degree or associate degree or lower education), marital status (married/domestic partnership or single/never married/widowed/divorced/separated), employment (employed for wages, self-employed, retired, or other employment status), and rural or urban resident status. To facilitate age-based comparisons, participants were grouped into young adults (age 18 – 54 years old) or older adults (55 years or older). A cross-sectional survey study conducted with a nationally representative sample of U.S. adults (Dec 2008 – Feb 2009) showed an increasing prevalence of chronic pain with age, ranging from 12.4% in adults aged 18 to 24 to 38.5% in adults aged 65 years and older (Johannes et al., 2010). However, the prevalence among those aged 55 to 64 (38.2%) was comparable to that among adults aged 65 and older (Johannes et al., 2010). A similar trend was observed in a study reported in the U.K. where the prevalence of chronic pain increased from 31.7% in individuals aged 25 to 34 to 57.3% in those aged 65 to 75. The rate among individuals aged 55 to 64 (57.1%) was comparable to those aged 65 to 75 (Elliott et al., 1999). This trend is also in agreement with a more recent observation using the National Health Interview Survey from 2019 to 2020 which found that U.S.

adults aged 50 and older have a higher risk of chronic pain compared to their younger counterparts aged 18 to 49 (Nahin et al., 2023).

Statistical Analyses

Sociodemographic characteristics, and attitudes and experiences related to pain and pain management were described using frequencies and percentages or means and standard deviations. Bivariate analyses were used to compare sociodemographic characteristics, attitudes, and experiences related to pain and pain management between young and older adults. Chi-square tests were used for categorical variables, and Wilcoxon Rank Sum tests were used for interval variables. A separate multivariable logistic regression model was used to examine factors influencing each outcome variable of interest: (1) being referred to a pain specialist or pain clinic, (2) receiving any information about pain treatment/management, (3) perceiving being allowed to participate in decisions about pain treatment/management as much as wanted, and (4) concern about addiction to taking opioid prescriptions. The interval outcome variables (perceiving being allowed to participate in decisions about pain treatment/management as much as wanted; concern about addiction to taking opioid prescriptions) were not normally distributed and could not be normalized through transformation. The outcome variable about decision involvement had a left-skewed distribution and was dichotomized using median cut-off (1 = greater than median and 0 = equal to or less than median) (median = 8.00). The outcome variable about addiction concern had a u-shaped distribution and was dichotomized using median cut-off (1 = greater than median and 0 = equal to or less than median) (median = 4.00). The primary independent variable was age, and other covariates included pain frequency, pain severity, race, education, marital status, and

rural or urban resident status. One participant who reported hardly ever experiencing any form of pain was excluded from all analyses related to pain severity, sources, and management. As a result, the analytic sample for these analyses included 201 adults. Other descriptive analyses and comparisons of pain frequency used the full sample of 202 adults, comprising 93 adults aged 18 to 54 years and 109 adults aged 55 years and older. Significance level of 0.05 was used, and all statistical analyses were performed using SAS 9.4.

Ethics

This research activity (analysis of existing data) was reviewed by the Texas A&M Institutional Review Board, and this secondary data analysis was determined not to be a human subject research.

Results

Study Participants

Participants' sociodemographic characteristics and self-reported experiences with pain are described in Tables 1 and 2. Most of the participants were White (79.2%), non-Hispanic (92.5%), and urban residents (66.8%). Over half of the participants had an associate degree or less education (53.2%), were married or had a domestic partnership (55.0%), and were employed or self-employed (68.3%). The younger cohort (i.e., 18-54 years old) had an average age of 32.6, and the older cohort (i.e., 55 years or older) had an average age of 63.1. Compared to the younger cohort, the older cohort was more likely to be White (87.2% vs. 69.9%), non-Hispanic (97.2% vs. 87.1%), have an associate degree or less education (60.6% vs. 44.6%), retired (41.3% vs. 0%), and have rural residence (46.8% vs. 17.2%).

Table 1

Comparison of Participants' Sociodemographic Characteristics Between the Younger (i.e., 18-54 Years) and Older (i.e., 55 Years and Older) Participants

Sociodemographic characteristics	Average or Frequency (%)			<i>Age 18-54 vs. 55+ p-value</i>
	Overall (n=202)	Age 18-54 (n=93)	Age 55+ (n=109)	
<i>Age (years)^a</i>	49.04	32.55	63.11	<i>NA</i>
18 – 24 years	9 (4.5%)	9 (9.7%)	0	
25 – 34 years	56 (27.7%)	56 (60.2%)	0	
35 – 44 years	20 (9.9%)	20 (21.5%)	0	
45 – 54 years	8 (4.0%)	8 (8.6%)	0	
55 – 64 years	71 (35.1%)	0	71 (65.1%)	
65 – 74 years	36 (17.8%)	0	36 (33.0%)	
75 years and more	2 (1.0%)	0	2 (1.8%)	
<i>Race</i>				0.003*
White	160 (79.2%)	65 (69.9%)	95 (87.2%)	
Non-White	42 (20.8%)	28 (30.1%)	14 (12.8%)	
<i>Ethnicity</i>				0.007*
Hispanic	15 (7.5%)	12 (12.9%)	3 (2.8%)	
Not Hispanic	186 (92.5%)	81 (87.1%)	105 (97.2%)	
<i>Education</i>				0.024*
Associate degree or lower	107 (53.2%)	41 (44.6%)	66 (60.6%)	
Bachelor's degree or higher	94 (46.8%)	51 (55.4%)	43 (39.4%)	
<i>Marital status</i>				0.244
Married or domestic partnership	111 (55.0%)	47 (50.5%)	64 (58.7%)	
Others (e.g., single, never married, divorced, widowed, or separated)	91 (45.0%)	46 (49.5%)	45 (41.3%)	
<i>Employment</i>				<0.001*
Employed for wages	103 (51.0%)	70 (75.3%)	33 (30.3%)	
Self-employed	35 (17.3%)	18 (19.4%)	17 (15.6%)	
Retired	45 (22.3%)	0 (0%)	45 (41.3%)	
Others	19 (9.4%)	5 (5.4%)	14 (12.8%)	
<i>Rural/Urban</i>				<0.001*
Rural area or small town	67 (33.2%)	16 (17.2%)	51 (46.8%)	
Urban (mid-sized city, suburban, or urban)	135 (66.8%)	77 (82.8%)	58 (53.2%)	

* $p < 0.05$.

a. Average was calculated using mid-point of each age range (e.g., 21 for the age range 18-24).

Table 2

Comparison of Participants' Pain Experiences Between the Younger (i.e., 18-54 Years) and Older (i.e., 55 Years and Older) Participants

Pain characteristics	Frequency (%)			<i>Age 18-54 vs. 55+ p-value</i>
	Overall (N=202)	Age 18-54 (n=93)	Age 55+ (n=109)	
Frequency of chronic pain experienced over the past 6 months				<.001*
Hardly ever	25 (12.4%)	10 (10.8%)	15 (13.8%)	
Infrequently (once or twice over the past six months)	26 (12.9%)	13 (14.0%)	13 (11.9%)	
2-3 times per month	24 (11.9%)	17 (18.3%)	7 (6.4%)	
1 time per week	13 (6.4%)	12 (12.9%)	1 (0.9%)	
2-3 times per week	47 (23.3%)	22 (23.7%)	25 (22.9%)	
Daily	67 (33.2%)	19 (20.4%)	48 (44.0%)	
Frequency of acute pain experienced over the past 6 months				0.117
Hardly ever	41 (20.3%)	17 (18.3%)	24 (22.0%)	
Infrequently (once or twice over the past six months)	58 (28.7%)	27 (29.0%)	31 (28.4%)	
2-3 times per month	28 (13.9%)	14 (15.1%)	14 (12.8%)	
1 time per week	34 (16.8%)	22 (23.7%)	12 (11.0%)	
2-3 times per week	30 (14.9%)	9 (9.7%)	21 (19.3%)	
Daily	11 (5.4%)	4 (4.3%)	7 (6.4%)	
Pain severity ^a				0.106
Mild	8 (4.0%)	6 (6.5%)	2 (1.9%)	
Discomforting	53 (26.4%)	26 (28.0%)	27 (25.0%)	
Distressing	72 (35.8%)	28 (30.1%)	44 (40.7%)	
Very distressing	31 (15.4%)	11 (11.8%)	20 (18.5%)	
Intensive	25 (12.4%)	16 (17.2%)	9 (8.3%)	
Very intensive or excruciating	12 (6.0%)	6 (6.5%)	6 (5.6%)	
Having two or more sources of pain ^a	101 (50.2%)	36 (38.7%)	65 (60.2%)	0.002*
Back	109 (54.2%)	48 (51.6%)	61 (56.5%)	0.490
Knee	63 (31.3%)	21 (22.6%)	42 (38.9%)	0.013*
Other muscle or joint pain	82 (40.8%)	30 (32.3%)	52 (48.1%)	0.022*
Dental pain	22 (10.9%)	9 (9.7%)	13 (12.0%)	0.593
Migraine headache	39 (19.4%)	24 (25.8%)	15 (13.9%)	0.033*
Other	66 (32.8%)	26 (28.0%)	40 (37.0%)	0.172

* $p < 0.05$.

a. Pain severity and sources were described only for participants who reported experiencing at least infrequent chronic or acute pain within the past six months (n=201).

Table 3

Comparison of Participants' Experiences and Attitudes Related to Pain Management Between the Younger (i.e., 18-54 Years) and Older (i.e., 55 Years and Older) Participants

	Mean (S.D.) or Frequency (%)			Age 18-54 vs. 55+ <i>p-value</i>
	Overall (N=201)	Age 18-54 (n=93)	Age 55+ (n=108)	
Experiences				
Usual place of care for pain				0.680
Primary care doctor or health clinic	114 (57.0%)	51 (55.4%)	63 (58.3%)	
Others	86 (43.0%)	41 (44.6%)	45 (41.7%)	
Prescribed/recommended pain treatment type				
Non-opioids pain medications	134 (66.7%)	50 (53.8%)	84 (77.8%)	<0.001*
Opioids	70 (34.8%)	37 (39.8%)	33 (30.6%)	0.171
Non-pharmacological care	103 (51.2%)	48 (51.6%)	55 (50.9%)	0.923
Was referred to a pain management specialist or a pain management clinic	55 (27.5%)	33 (35.5%)	22 (20.6%)	0.018*
Received any information about your pain treatment/management options	144 (72.4%)	73 (79.4%)	71 (66.4%)	0.041*
Spoke with doctor/nurse	95 (47.5%)	49 (53.3%)	46 (43.0%)	
Pharmacist	11 (5.5%)	5 (5.4%)	6 (5.6%)	
Printed materials	38 (19.0%)	19 (20.7%)	19 (17.8%)	
Allowed to participate in decisions about pain treatment/management as much as wanted ^a	6.99 (2.93)	6.60 (2.75)	7.33 (3.05)	0.010*
Attitudes and Beliefs				
Concern about addiction in taking opioid prescriptions for pain ^b	4.36 (3.71)	4.91 (3.48)	3.88 (3.84)	0.055

* $p < 0.05$.

a. Score ranged from 0 to 10, with a higher score indicating a greater perceived participation allowed. The score distribution was extremely skewed to left (median = 8.00 and mode = 10.00).

b. Score ranged from 0 to 10, with a higher score indicating a greater concern about addiction in taking opioid prescriptions for pain. The score had a u-shaped curve (median = 4.00 and mode = 0.00).

Table 4*Factors Influencing Participants' Experiences and Attitudes Related to Pain Management*

	Adjusted Odd Ratios [95% Confidence Interval]			
	Your physician has ever referred you to a pain management specialist or a pain management clinic	Received any information about your pain treatment/management options	Participated in decisions about pain treatment/management as much as wanted ^a	Concern about addiction in taking opioid prescriptions for pain medications ^b
Age (reference = 18-54 years old)	0.51 [0.24, 1.06]	0.40 [0.19, 0.82]*	2.06 [1.07, 3.94]*	0.75 [0.40, 1.41]
Frequency of chronic pain experienced over the past 6 months	1.34 [1.08, 1.68]*	1.04 [0.87, 1.25]	0.90 [0.76, 1.07]	0.97 [0.82, 1.15]
Pain severity	1.19 [0.91, 1.55]	1.24 [0.93, 1.65]	0.97 [0.76, 1.25]	1.18 [0.92, 1.52]
Race (reference = not White)	0.33 [0.14, 0.74]*	0.79 [0.32, 1.95]	2.72 [1.16, 6.38]*	0.31 [0.13, 0.70]*
Education (reference = Associate degree or lower education)	1.45 [0.73, 2.90]	1.69 [0.86, 3.34]	2.26 [1.21, 4.22]*	1.71 [0.94, 3.11]
Marital status (reference = Not married)	1.16 [0.58, 2.34]	1.43 [0.73, 2.80]	0.85 [0.45, 1.58]	1.25 [0.68, 2.31]
Rural (reference = urban)	0.90 [0.41, 1.98]	2.61 [1.18, 5.75]*	1.56 [0.79, 3.08]	0.84 [0.42, 1.65]

* $p < 0.05$.

a. This outcome variable had a left-skewed distribution, and sufficient normalization could not be obtained through transformation. Hence, the variable has been dichotomized using median cut-off (1 = greater than median and 0 = equal to or less than median) (median = 8.00). Higher score indicates greater participation or concern.

b. This outcome variable had a u-shaped distribution. Hence, the variable has been dichotomized using median cut-off (1 = greater than median and 0 = equal to or less than median) (median = 4.00).

Pain Characteristics

Nearly two-thirds of the respondents reported experiencing chronic pain at least once a week, and about one-third reported experiencing chronic pain daily (Table 2). Most people described their pain severity as at least distressing (69.7%). On average, participants reported about two primary sources of pain. The most frequently reported source of pain was back pain (54.2%), followed by muscle or joint pain (i.e., not back or knee) (40.8%), knee (31.3%), migraine headache (19.4%), and dental pain (10.9%).

Age and Pain Characteristics

The older cohort reported more frequent chronic pain and a higher likelihood of multisite pain (60.2% vs. 38.7%) (Table 2). A larger proportion of the older cohort reported their primary source of pain as knee pain (38.9% vs. 22.6%) and other muscle or joint pain (48.1% vs. 32.3%). Conversely, the younger cohort reported their primary source of pain as migraine headache (25.8% vs. 13.9%).

Pain Management Attitudes and Experiences

More than half of the respondents reported their primary care doctor or health clinic as their usual place of care for pain (57.0%) (Table 3). The most frequently prescribed or recommended pain treatment was non-opioid pain medications (66.7%), followed by non-drug care (51.2%), and opioids (34.8%). About 72% of respondents received information about their pain treatment options through channels, such as: communication with a physician or nurse (47.5%), printed materials (19.0%), and counseling from a pharmacist (5.5%). The majority were not referred to a pain management specialist or a pain management clinic by their physician (72.5%). They also

perceived that they were allowed to participate in decisions about pain treatment as much as they wanted (mean [S.D.] = 6.99 [2.93], median = 8.00, and mode = 10.00). Participants' responses to the question about their concern about addiction from opioid prescriptions showed a u-shaped (i.e., inverted bell-shape) distribution with 30.5% reporting no concern at all (i.e., 0 out of 10) and 25.5% reporting high concern (i.e., 8-10 out of 10).

Age and Pain Management Experiences and Attitudes

Non-opioids pain medication use was more frequent among older adults (77.8% vs. 53.8%) (Table 3). Compared to the younger cohort, fewer older adults reported ever being referred to a pain management specialist or pain clinic (20.6% vs. 35.5%), or receiving any information about their pain treatment or management options (66.4% vs. 79.4%).

After adjusting for pain frequency, pain severity, race, education, marital status, and rural or urban resident status, older adults were significantly less likely to receive any information about their pain treatment or management options compared to younger adults (Adjusted Odds Ratio [AOR] = 0.40, 95% Confidence Interval [CI] = [0.19, 0.82]) (Table 4). Compared to younger adults, older adults were significantly more likely to perceive that they were allowed to participate in pain treatment decision-making as much as they wanted (AOR = 2.06, 95% CI = [1.07, 3.94]).

Other Factors Associated with Pain Management Experiences and Attitudes

The adjusted odds of being referred to a pain specialist was significantly lower among adults who were White (AOR = 0.33, 95% CI = [0.14, 0.74]) and higher among those who reported higher pain frequency (AOR = 1.34, 95% CI = [1.08, 1.68]) (Table 4). Compared

to urban residents, rural residents had significantly greater odds of receiving any information about pain treatment options (AOR = 2.61, 95% CI = [1.18, 5.75]). White individuals (AOR = 2.72, 95% CI = [1.16, 6.38]) and those with higher education (AOR = 2.26, 95% CI = [1.21, 4.22]) showed a greater likelihood of perceiving being allowed to participate in their pain treatment decision-making as much as they wanted. The odds of having concerns about addiction in taking opioid prescriptions was significantly lower among White individuals compared to non-White individuals (AOR = 0.31, 95% CI = [0.13, 0.70]).

Discussion

The current study examined age-related differences in pain and pain management attitudes and experiences among younger (18-54 years) and older (55 years and older) adults. In this study, differences in pain experiences (e.g., frequency and sources) were observed between the younger and older cohorts. The older cohort reported significantly more frequent experiences of chronic pain. On average, older participants were significantly more likely to report having two or more pain sources than the younger counterpart. This finding is comparable to a prior population-based study that reported high co-occurrence rates of chronic multisite pain with multiple geriatric syndromes among older adults and suggested multisite pain as a new geriatric syndrome (Thapa et al., 2019). The current study also showed that, compared to their younger counterparts, the older cohort was more likely to report knee and other muscles and joints as their primary sources of pain but were less likely to report headache as their primary source of pain. This observation corroborates with the previous epidemiologic studies (Domenichiello & Ramsden, 2019; Helme & Gibson, 2001). Such differences in

the pain experiences signifies the different needs for pain management for different age cohorts.

In this study, opioids were the least used pain management method for both younger and older cohorts. This observation may reflect the evolving recommendation for using non-opioid therapy as a preferred treatment method for chronic pain (Dowell et al., 2016). Comparable to the current study, a study using a national sample of U.S. adults reported 15.2% using opioids for chronic pain in 2019, with prescription opioids being the least used pain management techniques (vs. 65.4% non-opioid pain management techniques) (Groenewald et al., 2022). The study also observed that prescription opioid was more common chronic pain treatment option for older age group (19.3% in 45-64 years old and 15.5% in 65 years and older) than the younger age group (8.4% in 18-44 years old) (Groenewald et al., 2022). However, the current study did not find any statistically significant differences in opioid use by age groups. This could be due to the different age brackets, and sampling and data collection methods used in the two studies. In the current study, the older cohort was more likely to use non-opioid medication than participants in the younger cohort. This may be associated with more frequent pain experienced by older adults. Given the non-significant age-based differences in non-pharmacological therapy use, attitudes toward or feasibility of non-pharmacological therapies does not appear to drive age-based differences in non-opioid medication use. The observed age differences in referral to pain specialists disappeared after controlling for other factors, such as pain frequency and race.

Compared to the younger cohort, the older cohort was significantly less likely to receive any information about their pain treatment or management options, yet they were more likely to agree that they were able to

participate in their pain decision-making as much as they wanted. The observation may indicate that the older adult group might have experienced longer or more frequent pain, required less information, and are more experienced in pain management than their younger counterparts. However, the observed paradoxical relationship may be associated with pain-related stigma (i.e., perceiving pain as a natural part of getting older), rather than a symptom for management. Alternatively, the observation may also be linked to older adults' preference for a less active role in their treatment decision-making (Chiu et al., 2016; Lechner et al., 2016). A potential mechanism underlying this paradoxical relationship may be the differences in expectation and medical interaction styles between younger and older individuals (Chiu et al., 2016; Peck, 2011; McLoughlin et al., 2017). For example, McLoughlin et al. (2017) compared expectations of pain clinic patients in Ireland and showed that patients younger than 65 years old had greater expectations for diagnosis and education about their pain than older patients. McLoughlin et al. (2017) also observed that older patients were more likely than younger patients to visit the pain clinic without much expectation or not knowing what to expect. A study conducted in San Francisco suggested relatively low readiness to ask questions to doctors among older adults and its association with a preference for doctors making their medical decisions (Chiu et al., 2016). Understanding the reasons underlying this paradoxical relationship can better inform expectations for patients' and providers' roles, and patient-provider interaction strategies, meriting further investigation.

Other than age, pain and other sociodemographic characteristics were significantly associated with pain management experiences and attitudes. Notably, race was associated with three of the four examined outcomes. White race was

significantly associated with a greater likelihood of participating in decisions about pain treatment as much they wanted and less concern about addiction. These findings align with previous reports about differing stigmatization of opioid use based on race (Cooke et al., 2023; Chavanne et al., 2023; Goodyear et al., 2022) and how it is reflected in patients' pain management (Cooke et al., 2023; Hirsh et al., 2020). For example, qualitative studies conducted with patients and clinicians by Cooke et al. (2023) reported Black patients felt being stigmatized by their clinicians based on their race and clinicians' internal struggles in addressing their own racial and ethnic stereotypes during pain management. The current study also found that White individuals reported lower likelihood of being referred to a pain specialist than non-White individuals. The observed finding may be associated with race-related bias (Hoffman et al., 2016); however, the inference from this finding is limited by a lack of information on factors, such as clinical considerations when referring patients to a pain management specialist or clinic. It should be noted that referring patients to a pain management specialist or clinic may not always be the optimal choice of pain care. While these findings should be interpreted with caution, especially given that non-age variables, such as race, were included only as control variables (Hünemann & Louw, 2023), further research about potential racial differences in pain experiences and management is needed, which can deepen our understanding about pain care for these population subgroups (Olorunfoba et al., 2024).

Limitations

This study is among the few that investigate age-based differences in an individual's experience with pain and pain management. The study highlights gaps in the current literature and may provide

insights for future studies in this field. While exploratory in its nature, the study results suggest age differences in patients' experiences of chronic pain and pain management, as well as important perceptions related to pain management.

The results should be interpreted with caution. First, the study used self-reported data that might be subject to recall bias and social desirability bias. Second, the study observations were drawn from the non-random online MTurk sample, hence the study generalizability may be limited. More specifically, the recruitment strategy utilizing MTurk excluded those without access to internet, which may have omitted individuals with lower education, less household affluence, and who reside in rural areas. Although the age-based digital gap is narrowing, it remains, suggesting that older adults included in this study might not fully represent the broader older adult population. Moreover, it should be noted that older adults constitute a relatively small proportion of the MTurk participant pool (Simons & Chabris, 2012; Patrick et al., 2016). Older adults who participated through MTurk may be more technologically proficient than their peers who are not as engaged with technology, potentially limiting the generalizability of findings to the broader older adult population. Third, although a robust set of items were included in the study, other important variables (e.g., gender and duration of pain) were not included in the survey instrument, which might limit the ability to contextualize the full scope of the participants' pain and treatment experiences. Particularly, given the well-documented gender differences in pain perception and symptom presentation, the absence of gender as a variable in this study represents a significant limitation. Fourth, while prior studies have demonstrated successful recruitment and data collection of middle-aged and older adults via MTurk (Simons & Chabris, 2012; Patrick et al., 2016;

Turner et al., 2021), the concern about data quality (e.g., potential for participant inattentiveness and non-human respondents) remains a concern with MTurk samples (Keith et al., 2017). This study used multiple pre-screeners to identify desirable workers (Chandler et al., 2014) along with a redundancy check by asking age and year of birth in different places in the survey. In addition, IP addresses and geolocations were checked to prevent potential duplicate respondents. However, limited use of "catch trials" in the current study restricted the ability to assess participant attentiveness and thoughtfulness when completing the questionnaire. Fifth, while the data used in this study was from 2017 to 2018, that time period was significant in the acceleration of opioid-related deaths in some groups (Lippold et al., 2019). Finally, the statistical analyses might lack sufficient power, which could limit the conclusions drawn from the statistically non-significant findings. For example, post-hoc power estimates for the bivariate analyses comparing age differences in concern about addiction and degree of feeling allowed to participate in decision-making were 0.46 and 0.41, respectively. The power was estimated using GPower.

Implications for Health Behavior Research

Despite its exploratory nature, this study offers insights into how pain and pain management attitudes and experiences differ between younger and older adults, as well as the relationship of sociodemographic and pain characteristics. This study aligns with others that demonstrate that older adults experience more frequent pain and are more likely to experience multisite pain than their younger counterparts. Older adults in this study received significantly less information about their treatment options than younger adults. In addition, this study suggests the paradoxical relationship in older adults'

receiving of health information and their response to patient engagement in pain management decision-making. A potential mechanism underlying the observed paradoxical relationship could be differences in patients' needs for information due to the longer duration of pain and its management; however, it could also be related to the age-related differences in patients' attitudes toward pain and expectation of pain management. Further research is needed to understand the mechanism underlying the paradoxical relationship, as well as the impact of the paradoxical relationship on the quality of care. We found statistically significant differences in pain management experiences and attitudes by race. While this finding should be interpreted with caution, more research is needed to enhance our understanding of how pain experiences and management may vary across racial and ethnic groups.

Discussion Questions

How can the findings from this study inform age-specific pain management strategies to optimal uptake and success?

What determines younger and older adults' attitudes toward their pain management, and what are the implications of the age-related differences in their pain management experiences and outcomes?

Conflict of Interest

The authors have no conflicts of interest to declare. This research received no specific grant from any funding agency in the public, commercial, or non-profit sector.

Author Contributions

SL, DV, NP, and MO contributed to the study concept and design; DV and MO contributed to data acquisition; SL planned and carried out statistical analyses; SL, MLS, and MO contributed to the results interpretations; SL

took the lead in writing the manuscript. All authors provided critical feedback and helped shaping the manuscript.

References

- American Society of Regional Anesthesia and Pain Medicine. (n.d.). *The specialty of chronic pain management*. <https://www.asra.com/patient-information/chronic-pain-management>
- Amtmann, D., Cook, K. F., Jensen, M. P., Chen, W. H., Choi, S., Revicki, D., Cella, D., Rothrock, N., Keefe, F., Callahan, L., & Lai, J. S. (2010). Development of a PROMIS item bank to measure pain interference. *Pain*, 150(1), 173–182. <https://doi.org/10.1016/j.pain.2010.04.025>
- Ashton-James, C. E., Anderson, S. R., Mackey, S. C., & Darnall, B. D. (2022). Beyond pain, distress, and disability: the importance of social outcomes in pain management research and practice. *Pain*, 163(3), e426–e431. <https://doi.org/10.1097/j.pain.00000000000002404>
- Bicket, M. C., & Mao, J. (2015). Chronic pain in older adults. *Anesthesiology Clinics*, 33(3), 577–590. <https://doi.org/10.1016/j.anclin.2015.05.011>
- Chandler, J., Mueller, P., & Paolacci, G. (2014). Nonnaïveté among Amazon Mechanical Turk workers: Consequences and solutions for behavioral researchers. *Behavior research methods*, 46(1), 112–130. <https://doi.org/10.3758/s13428-013-0365-7>
- Chavanne, D., Ahluwalia, J. S., & Goodyear, K. (2023). The effects of race and class on community-level stigmatization of opioid use and policy preferences. *The International Journal on Drug Policy*, 120, Article 104147. <https://doi.org/10.1016/j.drugpo.2023.104147>

- Chiu, C., Feuz, M. A., McMahan, R. D., Miao, Y., & Sudore, R. L. (2016). "Doctor, make my decisions": Decision control preferences, advance care planning, and satisfaction with communication among diverse older adults. *Journal of Pain and Symptom Management*, 51(1), 33-40. <https://doi.org/10.1016/j.jpainsymman.2015.07.018>
- Cooke, A., Castellanos, S., Koenders, S., Joshi, N., Enriquez, C., Olsen, P., Miaskowski, C., Kushel, M., & Knight, K. R. (2023). The intersection of drug use discrimination and racial discrimination in the management of chronic non-cancer pain in United States primary care safety-net clinics: Implications for healthcare system and clinic-level changes. *Drug and Alcohol Dependence*, 250, Article 110893. <https://doi.org/10.1016/j.drugalcdep.2023.110893>
- Cronin, R. M., Dorner, T. L., Utrankar, A., Allen, W., Rodeghier, M., Kassim, A. A., Jackson, G. P., & DeBaun, M. R. (2019). Increased patient activation is associated with fewer emergency room visits and hospitalizations for pain in adults with sickle cell disease. *Pain Medicine*, 20(8), 1464–1471. <https://doi.org/10.1093/pm/pny194>
- Dahlhamer, J., Lucas, J., Zelaya, C., Nahin, R., Mackey, S., DeBar, L., Kerns, R., Von Korff, M., Porter, L., & Helmick, C. (2018). Prevalence of chronic pain and high-impact chronic pain among adults - United States, 2016. *Morbidity and Mortality Weekly Report*, 67(36), 1001–1006. <https://doi.org/10.15585/mmwr.mm6736a2>
- Daoust, R., Paquet, J., Piette, É., Sanogo, K., Bailey, B., & Chauny, J. M. (2016). Impact of age on pain perception for typical painful diagnoses in the emergency department. *The Journal of Emergency Medicine*, 50(1), 14–20.
- De Ruddere, L., & Craig, K. D. (2016). Understanding stigma and chronic pain: a state-of-the-art review. *Pain*, 157(8), 1607–1610. <https://doi.org/10.1097/j.pain.0000000000000512>
- dela Cruz, A. M., Bernstein, I. H., Greer, T. L., Walker, R., Rethorst, C. D., Grannemann, B., Carmody, T., & Trivedi, M. H. (2014). Self-rated measure of pain frequency, intensity, and burden: psychometric properties of a new instrument for the assessment of pain. *Journal of Psychiatric Research*, 59, 155–160. <https://doi.org/10.1016/j.jpsychires.2014.08.003>
- Domenichiello, A. F., & Ramsden, C. E. (2019). The silent epidemic of chronic pain in older adults. *Progress in Neuro-Psychopharmacology & Biological Psychiatry*, 93, 284–290. <https://doi.org/10.1016/j.pnpbp.2019.04.006>
- Dowell, D., Haegerich, T. M., & Chou, R. (2016). CDC guideline for prescribing opioids for chronic pain - United States, 2016. *Morbidity and Mortality Weekly Report: Recommendations and Reports*, 65(1), 1–49. <https://doi.org/10.15585/mmwr.rr6501e1>
- Elliott, A. M., Smith, B. H., Penny, K. I., Smith, W. C., & Chambers, W. A. (1999). The epidemiology of chronic pain in the community. *Lancet*, 354(9186), 1248–1252. [https://doi.org/10.1016/s0140-6736\(99\)03057-3](https://doi.org/10.1016/s0140-6736(99)03057-3)
- Gaskin, D. J., & Richard, P. (2011). The economic costs of pain in the United States. In: *Institute of Medicine (US) Committee on Advancing Pain Research, Care, and Education, Relieving pain in America: A blueprint for transforming prevention, care, education, and research*. National Academies Press.

- Goodyear, K., Ahluwalia, J., & Chavanne, D. (2022). The impact of race, gender, and heroin use on opioid addiction stigma. *Journal of Substance Abuse Treatment*, 143, Article 108872. <https://doi.org/10.1016/j.jsat.2022.108872>
- Grimby-Ekman, A., Gerdle, B., Björk, J., & Larsson, B. (2015). Comorbidities, intensity, frequency and duration of pain, daily functioning and health care seeking in local, regional, and widespread pain - a descriptive population-based survey (SwePain). *BMC Musculoskeletal Disorders*, 16, Article 165. <https://doi.org/10.1186/s12891-015-0631-1>
- Groenewald, C. B., Murray, C. B., Battaglia, M., Scaini, S., & Quinn, P. D. (2022). Prevalence of Pain Management Techniques Among Adults With Chronic Pain in the United States, 2019. *JAMA Network Open*, 5(2), e2146697. <https://doi.org/10.1001/jamanetworkopen.2021.46697>
- Grol-Prokopczyk, H. (2017). Sociodemographic disparities in chronic pain, based on 12-year longitudinal data. *Pain*, 158(2), 313–322. <https://doi.org/10.1097/j.pain.00000000000000762>
- Helme, R. D., & Gibson, S. J. (2001). The epidemiology of pain in elderly people. *Clinics in Geriatric Medicine*, 17(3), 417–431. [https://doi.org/10.1016/s0749-0690\(05\)70078-1](https://doi.org/10.1016/s0749-0690(05)70078-1)
- Hibbard, J. H., Mahoney, E. R., Stock, R., & Tusler, M. (2007). Do increases in patient activation result in improved self-management behaviors? *Health Services Research*, 42(4), 1443–1463. <https://doi.org/10.1111/j.1475-6773.2006.00669.x>
- Hibbard, J. H., Stockard, J., Mahoney, E. R., & Tusler, M. (2004). Development of the Patient Activation Measure (PAM): conceptualizing and measuring activation in patients and consumers. *Health Services Research*, 39(4 Pt 1), 1005–1026. <https://doi.org/10.1111/j.1475-6773.2004.00269.x>
- Hirsh, A. T., Anastas, T. M., Miller, M. M., Quinn, P. D., & Kroenke, K. (2020). Patient race and opioid misuse history influence provider risk perceptions for future opioid-related problems. *The American Psychologist*, 75(6), 784–795. <https://doi.org/10.1037/amp0000636>
- Hoffman, K. M., Trawalter, S., Axt, J. R., & Oliver, M. N. (2016). Racial bias in pain assessment and treatment recommendations, and false beliefs about biological differences between blacks and whites. *Proceedings of the National Academy of Sciences of the United States of America*, 113(16), 4296–4301. <https://doi.org/10.1073/pnas.1516047113>
- Hollingshead, N. A., Ashburn-Nardo, L., Stewart, J. C., & Hirsh, A. T. (2016). The Pain Experience of Hispanic Americans: A Critical Literature Review and Conceptual Model. *The journal of pain*, 17(5), 513–528. <https://doi.org/10.1016/j.jpain.2015.10.022>
- Hünemann, P., & Louw, B. (2023). On the nuisance of control variables in causal regression analysis. *Organizational Research Methods*, 28(1), 138–151. <https://doi.org/10.1177/10944281231219274>
- Huntoon, E. (2013). Education and training of pain medicine specialists in the United States. *European Journal of Physical and Rehabilitation Medicine*, 49(1), 103–106.
- International Association for the Study of Pain. (n.d.). *Terminology*. <https://www.iasp-pain.org/resources/terminology/?ItemNumber=1698#Pain>
- Johannes, C. B., Le, T. K., Zhou, X., Johnston, J. A., & Dworkin, R. H. (2010).

- The prevalence of chronic pain in United States adults: results of an Internet-based survey. *The Journal of Pain*, 11(11), 1230–1239.
<https://doi.org/10.1016/j.jpain.2010.07.002>
- Keith, M. G., Tay, L., & Harms, P. D. (2017). Systems perspective of Amazon Mechanical Turk for organizational research: review and recommendations. *Frontiers in psychology*, 8, 1359.
<https://doi.org/10.3389/fpsyg.2017.01359>
- Lechner, S., Herzog, W., Boehlen, F., Maatouk, I., Saum, K. U., Brenner, H., & Wild, B. (2016). Control preferences in treatment decisions among older adults - Results of a large population-based study. *Journal of Psychosomatic Research*, 86, 28–33.
<https://doi.org/10.1016/j.jpsychores.2016.05.004>
- Lippold, K. M., Jones, C. M., Olsen, E. O., & Giroir, B. P. (2019). Racial/Ethnic and Age Group Differences in Opioid and Synthetic Opioid-Involved Overdose Deaths Among Adults.
- Matthias, M. S., Hirsh, A. T., Ofner, S., & Daggy, J. (2022). Exploring the relationships among social support, patient activation, and pain-related outcomes. *Pain Medicine*, 23(4), 676–685.
<https://doi.org/10.1093/pm/pnab306>
- McLoughlin, M., Imran, A., Hannigan, A., & Harmon, D. (2017). Does age impact on expectations and concerns of patients attending a chronic pain clinic? *Pain Practice*, 18(1), 23–28.
<https://doi.org/10.1111/papr.12576>
- Nahin, R. L., Feinberg, T., Kapos, F. P., & Terman, G. W. (2023). Estimated Rates of Incident and Persistent Chronic Pain Among US Adults, 2019-2020. *JAMA network open*, 6(5), e2313563.
<https://doi.org/10.1001/jamanetworkopen.2023.13563>
- Nicola, M., Correia, H., Ditchburn, G., & Drummond, P. (2021). Invalidation of chronic pain: a thematic analysis of pain narratives. *Disability and Rehabilitation*, 43(6), 861–869.
<https://doi.org/10.1080/09638288.2019.1636888>
- Oloruntoba, O., Bergeron, C. D., Zhong, L., Merianos, A. L., Sherman, L. D., Kew, Goidel, R. K., C. L., & Smith, M. L. (2024). Pharmacological prescribing and satisfaction with pain treatment among non-Hispanic black men with chronic pain. *Patient Preference and Adherence*, 18, 187–195.
<https://doi.org/10.2147/PPA.S435652>
- Patrick, J. H., Nehrkorn, A. M., & Knepple Carney, A. (2016, April). Crowd sourcing in aging research: Some cautions and best practices. *Adult Development & Aging News*.
<https://www.apadivisions.org/division-20/publications/newsletters/adult-development/2016/04/crowd-sourcing>
- Peck, B. M. (2011). Age-related differences in doctor-patient interaction and patient satisfaction. *Current Gerontology and Geriatrics Research*, 2011, Article 137492.
<https://doi.org/10.1155/2011/137492>
- Pitcher, M. H., Von Korff, M., Bushnell, M. C., & Porter, L. (2019). Prevalence and profile of high-impact chronic pain in the United States. *The Journal of Pain*, 20(2), 146–160.
<https://doi.org/10.1016/j.jpain.2018.07.006>
- Rikard, S. M., Strahan, A. E., Schmit, K. M., & Guy, G. P., Jr. (2023). Chronic pain among adults - United States, 2019-2021. *Morbidity and Mortality Weekly Report*, 72(15), 379–385.
<https://doi.org/10.15585/mmwr.mm7215a1>
- Salamon, K. S., Davies, W. H., Fuentes, M. R., Weisman, S. J., & Hainsworth, K. R.

- (2014). The pain frequency-severity-duration scale as a measure of pain: preliminary validation in a pediatric chronic pain sample. *Pain Research and Treatment*, 2014, Article 653592. <https://doi.org/10.1155/2014/653592>
- Simon, L. S. (2012). Relieving pain in America: A blueprint for transforming prevention, care, education, and research. *Journal of Pain & Palliative Care Pharmacotherapy*, 26(2), 197–198. <https://doi.org/10.3109/15360288.2012.678473>
- Simons, D. J., & Chabris, C. F. (2012). Common (mis)beliefs about memory: a replication and comparison of telephone and Mechanical Turk survey methods. *PloS One*, 7(12), e51876. <https://doi.org/10.1371/journal.pone.0051876>
- Thapa, S., Shmerling, R. H., Bean, J. F., Cai, Y., & Leveille, S. G. (2019). Chronic multisite pain: evaluation of a new geriatric syndrome. *Aging Clinical and Experimental Research*, 31(8), 1129–1137. <https://doi.org/10.1007/s40520-018-1061-3>
- Thielke, S., Sale, J., & Reid, C. (2012). Aging: Are these 4 pain myths complicating care? *Journal of Family Practice*, 61(11), 666–670.
- Treede, R. D., Rief, W., Barke, A., Aziz, Q., Bennett, M. I., Benoliel, R., Cohen, M., Evers, S., Finnerup, N. B., First, M. B., Giamberardino, M. A., Kaasa, S., Kosek, E., Lavand'homme, P., Nicholas, M., Perrot, S., Scholz, J., Schug, S., Smith, B. H., ... Wang, S. J. (2015). A classification of chronic pain for ICD-11. *Pain*, 156(6), 1003–1007. <https://doi.org/10.1097/j.pain.0000000000000160>
- Turner, A. M., Engelsma, T., Taylor, J. O., Sharma, R. K., & Demiris, G. (2021). Recruiting older adult participants through crowdsourcing platforms: Mechanical Turk versus Prolific Academic. *AMIA Annual Symposium Proceedings*. 1230–1238.
- U.S. Centers for Disease Control and Prevention. (2024). Understanding the Opioid Overdose Epidemic. <https://www.cdc.gov/opioids/basics/epidemic.html>
- U.S. Department of Health and Human Services. (2017). Determination that a public health emergency exists. https://www.cms.gov/About-CMS/Agency-Information/Emergency/Downloads/October_26_2017_Public_Health_Declaration_for_Opioids_Crisis.pdf
- U.S. Pain Foundation. (2022). *A Chronic Pain Crisis: 2022 Survey Report*. <https://uspainfoundation.org/wp-content/uploads/2022/07/A-Chronic-Pain-Crisis-US-Pain-2022-FINAL.pdf>
- Yong, R. J., Mullins, P. M., & Bhattacharyya, N. (2022). Prevalence of chronic pain among adults in the United States. *Pain*, 163(2), e328–e332. <https://doi.org/10.1097/j.pain.00000000000002291>
- You, D. S., Ziadni, M. S., Hettie, G., Darnall, B. D., Cook, K. F., Von Korff, M. R., & Mackey, S. C. (2022). Comparing perceived pain impact between younger and older adults with high impact chronic pain: a cross-sectional qualitative and quantitative survey. *Frontiers in Pain Research*, 3, Article 850713. <https://doi.org/10.3389/fpain.2022.850713>
- Zajacova, A., Grol-Prokopczyk, H., & Zimmer, Z. (2021). Pain trends among American adults, 2002-2018: Patterns, disparities, and correlates. *Demography*, 58(2), 711–738. <https://doi.org/10.1215/00703370-8977691>