

# Over 50 years of research on social disparities in pain and pain treatment: a scoping review of reviews

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## Abstract

Research on social disparities in pain and pain treatment has grown substantially in recent decades, as reflected in a growing number of review articles on these topics. This scoping review of reviews provides a macrolevel overview of scholarship in this area by examining what specific topics and findings have been presented in published reviews. We searched CINAHL, Cochrane Database of Systematic Reviews, Embase, PsycINFO, PubMed, and Web of Science for English-language, peer-reviewed review articles, qualitative or quantitative, that aimed to characterize or explain pain-related differences or inequities across social groups. Of 4432 unique records screened, 397 articles, published over a 56-year period, were included. For each, we documented (1) axes of social difference studied (eg, sex/gender, race/ethnicity), (2) pain-related outcomes (eg, chronic pain prevalence), (3) broad findings, (4) types of mechanisms proposed, and (5) policy or practice recommendations. Findings reveal a sharp increase in the number of published review articles on pain-related disparities since approximately the year 2000. The most commonly studied social dimension was sex/gender, followed by race/ethnicity and age. Studies examining disparities by socioeconomic status, geography, or other categories were rarer. While most findings showed disadvantaged social groups to have worse pain outcomes, there were intriguing exceptions. Biological, psychological, and sociocultural mechanisms were considered much more frequently than sociostructural (macrolevel) ones. Policy/practice recommendations were typically individual-level behavioral suggestions for providers or patients. We identify high-priority areas for future research, including greater attention to lower-income countries, chronic pain prevention, and macrolevel drivers of pain disparities.

**Keywords:** Health inequities, Pain disparities, Pain epidemiology, Sociodemographic disparities

## 1. Introduction

In the late 20th century, interest in health disparities began to grow rapidly in academic and government settings in the United States, the United Kingdom, and elsewhere.<sup>8,24</sup> By 2003, the first annual *National Health Care Disparity Report* described health disparities in the United States as a pervasive national problem that affects “all medical conditions” and extracts high personal and societal costs, including preventable morbidity,

disability, and mortality.<sup>1</sup> Regarding pain in particular, compelling evidence that modifiable social factors drive unequal outcomes has also amassed.<sup>31,38</sup> Given that pain is increasingly accepted as a major public health problem<sup>13</sup>—one with high prevalence, high societal costs, and major consequences for individuals’ daily function, ability to work, mental health, and even will to live<sup>33</sup>—social inequities in pain represent avoidable suffering at a large scale.

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This same time period saw an exponential increase in the publication of medical review articles (on any health-related topic). By 2010, it was estimated that over 4000 systematic reviews were published annually, with “no signs of this [trend] slowing down.”<sup>4</sup> Just as in 1979 Cochrane could argue for the importance of “critical summaries” (ie, reviews) of primary research to synthesize critical information,<sup>4</sup> today one could argue that reviews of reviews may be needed to fully comprehend and evaluate the state of a field.

This study is a scoping review of reviews of social disparities in pain and pain treatment. It summarizes and evaluates what questions are asked and what answers are found in review articles on this topic. Specifically, we ask: (1) What axes of social difference (eg, sex, race/ethnicity, socioeconomic status [SES], etc.) and (2) what pain outcomes (eg, prevalence of a given pain condition) have existing review articles examined? (3) What are the main findings regarding social disparities in pain? (4) What types of mechanisms for social disparities and (5) what policy or practice implications have been proposed?

By focusing on multiple axes of difference (rather than a single one, such as race/ethnicity), we are able to document the relative frequencies of different social dimensions in pain disparities research and track how these have changed over time. We expect that some important social dimensions—especially those whose measurement in pain research is less institutionalized—may be understudied. Our focus on multiple axes of difference also reflects recent scholarship suggesting that important common factors—e.g., stigma—are “fundamental driver[s]” of many types of social disparities.<sup>27</sup> Our approach allows us to assess whether the topical siloing (eg, studying individual social dimensions in isolation) said to hamper health disparities research broadly<sup>15,27</sup> is observed specifically in the pain field.

This effort complements but differs from recent reviews and bibliometric analyses of health inequalities research<sup>6,8,14,15,37</sup> by focusing specifically on pain-related disparities; by considering all axes of difference; by examining reviews rather than primary research articles; by including reviews published over a 56-year period; and by highlighting topics studied rather than geographic/disciplinary affiliations or citation patterns. Overall, this article presents a broad overview of the field of pain disparities research and identifies high-priority areas for further study.

The terms “health disparities,” “health inequities,” and “health inequalities” are used inconsistently and sometimes interchangeably in published research.<sup>8</sup> Whitehead’s foundational definition is explicit that “‘inequity’ has a moral and ethical dimension. It refers to differences which are unnecessary and avoidable, [and] in addition are considered unfair and unjust.”<sup>78</sup> When the phrase “health disparities” was coined in the United States in approximately 1990, it was intended to have a similar meaning.<sup>11</sup> However, both “disparities” and “inequalities” (the latter term often being preferred in Europe, especially the United Kingdom)<sup>15</sup> have also been used to refer to “differences” generally, whether unjust or not.<sup>11,49</sup> Given this diversity of terms and meanings, our search sought out studies referring to “disparities,” “inequities,” “inequalities,” “disadvantage,” “differences,” etc., to identify as many articles addressing relevant topics as possible.

We primarily use the term “disparity” in this article for 2 reasons. First, a recent bibliometric analysis shows that “disparity” has been the most frequently used term in peer-reviewed articles since the early 2000s.<sup>8</sup> Second, although we are primarily interested in unjust, modifiable inequities between social groups à la Whitehead, it is not always straightforward to distinguish such inequities from mere (unavoidable or not-unjust) differences.

Whitehead notes that to deem a situation unjust, “the cause has to be examined,”<sup>78</sup> but causes of group differences in pain are often unknown and not readily disaggregated into unjust vs not-unjust components. If, for instance, women experience chronic pain more often than men due to a combination of putatively inevitable factors, such as biological sex differences, and unjust, modifiable ones, such as undertreatment of women’s pain, then both unavoidable differences and unjust inequities are involved. Such categories may well interact, further complicating the distinction.<sup>73</sup> For these reasons, we include articles that discuss differences across social groups without explicitly identifying them as inequities, as they have the potential to shed light on pain-related inequities rooted in social advantage/disadvantage.

## 2. Methods

Similar to other scoping reviews, which aim to characterize the extent and characteristics of scholarship in a given realm,<sup>54</sup> our study casts a broad net. We set no time limits on our search and did not restrict it to specific “PICO” elements (population, phenomena of interest, context)<sup>3</sup> other than requiring that comparisons occur across social groups and that outcomes be pain-related. Because scoping reviews of reviews have similarities with both standard scoping reviews and systematic reviews, we followed recommended best practices for both types of reviews<sup>3,16,61</sup> whenever applicable.

### 2.1. Search method

Our searches specified no lower limit on year of publication (so could potentially yield articles from database onset onward, although in fact no relevant articles were identified before 1968). The searches covered articles published through December 31, 2023. Databases used, with years of coverage in parentheses, are PubMed (1953-present), PsychInfo (1806-present), Embase (1947-present), CINAHL (1977-present), Web of Science (1945-present for Science Citation Index; 1956-present for Social Sciences Citation Index), and Cochrane Database of Systematic Reviews (2005-present). Searches were completed on April 23, 2024.

We aimed to identify all English-language peer-reviewed review articles about differences/disparities in pain or pain treatment across social groups. Based on arguments for the importance of both quantitative and qualitative reviews in pain research,<sup>68</sup> the greater potential for qualitative reviews to consider multifactorial, multilevel explanations for disparities, and the status of narrative reviews as “the staple of medical literature synthesis,”<sup>4</sup> we include both quantitative and qualitative reviews. We searched for English-language articles that met all 3 of these criteria:

- (1) Identified themselves as reviews (by including “review,” “meta-analysis,” or similar in their title or abstract).
- (2) Addressed pain (as indicated by the appearance in the title of “pain,” or of any of a long list of pain-producing conditions without “pain” in their names, such as “migraine” and “fibromyalgia.” This list represents a merging of pain conditions listed in the introduction to the ACTION/American Pain Society pain taxonomy,<sup>19</sup> in the 2012 U.S. National Health Interview Survey,<sup>56</sup> and in the 2015 Chronic Pain Research Alliance report on chronic overlapping pain conditions).<sup>77</sup>
- (3) Addressed social disparities or differences (as indicated by appearance of terms such as “disparity,” “disparities,” “inequality,” “social determinants,” “racial differences,” “rural-urban differences,” etc. in their title or abstract; or by the

appearance of terms such as “African-American,” “Latino,” “socioeconomic status,” “education,” “health insurance,” “access to care,” etc. in their title). We aimed to include as many axes of difference as possible, including but not limited to the frequently recommended PROGRESS-Plus categories (place, race/ethnicity/culture/language, occupation, gender and sex, religion, education, socioeconomic status, social capital, age, disability, sexual orientation, and other).<sup>37,59</sup> Any social dimension that could be reasonably hypothesized to “stratify health opportunities and outcomes” (<https://www.isshoos.org/>) would be included.

For full details about search terms, see Supplementary Appendix 1, <http://links.lww.com/PAIN/C307> (our generic template for searches), and Supplementary Appendix 2, <http://links.lww.com/PAIN/C307> (showing database-specific searches for each database).

## 2.2. Eligibility criteria

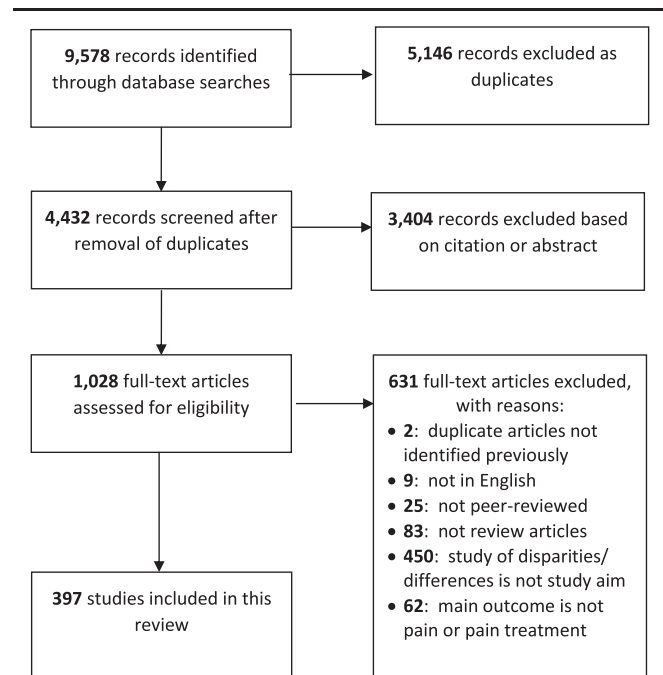
All included studies examined social group differences/disparities in pain or pain treatment. This could include testing for such disparities, summarizing/characterizing them, seeking to explain them (ie, focusing on specific mechanisms), and/or exploring how best to address them. Articles were excluded if they were duplicates, not in English, not peer-reviewed, not review articles, or if pain or pain treatment was not the main outcome of interest. Dissertations and theses were not considered peer-reviewed and hence excluded. Because many pain studies present results separately by sex and/or age but go no further in examining disparities, studies were only included if their abstract described the study of social disparities or differences as a study aim or goal. Some social group comparison was required for inclusion. Thus, for example, articles describing how menstrual hormones shape the timing of women’s migraines, without addressing whether this may contribute to sex differences in migraine, were excluded. Genetic studies that mentioned ethnic groups solely for the purposes of population stratification were excluded. Articles describing animal studies were included if their goal was to help explain group differences in human pain (eg, by clarifying the role of gonadal hormones in sex differences in pain sensitivity<sup>41</sup> or by modeling associations between early life deprivation and later-life pain sensitivity).<sup>64</sup> Because we sought to characterize the field of pain disparities research, we included eligible reviews even if they overlapped in terms of topics or included primary studies with other reviews.

## 2.3. Inclusion coding

Across all searches, 9578 records were identified. EndNote 20 was used to remove duplicates, yielding 4432 unique articles. These were independently coded for inclusion by 5 authors and 1 assistant (H.G., Z.H., C.Y., M.L., S.K., and W.L.), all of whom had received detailed training on inclusion criteria. Over 20% of articles (925; 20.9%) were reviewed by 2 coders, including all ambiguous cases, which were discussed to reach consensus. A total of 397 articles were ultimately included for full coding. **Figure 1** shows the Prisma flowchart for our searches and inclusion coding. Supplementary Appendix 3, <http://links.lww.com/PAIN/C307> gives full citations for all 397 included articles.

## 2.4. Content coding and analyses

The content of the 397 included articles was then coded by 7 authors (H.G., Z.H., C.Y., Y.C., T.L., S.K., M.L.) in an Excel



**Figure 1.** Prisma flowchart.

spreadsheet using a preregistered coding scheme. All of these authors received detailed training in coding protocols. Each article was initially fully coded by 1 of these authors. To ensure intercoder consistency, 166 (41.8%) articles were subsequently coded by 1 or more additional authors, with all ambiguous cases discussed to reach consensus. (Initials of primary and secondary coders are provided in the Excel spreadsheet; URL below.) Key information coded for each article included year of publication, type of review, type of independent variable (ie, type of social difference examined), type of dependent variable (ie, type of pain or pain treatment-related outcome), key findings, types of mechanisms identified (if any), practice or policy recommendations (if any), and—when applicable—number of included articles, age restrictions, and statistical significance of and direction of findings. Reviews involving quantitative analysis often referred to axes of social difference and pain-related outcomes as independent and dependent variables, respectively. We use these terms herein, although qualitative analyses do not necessarily use this terminology.

Anticipated common independent variables (based on previous enumerations of axes of social stratification),<sup>75</sup> dependent variables, mechanisms (based on previous categorizations),<sup>25</sup> and practice/policy recommendations were provided in the spreadsheet as coding options, with an “Other (describe)” option always available to capture unanticipated categories. When initial coding was complete, “Other” entries were reviewed and new categories created for commonly mentioned items. Data were imported into StataMP 17 for analysis. The Excel spreadsheet with codings (and coders’ initials) for all 397 included articles is available online at the Open Science Framework repository ([https://osf.io/rcyx6/?view\\_only=1ef88507b29c47b0bdb4dd6bc92c79d5](https://osf.io/rcyx6/?view_only=1ef88507b29c47b0bdb4dd6bc92c79d5)).

Because many published studies use the terms “sex” and “gender” interchangeably or inconsistently<sup>5</sup>—and because it is often unclear whether sex, gender, and/or both drive observed differences in pain—we classified these together as “sex/gender,” although we acknowledge the widely accepted distinction between the 2.<sup>5</sup> Similarly, because many studies use

“race” and “ethnicity” as synonyms,<sup>40,43</sup> or explicitly argue that the distinction between them is “arbitrary and flawed,”<sup>79</sup> we treated “race/ethnicity” as a single category. We use the terms “racial” and “minority,” rather than “racialized” and “minoritized,” to match the language used in the included articles. We define SES broadly to include closely related concepts such as social class or socioeconomic position.

### 3. Results

#### 3.1. Review types, publication years, and study populations

As shown in **Table 1**, nearly 60% of the 397 included articles were fully qualitative reviews, which neither reported systematic search strategies nor analyzed reviews quantitatively. The remaining reviews all reported conducting systematic searches for articles to include, but varied in whether they analyzed the articles qualitatively (7.6%), quantitatively without meta-analysis (18.4%), or quantitatively with meta-analysis (14.1%). (Some of our analyses below, as indicated, were restricted to subsets of these 4 review types.)

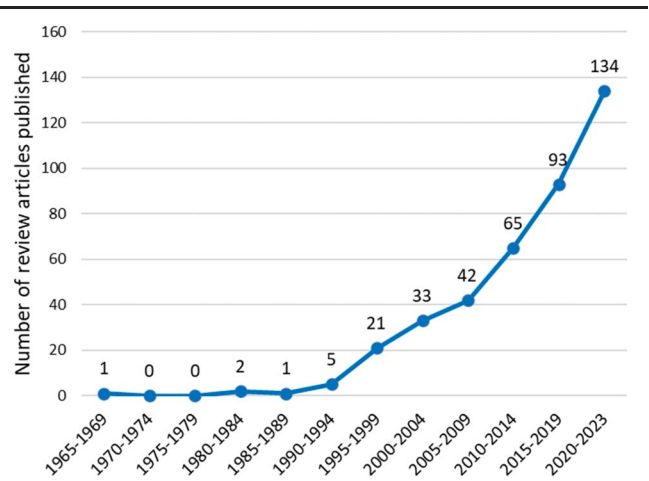
The median year of publication was 2016, indicating that half of the included articles were published in the last 8 years of our study’s period of coverage. Indeed, as shown in **Figure 2**, publication of reviews on social disparities in pain has accelerated rapidly since roughly the turn of the century. The earliest identified review was a 1968 article in an anthropology journal on “differences between ethnocultural groups” in “pain sensation and reaction” (referring primarily to differences in thresholds and tolerance in experimental pain studies).<sup>81</sup> The second-earliest article, describing differences in incidence and prevalence of rheumatoid arthritis by age, sex, and other social categories, was published 13 years later.<sup>30</sup> By the 2000 to 2004 time period, an average of 6.6 reviews were published annually, and by 2020 to 2023, this figure had risen to 33.5 reviews annually.

Reviews conducting qualitative searches typically did not report the number of included studies or study details, such as the geographic source of data. Of the 159 reviews conducting systematic searches (hereafter “systematic reviews”), 147 reported on how many articles they included—which number totaled 5247 articles, or an average of 35.7 articles each. Most used wide time frames in their searches, typically including publication windows of 10 years or longer—although the question of whether disparities have narrowed or widened over time was rarely addressed. Among the 159 systematic reviews, 91 (57.2%) included only studies of adults, 12 (7.5%) included only studies of children and/or adolescents, 27 (17.0%) included both adults and children/adolescents, and 29 (18.2%) did not specify the age of included participants.

**Table 1**  
Type of included review articles (N = 397).

Review type	Percent	N
Qualitative search; qualitative analysis	59.9%	238
Systematic search; qualitative analysis	7.6%	30
Systematic search; quantitative analysis	18.4%	73
Systematic search; meta-analysis	14.1%	56
Total	100.0%	397

Searches were classified as “systematic” if they reported the specific keywords and databases used to identify articles for possible inclusion, or “qualitative” if they did not describe a search strategy. Analyses were classified as “quantitative” if they indicated the statistical significance and direction of findings in included articles, “meta-analyses” if they did so and also pooled and analyzed data from included studies, and “qualitative” if they did neither.



**Figure 2.** Publication year of review articles on social disparities in pain (N = 397), by 5-year time period (except 4 years for 2020-2023).

Forty-nine (30.8%) of the systematic reviews did not provide information about the geographic source of data in included studies. Among the remaining 110 reviews, the most commonly named countries and continents from which data originated are shown in **Table 2**. The United States was by far the most frequently named country (in 65.5% of reviews), followed by other highly economically developed countries and China. North America was the most common continent (in 78.2% of reviews), followed by Europe and then Asia.

#### 3.2. Axes of social difference (“independent variables”)

**Figure 3** shows the key axes of difference (“independent variables”) examined in the included reviews. The most common, by far, was sex/gender, examined in 235 (59.2%) of the 397 reviews. Next were race/ethnicity and age, addressed in 122 and 84 reviews (30.7% and 21.2%), respectively. Socio-economic, cross-national, and within-country (eg, rural vs urban) differences were less common, considered in 52, 42, and 24 reviews (13.1%, 10.6%, and 6.0%), respectively. All other axes of difference, including health insurance status/type, were examined very rarely, each appearing in fewer than 2.5% of reviews. The 6 reviews categorized as “Other” examined pain disparities by religion (2 reviews), sexual identity (2 reviews), nativity (ie, immigrant vs native-born; 1 review), and social capital (1 review; we follow PROGRESS-Plus in considering this distinct from SES).<sup>37</sup> Most reviews (299, or 75.3%) examined precisely 1 axis of difference, but 98 (24.7%) examined 2 or more. Among these 98, well under half (N = 40; 40.8%) examined intersections of independent variables, eg, describing how sex differences (in juvenile arthritis prevalence,<sup>23</sup> migraine prevalence,<sup>67,74</sup> or response to opioids)<sup>58</sup> vary by age or geographic region.

Among the 235 reviews focusing on sex/gender disparities, 8 (3.4%) focused on or included transgender individuals. Of note, all 8 of these were published in 2020 or later; before then, reviews’ classifications of sex/gender were always dichotomous. Among the 122 reviews addressing racial/ethnic disparities in pain, the groups most commonly mentioned were Whites (96 reviews; 78.7%), Blacks (92; 75.4%), Latinos (69; 56.6%), Asian Americans (33; 27.1%), Native Americans (24; 19.7%), and Asians other than Asian Americans (12; 9.8%). No other categories, including multiracial individuals or specific ethnicities (eg, Ashkenazi Jewish), were analyzed in more than 5 reviews.

**Table 2****Geographic sources of data in systematic reviews on social disparities in pain, when specified (N = 110).**

Countries (most common)	N (%)	Continents (most to least common)	N (%)
United States	72 (65.5%)	North America	86 (78.2%)
United Kingdom	34 (30.9%)	Europe	63 (57.3%)
Canada	25 (22.7%)	Asia	53 (48.2%)
Australia	24 (21.8%)	Oceania	27 (24.3%)
China	22 (20.0%)	Africa	21 (19.1%)
Sweden	22 (20.0%)	South America	18 (16.4%)
Netherlands	19 (17.3%)		
France	16 (14.5%)		
South Korea	16 (14.5%)		
Denmark	13 (11.8%)		
Finland	13 (11.8%)		
Spain	13 (11.8%)		
Germany	12 (10.9%)		

Totals exceed 100% since some reviews included data from multiple countries and/or continents. Studies varied in whether they described geography at the country, continental, or subcontinental level. The Continents column aggregates information from any geographic level, so, eg, studies of “Thailand,” “Southeast Asia,” or “Asia” would all be coded as including data from Asia.

Figure 4 shows the relative frequency of the various axes of social difference over time (with articles published before 2000 grouped in a single category due to low numbers). Reviews about age-related pain disparities were relatively common before the year 2000, constituting 26.7% of all reviews. This proportion gradually declined, falling to 8.8% by 2020–2023. Reviews about pain disparities by sex/gender peaked, in relative terms, in 2000 to 2004, when well over half (60.5%) of reviews addressed this topic. The relative share of reviews on sex/gender has declined since then, reaching 40.9% between 2020 and 2023. Simultaneously, reviews about other social disparities, especially racial/ethnic and socioeconomic disparities, have constituted an increasing proportion of reviews since the turn of the century. Despite these changes, sex/gender, race/ethnicity, and until very recently age have been the most common “independent variables” across this 56-year time period, with SES, cross- and within-country geography, and all other axes of social difference being much less common.

### 3.3. Pain or pain treatment outcomes (“dependent variables”) examined

Table 3 summarizes the pain or pain treatment outcomes (“dependent variables”) examined across the 397 reviews. The mean number of outcomes per article was 2.0 [SD: 1.5]. The most frequently examined outcomes, each addressed in at least 20% of reviews, were specific types/locations of chronic pain, pain treatment, treatment response, and experimental pain (assessed through quantitative sensory testing). Of these, the single most common category was specific types/locations of chronic pain, addressed in 163 (41.1%) of the reviews. The most commonly studied chronic pain conditions in our data were arthritis (examined in 70 [42.9%] of the 163 reviews about chronic conditions; most frequently specified as osteoarthritis [66 reviews] and/or rheumatoid arthritis [18 reviews]); irritable bowel syndrome (IBS) (24 reviews [14.7%]); and chronic headache or chronic migraine (16 reviews [9.8%]). A number of chronic conditions with relatively high prevalence and/or high impact on quality of life were less frequently examined, eg, endometriosis [6 reviews], fibromyalgia [5 reviews], temporomandibular disorders [TMD; 3 reviews], and chronic widespread pain [2 reviews].

As also shown in Table 3, the most common aspects of pain addressed in the 397 reviews were prevalence (57.4% of studies), intensity (40.8%), thresholds and/or tolerance (27.2%), pain-related function (24.9%), treatment with prescription medication (21.7%), and incidence (20.9%).

### 3.4. Findings from review articles reporting quantitative findings

For the 129 review articles reporting on the statistical significance of study findings (hereafter “quantitative reviews”), we coded whether findings showed more disadvantaged social groups to have worse, better, or not statistically different pain-related outcomes—or some combination of these categories—vis-à-vis more privileged groups (defined as noted in Fig. 5). Because some articles addressed multiple axes of difference, there were 161 sets of findings across the 129 articles.

Broad findings are summarized in the left-most set of bars in Figure 5, and findings specifically regarding differences by age, sex/gender, race/ethnicity, socioeconomic status, and country

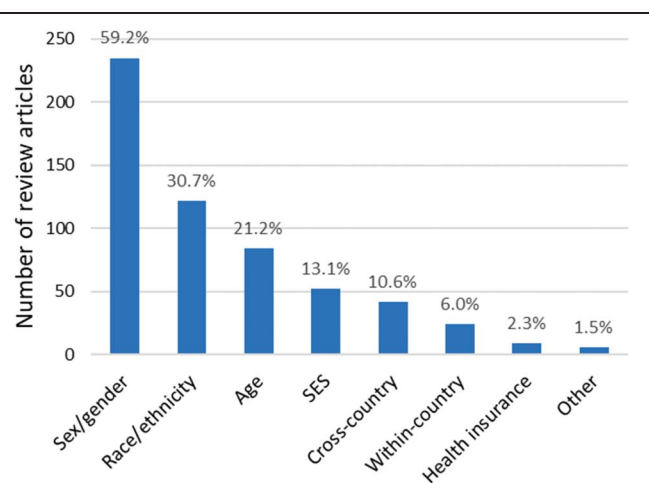
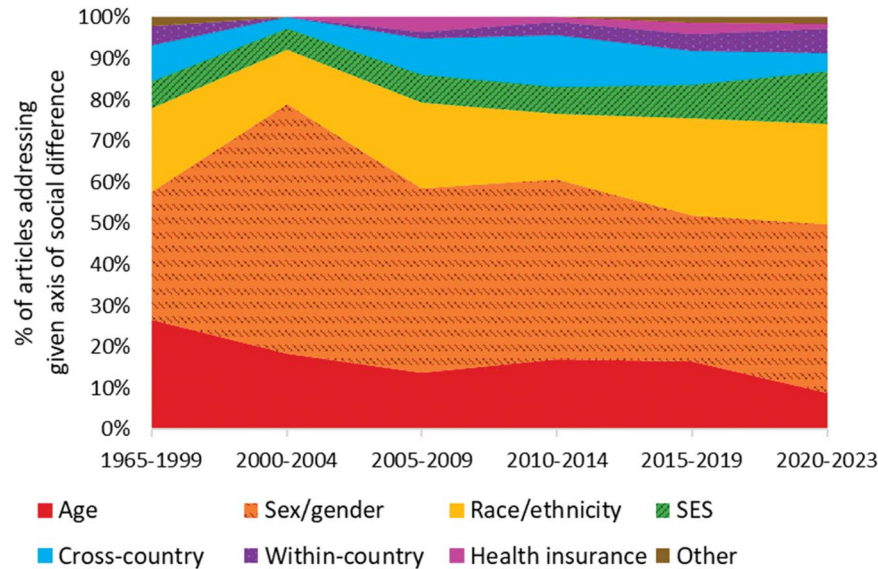


Figure 3. Number of review articles about social disparities in pain, by axis of social difference.



**Figure 4.** Percentage of review articles (N = 397) addressing specific axes of social difference, by time period.

are shown in the subsequent sections. Few quantitative reviews addressed within-country pain disparities (N = 5), health insurance (N = 1), or any other axis of difference (social capital; N = 1) and so are not shown in the figure.

As the left-most section of **Figure 5** shows, overall, most quantitative reviews found evidence that disadvantaged social groups have worse pain outcomes than more privileged ones—either exclusively worse outcomes (red bar; 74 [46.0%] of 161 sets of findings), or a combination of worse and similar outcomes (orange bar; 28 sets of findings [17.4%]). It was also somewhat common to report a mix of worse and better pain outcomes for disadvantaged groups (green bar; 28 sets of findings [17.4%]). Findings that disadvantaged social groups have *better* pain outcomes—either a mix of better and similar outcomes (light blue bar; 5 sets of findings [3.1%]) or exclusively better ones (darker blue bar; 12 sets of findings [7.5%])—were rarer, but present nonetheless. In 14 cases (8.7% of findings), no significant differences in pain outcomes were found (gray bar).

The exact pattern of findings varied across axes of social difference. Reviews about pain disparities by sex/gender, race/ethnicity, and SES were very consistent in finding worse outcomes for disadvantaged groups; exceptions to this pattern were observed but were rare. By contrast, reviews addressing differences by age reported a mix of better and worse outcomes for older individuals nearly as often as they reported exclusively worse ones. Reviews focused on cross-national differences were equally likely to find that poorer/less developed countries had *better* pain outcomes than richer/more developed ones as they were to find the opposite.

Owing to space constraints, a more detailed account of quantitative reviews’ findings, organized by axis of difference and including illustrative examples, appears in Appendix 4, <http://links.lww.com/PAIN/C307>. These findings are also summarized very briefly in **Table 4**.

### 3.5. Findings regarding mechanisms underlying social disparities in pain

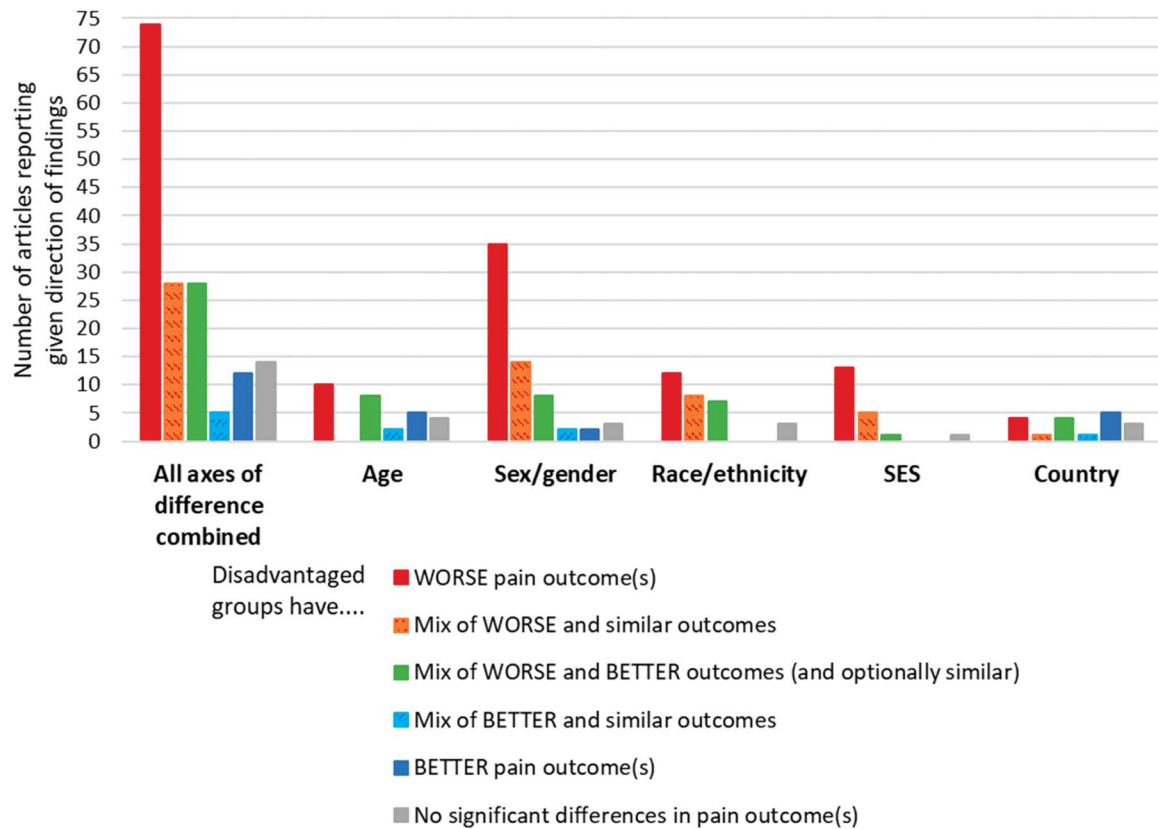
Approximately half (203, or 51.1%) of the 397 review articles explicitly described elucidation of mechanisms underlying social disparities in pain as a study goal. An even larger share—355, or

91.5%—actually discussed mechanisms, although 50 (12.6%) did so minimally, in 3 sentences or less. **Table 5** presents the types of mechanisms discussed, classified into 4 broad categories (biological, psychosociocultural, sociostructural, and other factors), as well as more specific subcategories.

**Table 3**  
**Pain or pain treatment outcomes examined in 397 reviews on social disparities in pain.**

	Percent	N
Category of pain or pain treatment		
Chronic pain, specific type/bodily location	41.1	163
Treatment (type, dosage, etc.)	39.0	155
Treatment response	24.9	99
Acute pain, experimental	21.7	86
Chronic pain, general	18.9	75
Pain, general (not identified as acute or chronic)	17.6	70
Pain, specific type/location (not identified as acute or chronic)	14.9	59
Postsurgical pain	8.3	33
Cancer pain	6.8	27
Acute pain, general	6.3	25
Acute pain, specific type/location	3.3	13
Aspect of pain condition or treatment examined		
Prevalence	57.4	228
Pain intensity	40.8	162
Thresholds/tolerance	27.2	108
Pain-related function	24.9	99
Treatment: Prescription (yes/no, or type)	21.7	86
Incidence	20.9	83
Treatment: Prescription dosage	15.4	61
Duration	12.3	49
Treatment: Other treatment types (eg, physical therapy, complementary and alternative; yes/no)	6.1	24
Pain assessment (by provider)	5.8	23
Treatment: Surgery or other procedure (yes/no)	4.3	17
Diagnosis, including time to diagnosis	3.3	13
Pain-related mental health (eg, depression)	3.3	13

Totals exceed 397 (100%) since some reviews addressed multiple types of pain outcomes. The mean number of outcome categories discussed per article was 2.0 (SD: 1.5).



**Figure 5.** Direction of findings regarding disparities in pain or pain treatment among 129 quantitative review articles, overall and by specific axes of difference.

As **Table 5** shows, biological and psychosociocultural mechanisms were the most commonly discussed, each invoked by 61.2% of articles. Sociostructural mechanisms, which included both health systems factors (eg, unaffordable or inaccessible health care, specialty providers, or analgesics) and other environmental or contextual factors (including neighborhood, job, or family characteristics [eg, unsafe or unwalkable neighborhoods], or suboptimal public health policies), were less frequently discussed, mentioned by 30.5% of articles. The “other” mechanisms category primarily included provider factors (mentioned in 28.2% of articles) and methodological factors such as group reporting differences (17.6% of articles). (Provider factors could not be subsumed into the other broad categories, since they sometimes reflected psychosociocultural factors [eg, individual-level bias or stereotyping] and sometimes sociostructural ones [eg, insufficient training]). Additional mechanisms were often theoretically interesting but mentioned less often (in 1–15 articles); these included SES (as a mechanism of other types of disparities), history of sexual or physical abuse or other life course factors, medication overuse, and comorbidities.

The broad types of mechanisms invoked to explain social disparities in pain varied considerably across axes of differences, as shown in **Figure 6**. Reviews that were focused on age or sex/gender disparities emphasized biological, and to a slightly lesser extent psychosociocultural explanations, with relatively few articles (29.8% and 15.7% for age and sex/gender, respectively) describing sociostructural mechanisms. In contrast, among studies of racial/ethnic and socioeconomic disparities, psychosociocultural and sociostructural mechanisms were the most frequently invoked (in 71.3% and 58.2% of articles about race/ethnicity, respectively, and 51.9% and 48.1% of articles about SES), while biological mechanisms were mentioned much less

frequently. It is unclear whether these findings reflect genuine differences in drivers of pain disparities, differences in researcher interests across different areas of social disparities research, or some combination of the two. The potential commonality of mechanisms across multiple axes of difference was rarely discussed.

### 3.6. Policy or practice recommendations

**Table 6** summarizes the policy/practice recommendations made in the 397 review articles regarding how to reduce social disparities in pain or pain treatment. A large portion of articles (178, or 44.8%) made no recommendations. When recommendations were made, the most common broad suggestion was to improve pain treatment or management (suggested in 39.0% of all articles), through specific means such as improving assessment tools (9.3% of all articles), addressing sociocultural factors (7.8%), or customizing treatment based on group membership (16.1%). (A smaller number of articles [4.8%] argued *against* customizing treatment based on group membership, instead supporting standardization of treatment/management practices.) Other broad categories of recommendations, in order of popularity, were to increase or improve pain-related research (34.3% of articles), provide or improve provider or patient education (18.1%), make sociostructural (eg, policy) changes (14.6%), address provider or broader societal stigma (7.8%; with “stigma” here defined to encompass stereotyping, discrimination, etc.),<sup>27</sup> and to prevent pain (2.0%). Recommendations were typically very brief and vague rather than detailed, actionable proposals.

We also took note of the intended audience of each policy/practice recommendation. Of the 219 articles that did make such

**Table 4**  
**Very brief summaries of findings from 129 quantitative review articles on social disparities in pain.**

Social dimension	# Reviews	Findings
Age	29	Reviews most frequently found curvilinear associations between age and pain, with prevalence of chronic conditions peaking in mid-life
Sex/gender	64	The large majority of articles found girls/women to have greater incidence and prevalence of pain conditions, to report greater pain intensity for a given condition, and to show greater experimental pain sensitivity
Race/ethnicity	30	The most common finding was that racial/ethnic minority patients receive worse pain treatment than White patients, evidenced by providers' underestimation of pain and lower rates of pharmacological and surgical treatment. Findings that minorities have higher pain prevalence than Whites were rare, however
SES	20	The majority of studies reported higher prevalence of pain conditions or worse pain-related disease outcomes among individuals with lower socioeconomic status
Country/region	18	The majority of studies compared the prevalence of chronic pain conditions across countries or global regions. They came to mixed conclusions regarding whether prevalence is higher, lower, or similar in more vs less developed areas

See Supplementary Appendix 4, <http://links.lww.com/PAIN/C307> for more detailed summaries, including citations to referenced studies. Totals exceed 129 since some reviews addressed multiple axes of social difference.

SES, socioeconomic status.

recommendations, three-quarters (164; 74.9%) addressed the recommendations to health care providers, and over half (136; 62.1%) addressed researchers. Smaller numbers of articles targeted recommendations to patients (32; 14.6%) or to actors outside the clinical setting (including policy makers and insurers) (60; 27.4%). Sometimes (in 23.3% of cases) it was unclear whether recommendations were directed to patients, providers, or both in tandem (eg, when calling for improved patient-provider communication).

### 3.7. Quality assessment of included reviews

Assessment of the quality of included reviews was complicated by several factors. First, a majority of the reviews (59.9%) were entirely qualitative (ie, included neither systematic searches nor quantitative analysis of findings), and another 7.6% conducted systematic searches but analyzed them qualitatively. We are aware of no established protocol for assessing the quality of such reviews. Second, the quantitative reviews (those conducting systematic searches and quantitative analyses of findings) varied in whether they included (observational) epidemiological studies, randomized trials, nonrandomized studies of healthcare interventions, etc., and in whether they conducted meta-analyses. Different types of reporting guides or quality assessment tools may apply to each of these.<sup>12,70</sup> Moreover, many quantitative reviews were published before the aforementioned quality assessment tools were established; hence, it would be unreasonable to expect them to adhere to all recommendations. For example, the AMSTAR 2 recommendations for studies of healthcare interventions were published in 2017<sup>70</sup>—later than 53.9% of our quantitative reviews. AMSTAR 2 recommends

preregistering review protocols with PROSPERO, which did not exist until 2011 and was not widely publicized until 2012<sup>7</sup>—after 30.8% of our quantitative reviews were published.

These complications notwithstanding, we attempted to conduct some assessments of review quality, focusing on reviews published after 2011. Among quantitative reviews in this period, only 23.2% reported registering with a prospective registry such as PROSPERO. This number rose to 50% among studies published in 2020 or later. The proportion of post-2011 quantitative reviews noting adherence to specific reporting guidelines, such as MOOSE or PRISMA, was higher: 63.9% overall, and 80.8% among articles published in 2020 or later. Approximately three-quarters of all post-2011 quantitative reviews reported conducting some quality assessment of included studies (77.6%). Among all reviews conducting systematic searches, 70.7% provided sufficient information for their searches to be replicated. While these findings suggest that some key features of high-quality reviews were absent in many cases, more careful examination of individual studies, taking into account specific study designs and goals, would be needed to determine this with confidence. Quality-related codings for all articles are included in the online coding spreadsheet ([https://osf.io/rcyx6/?view\\_only=1ef88507b29c47b0bdb4dd6bc92c79d5](https://osf.io/rcyx6/?view_only=1ef88507b29c47b0bdb4dd6bc92c79d5)).

## 4. Discussion

### 4.1. Discussion of time period and geographic focus

Our search identified 397 English-language review articles focused on disparities in pain or pain treatment. They spanned a 56-year period, beginning with an article published in 1968. Reviews appeared infrequently until the late 1990s, at which point they began to surge in number. Indeed, over one-third (33.9%) of included reviews were published in 2020 to 2023, demonstrating the recent, rapid growth of interest in this topic.

Among systematic reviews specifying the geographic source of their data, a majority focused on North America (78.2%) (primarily the United States [65.5%]) and/or Europe (57.3%). In general, wealthy countries were heavily overrepresented relative to their share of the world's population. Although we included only English-language articles, other reviews of health disparities research without this restriction report that 96+ % of identified articles were in English,<sup>8,40</sup> suggesting that our language criterion did not substantially bias our geographic (or other) findings. We thus echo calls to support and expand pain research in and on low- and middle-income countries: Too little is known about health disparities among the 85% of the world's population living there.<sup>69</sup>

### 4.2. Discussion of studied topics

The most common axes of social difference examined in our set of reviews were sex/gender (in 59.2% of articles), race/ethnicity (30.7%), and age (21.2%). A smaller number of reviews addressed disparities by socioeconomic status (SES; 13.1%), country (10.6%), or subnational geography (6.0%). The only other axes of difference that were examined—health insurance status, religion, sexual identity, immigration status, and social capital—appeared very rarely (in 0.3%-2.3% of articles). Overall, the “big 3” of sex/gender, race/ethnicity, and age dominated as research topics over the last half century, although since 2000 a relative decrease in studies on sex/gender and age, and concomitant increase in studies on race/ethnicity and SES, was observed.

**Table 5****Types of mechanisms discussed in 397 review articles on social disparities in pain.**

Type of mechanisms discussed	Percent of articles	No. of articles
Biological factors (any or all of below subcategories)	61.2	243
Biological: Hormonal	38.5	153
Biological: Neurophysiological	27.5	109
Biological: Other or unspecified	27.5	109
Biological: Genetic	25.9	103
Psychosociocultural factors (either or both of below)	61.2	243
Sociocultural (eg, lifestyles, financial resources)	52.6	209
Psychological (eg, stress, mental health, catastrophizing)	37.0	147
Sociostructural factors (either or both of below)	30.5	121
Environmental/contextual (eg, neighborhood characteristics; local opioid availability)	19.1	76
Health system factors (eg, access or language barriers)	17.9	71
Other factors (any or all of below subcategories)	47.6	189
Provider factors (eg, provider bias, treatment decisions)	28.2	112
Methodological concerns (eg, reporting differences)	17.6	70
Rarely mentioned factors (eg, SES, history of abuse)	12.6	50
None: No mechanism discussed	10.6	42

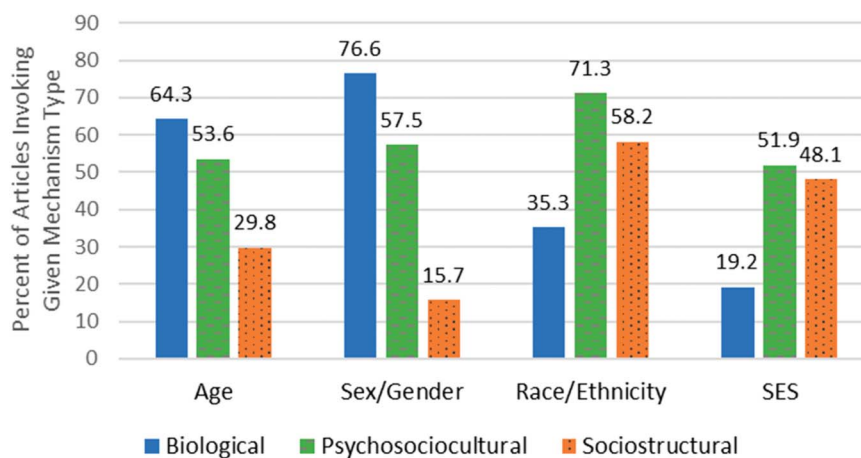
Totals exceeds 397 since many articles described more than 1 category of mechanisms. The mean number of specific mechanism categories discussed per article was 3.0 (SD: 1.9). SES, socioeconomic status.

The historical dominance of research on sex/gender, race/ethnicity, and age is perhaps unsurprising, given that specific social identities are most likely to become prominent in research when “the identity is already socially salient” and when it is “authorized by state classifications.”<sup>21</sup> Sex/gender, race/ethnicity, and age are typically highly socially salient, and have been institutionalized by many government agencies and funders—eg, the U.S. National Institutes of Health (NIH) and Food and Drug Administration have since the 1980s repeatedly issued guidelines calling for collection and analysis of data by precisely these characteristics.<sup>21</sup> However, pain disparities research appears to emphasize these 3 more heavily than health disparities research broadly, which examines aspects of SES (eg, education and income) much more frequently, according to a recent scoping review.<sup>37</sup>

It is worth considering whether the broad goal of reducing pain inequities is well-served by this heavy focus on sex/gender, race/ethnicity, and age. After all, SES is arguably the strongest predictor of health disparities generally,<sup>20,21,50</sup> and of pain disparities in particular<sup>26</sup>; it is also often a key mediator

of other disparities, including the more commonly studied ones.<sup>48</sup> Given this, we contend that SES should be a central rather than peripheral topic in pain disparities research. Moreover, conceptualized broadly, SES comprises both multiple individual-level characteristics (such as educational attainment, income, and/or wealth) and sociostructural/contextual characteristics of neighborhoods or larger geographic units.<sup>38</sup> The relative importance of these components, including geographic characteristics, deserves greater attention among pain scholars.

We found no review articles that examined the PROGRESS-Plus category<sup>37</sup> of disability status, and very few that focused on sexual orientation/identity or social capital (N = 2 and N = 1, respectively). Reviews on axes of social difference suggested elsewhere (eg, refugee or incarceration status)<sup>17</sup> were also absent. Moreover, within a given axis of difference, specific categories were often limited, as when most studies of race/ethnicity—reflecting the dominance of U.S.-based research—examined categories salient in the United States but not necessarily in other world regions,<sup>2</sup> or when



**Figure 6.** Percent of review articles invoking given broad mechanism category to explain pain disparities, for articles focusing on disparities by age, sex/gender, race/ethnicity, or socioeconomic status (SES).

**Table 6****Policy/practice recommendations in 397 review articles on social disparities in pain.**

Broad substance of recommendation	Percent of articles	No. of articles
Improve pain treatment/management (any or all of below)	39.0	155
Vary treatment based on group membership	16.1	64
Improve pain treatment/management broadly	10.1	40
Improve assessment tools/methods	9.3	37
Address sociocultural factors (in pain treatment/management)	7.8	31
Improve patient-provider communication/relationships	7.8	31
Use nonpharmacological interventions	5.8	23
Standardize/do not vary treatment based on group membership	4.8	19
Support self-management of pain	2.5	10
Address psychosocial factors (in pain treatment/management)	2.3	9
Provide telehealth options	1.3	5
Improve pain-related research (either or both of below)	34.3	136
Conduct additional research/data collection	31.0	123
Increase minority representation, e.g., in clinical trials or in workforce	6.6	26
Provide/improve education (either or both of below)	18.1	72
Educate health care providers or researchers	14.1	56
Educate patients	8.1	32
Make sociostructural (eg, policy) changes	14.6	58
Address stigma/attitudes (either or both of below)	7.8	31
Avoid/counter stigma (broadly defined) by healthcare providers	7.6	30
Avoid/counter stigma (broadly defined) by others	2.0	8
Other recommendations	5.0	20
Prevent pain: Promote strategies for pain prevention	2.0	8
None: No policy/practice recommendation made	44.8	178

Total exceeds 397 since some articles made more than 1 category of recommendation. The mean number of policy/practice recommendations per article was 1.6 (SD: 2.0).

sex/gender was, until the year 2020, strictly dichotomized (a practice institutionalized in many national and global health surveys).

Throughout the study period, a relatively small share of articles (40, or 10.1%) focused on intersections of 2 or more axes of difference, despite recent (and not-so-recent) evidence that social categories interact consequentially in shaping health.<sup>10,80</sup> Although many narrative reviews considered multiple outcomes (eg, summarizing differences by sex in experimental, acute, and chronic pain), far fewer studies engaged deeply with multiple axes of difference (even in parallel, not necessarily in interaction). When they did, the focus was often on mere documentation of patterns, rather than assessment of possible common mechanisms. The topical siloing noted in health disparities research broadly<sup>15,27</sup> appears to be mirrored in the pain field. Overall, our findings about “independent variables” suggest that incorporating additional social dimensions could be beneficial to pain disparities research; that such social dimensions or their constituent categories might vary across contexts and/or change over time; and that studying intersections or combinations of multiple social dimensions could yield important insights.

The most commonly studied pain-related outcomes were specific types of chronic pain (most frequently arthritis, IBS, and headache/migraine), prescription pain treatments or treatment responses, and experimental pain outcomes. Some prevalent and/or highly debilitating chronic conditions, including some chronic overlapping pain conditions,<sup>77</sup> were examined in very few reviews (endometriosis, fibromyalgia, TMD, and chronic widespread pain), or in no reviews (vulvodynia). Although a large number of articles examined treatment type and/or treatment response, they focused heavily on prescription drugs: Only 4.3% of reviews examined disparities in surgery or other procedures, and only 6.1% considered all other treatment types, including

physiotherapy, complementary and alternative medicine, and self-management. Overall, we found that reviews about disparities in certain important pain conditions and/or pain treatments were sparse or absent.

#### 4.3. Discussion of findings regarding disparities

The majority of review articles, as might be expected, indicated that individuals from disadvantaged social categories experience worse pain-related outcomes. This pattern was very consistent in articles on sex/gender, which nearly always found women to have greater pain incidence, prevalence, intensity, and sensitivity than men. As 1 included article noted regarding sex differences in chronic pain, “there seems to be no debate with regard to whether they exist, only with regard to the nature of the underlying mechanisms.”<sup>72</sup> Although more limited in number, reviews focusing on SES also almost always found higher incidence and prevalence of chronic pain conditions, and/or worse disease outcomes, among those with lower SES.

Reviews were generally consistent in finding racial/ethnic minorities to have worse pain-related outcomes than Whites, especially pain treatment-related outcomes. Evidence of higher pain prevalence among racial/ethnic minorities was rarer, consistent with the unexpected but robust findings in the United States that Black adults overall have lower pain prevalence than White adults.<sup>82</sup> Conditional on having pain, however, minorities were found to have greater disability, to receive worse care from providers, and to be underrepresented in clinical trials, and Black individuals were found to have lower experimental pain tolerance than White ones.<sup>65</sup>

Findings regarding pain disparities by age were more complex, both for experimental pain (where findings varied by specific

outcome) and clinical pain. Most frequently, the prevalence of chronic pain conditions showed an inverted U-shaped association with age, with prevalence peaking in mid-life. Some studies suggested plausible mechanisms for later-life reductions in pain risk (eg, postmenopausal hormonal changes reducing risk of migraine),<sup>74</sup> while others struggled to do so (eg, “it is difficult to understand why the prevalence of back pain would decrease with increasing age”).<sup>18</sup> Of note, all reviews on this topic relied on cross-sectional primary data, and none examined mortality selection bias. Because individuals with pain die—and hence exit survey samples—earlier than those without pain,<sup>26,66</sup> future research should clarify to what extent the reduced risk of pain in later life is genuine as opposed to an artefact of selective survival.

Findings regarding cross-national differences in pain also defy easy summary. Most reviews focused on the prevalence of chronic pain conditions (suggesting that little is known about cross-national differences in other outcomes, such as access to treatment). Studies were just as likely to find lower prevalence as higher prevalence in less developed countries or regions, and mixed findings were also common. An open question in many cases is whether residents of poorer countries truly had lower prevalence of pain conditions, or simply lower rates of diagnosis, perhaps due to more limited access to care (possibilities which are not mutually exclusive).

This ambiguity extended to disadvantaged groups broadly. For example, lower rates of endometriosis among Black or Hispanic women vis-à-vis non-Hispanic White women could reflect lower risk of the disease or less frequent diagnosis.<sup>9</sup> Similarly, “claims that migraine was more common among those at higher socioeconomic levels” could (and seemingly once were) driven by higher consultation rates.<sup>74</sup> Foundational facts about disparities in pain conditions may be obscured by disparities in diagnosis.

Reviews rarely discussed whether the primary study sample sizes provided sufficient statistical power to identify group differences. While many epidemiological studies relied on large population datasets, explicit considerations of statistical power are still recommended, especially if studying relatively small minority groups and/or doing intersectional analyses.

Most reviews took an ahistorical approach, rarely examining whether disparities have narrowed or widened over time. What evidence exists from primary studies suggests that disparities have widened globally,<sup>45</sup> but this trend (and its causes) deserves further study.

Our review highlighted exceptions to the general pattern of disadvantaged groups having worse pain-related outcomes, as such exceptions underscore the complexity of the relationship between social categories and health, and may suggest protective factors that could be emulated. Moreover, it is important that broad patterns not lead to exaggeration of group differences or stereotyping. For example, the well-established higher risk of pain among women should not be interpreted to suggest low or zero risk among men. Indeed, if pain generally, or specific conditions such as fibromyalgia, are strongly identified as “women’s conditions,” then men who experience them can encounter stigma and diagnostic delay.<sup>55</sup> A potential weakness of qualitative reviews in our study is that a large majority presumed worse pain outcomes among disadvantaged groups; this may have led to the omission of contrary evidence or contributed to stereotyping.

#### **4.4. Discussion of mechanisms and policy/practice recommendations**

Most review articles discussed biological and/or psychosociocultural mechanisms driving social disparities in pain (61.2% of articles

in each case). Substantially fewer (30.5%) discussed sociostructural mechanisms (ie, health system-related or other environmental/contextual factors). This may reflect that most included primary articles were experimental, epidemiological, or incidence/prevalence studies, not studies of policy or ecological determinants. This accords with other recent findings (eg, a 2022 review of racial/ethnic disparities in chronic musculoskeletal pain found no studies examining geographic or political mechanisms).<sup>60</sup>

While a large majority of reviews (89.4%) described at least 1 mechanism driving disparities, fewer (55.2%) made policy or practice recommendations for reducing them. When such recommendations were made, the focus was again heavily on individual-level rather than macrolevel factors. Only 14.6% of reviews suggested policy or other sociostructural changes. Instead, recommendations typically focused on changing the decisions or behavior of individuals. Most frequently, clinicians were advised to improve their assessment and treatment of pain, and their communication with and education of patients, and researchers were encouraged to conduct further needed research. Discussions of mechanisms and of policy/practice recommendations were often brief and/or superficial.

In recent years, a growing number of pain scholars, especially those focusing on racial/ethnic disparities in pain, have argued that the “social” aspects of the biopsychosocial model of pain have been neglected.<sup>6,34,36,44,46,60</sup> Our findings support this view and also underscore the importance of clarifying what is meant by “social.” In many reviews in our study, “social” factors, if considered at all, were individual-level characteristics such as level of education. But as major models of health disparities highlight, the “social” comprises a multitude of meso- and macrolevel political, economic, institutional, and cultural characteristics, which shape health-related opportunities and roadblocks at multiple scales, from the most local to the national or global. We refer to these more macrolevel factors as “sociostructural,” but related terms are also widely used, including “environmental factors” (in the NIA Health Disparities Research Framework)<sup>29</sup> or “socioeconomic and political context” (in the WHO Social Determinants of Health framework).<sup>71</sup> Whichever term is preferred, it may be conceptually helpful for pain research to expand the three-part “biopsychosocial” framework to a four-part framework—“biopsychosocial/structural,” perhaps?—that more explicitly invites consideration and amelioration of these macrolevel, contextual factors.

We highlight 4 related reasons to increase attention to sociostructural drivers of pain disparities. First, empirically, there is strong and growing evidence that such macrolevel factors (eg, national income inequality<sup>63</sup>; state-level policies)<sup>51</sup> shape health and health disparities broadly; some of this evidence is specific to pain.<sup>32</sup> Second, greater attention to “upstream factors”<sup>47</sup> could strengthen research on pain prevention. A mere 2.0% of review articles in our collection addressed prevention. However, given that effective treatments for chronic pain are often lacking<sup>76</sup> and are especially difficult to access for the socially vulnerable, pain prevention could play a crucial role in reducing pain’s burden. Greater understanding of what makes social environments more or less “painogenic” is needed.<sup>35</sup>

Third, greater attention to sociostructural factors accords with calls to recognize the role of structural discrimination in shaping disparities. It is increasingly widely acknowledged that it is not race (a social, rather than biological, construct), but racism that drives racial pain disparities.<sup>53</sup> Treating race as a causal agent in health research can reify racial categories and distract from racist practices and structures.<sup>34,43</sup> Less commonly acknowledged is that similar arguments can apply to other axes of difference, even

highly biologized ones. As 1 included review noted, “age-related patterns do not mean that ‘age’ causes any outcome. Age should be conceptualized a proxy for any number of potentially causal” factors<sup>22</sup>—including traditional biopsychosocial factors, but also potentially, we argue, structural ageism. Similar points could be made about sex, race/ethnicity, etc. Valid biological explanations for disparities do not preclude sociostructural explanations (including discrimination-related ones) as well. Indeed, psychosocial and sociostructural factors ultimately shape pain risk at the biological level.<sup>42</sup> We found no review articles that quantified the relative contributions of putatively inevitable biological differences vs modifiable social factors in shaping group differences (an admittedly fraught distinction),<sup>73</sup> but many articles attested to the importance of both.

Fourth, current individualistic recommendations put too heavy a burden on individual patients and providers, and often provide at best short-term solutions. For example, 1 review suggested that clinicians whose patients cannot afford medications should “[a]dvise patients to use online coupon options... Advise patients to call multiple pharmacies [for price comparison]...”<sup>57</sup> Such advice may well be the best available to address patients’ immediate needs. In the long term and at a macroscale, however, coupons and comparison-shopping do not address root causes such as drug unaffordability or socioeconomic disparities in treatment. Collective political action and policy reform are needed to achieve changes in these macrolevel determinants.

Apparent drivers of population-level trends in pain, such as obesity and distress,<sup>83</sup> are also linked to other leading causes of morbidity and mortality. Thus, policies likely to reduce pain prevalence, such as increasing physical activity or improving mental health, would also likely be beneficial for overall population health. This suggests promising opportunities for pain researchers to overcome disciplinary siloing and collaborate with researchers

studying other health outcomes, to identify common causes and strategies to improve health. Greater collaboration *within* the pain community, across axes of difference or pain outcomes, could also be fruitful, helping to identify common drivers of pain disparities,<sup>27,28</sup> common biomarkers of risk,<sup>42</sup> and common sociostructural factors that exacerbate or reduce disparities.

Key recommendations made in this discussion are summarized in **Table 7**.

**4.5. Limitations**

One potential limitation of our study is that we examined review, not primary, articles. Although reviews give a good sense of what topics are prioritized and commonly studied in a field, primary articles may cover a different range of topics that are important but have yet to be synthesized. Another limitation is that we included only articles published in English, and thus likely underestimated the extent of research being conducted in non-English speaking settings. Ideally, multilingual research teams could help overcome linguistic siloing to enhance global pain research. Next, although our database searches included many terms such as “disparities,” “inequities,” etc., some relevant articles may have nonetheless been missed, or may have been excluded due to lack of cross-group comparison. In addition, we included reviews regardless of whether they focused on clear inequities, mere “differences” (largely biological or otherwise not-unjust differences), or both. We also included reviews for which it was unclear how to classify the observed group differences. Our rationale was that distinctions among these categories are *often* unclear, and that understanding “mere” differences is important in disparities research, to elucidate which differences are in fact unjust and avoidable. However, future researchers may wish to attempt to conduct reviews focusing more directly on clear cases of inequities.

**Table 7**  
**Future directions for research on social disparities in pain: key recommendations.**

Topic	Recommendations
Geographic focus of pain research	More research is needed on pain in low- and middle-income countries to provide epidemiological description, to enable comparative research on the role of macrolevel determinants, and to broaden the range of social categories commonly examined
Social dimensions studied	Social dimensions other than age, sex/gender, and race/ethnicity deserve greater attention; in particular, socioeconomic status warrants more attention in pain disparities research Multiple social dimensions should be studied in tandem, to identify common mechanisms linking them to pain outcomes and to enable intersectional analyses Social categories (eg, of gender, sexual identity, and race/ethnicity) should be modified or expanded when appropriate to better capture the experiences of diverse groups
Pain outcomes studied	Disparities in certain common or highly debilitating chronic conditions (eg, endometriosis, fibromyalgia, vulvodynia) deserve further research More research is needed on disparities in nonpharmacological pain management (including nonmedical management), and on chronic pain <i>prevention</i> Research on temporal trends should document (and identify factors contributing to) widening, narrowing, or stable disparities in pain over time
Validity of findings	Mortality selection and differential rates of diagnoses across social groups should be examined as potential sources of bias Assessments of the quality of quantitative and qualitative reviews are needed (eg, to check for omission of contrary evidence)
Mechanisms and policies/practices	Macrolevel/sociostructural mechanisms and potential solutions deserve greater attention, to complement the heretofore heavy emphasis on individual-level factors contributing to pain disparities Collaboration among researchers examining different axes of social difference and/or studying different health conditions could speed identification of mechanisms driving disparities, and of policies/practices that could improve population health broadly

We heeded the advice that “scoping reviews should include all relevant literature regardless of methodological quality... to present an overview of the existing literature.”<sup>62</sup> Indeed, because we included narrative reviews—for which no established means of quality assessment exist—as well as reviews published long before current quality guidelines were established, comprehensive evaluation of methodological quality of all included reviews was not possible. Future research better able to assess the quality and potential publication bias of disparities-focused reviews would be valuable (especially given evidence that many systematic reviews of pain interventions are of poor quality).<sup>52</sup> Future researchers would also be encouraged to double-code all articles, not merely subsets of articles as was done herein.

A final important consideration is that scholarship continually evolves, in terms of topics, theories/frameworks, and findings—as shown, for instance, by scholarship inspired by the heightened attention to racial justice in the United States since 2020.<sup>53</sup> Recurring examinations of the field will be needed to keep abreast of such changes. However, given the exponential increase in pain disparities-related reviews, future researchers may need to explore different, less labor-intensive approaches to synthesizing reviews, such as large language models.<sup>39</sup>

## 5. Conclusion

Scholars assessing the state of health disparities research lament that “too much research addresses well-trodden questions and that the field has failed to gain public and policy traction.”<sup>15</sup> Our study highlights the relevance of this critique for pain disparities research specifically. Whereas some—admittedly important—topics are frequently investigated, other *also* important topics are not: Certain key social characteristics, pain-related outcomes, and mechanisms remain understudied; long-term trends in disparities are rarely assessed; and it is unclear whether some common findings are artefactual. Critics are also correct that even when pain disparities are well-documented, actionable ideas to reduce them have been limited. This appears to reflect limited understanding of some key mechanisms and a heavy focus on individual providers or patients as agents for change. Although some inequities may be reduced by individual-level interventions, more macrolevel sociostructural changes will be needed as well. At present, the pain community has not united sufficiently to identify and advocate for such changes. Prospects for meaningfully reducing social disparities in pain and pain treatment depend on doing so.

## Conflict of interest statement

R.D. has received in the past 5 years research grants and contracts from the U.S. Food and Drug Administration and the U.S. National Institutes of Health, and compensation for serving on advisory boards or consulting on clinical trial methods from Abide, Acadia, Akigai, Allay, AM-Pharma, Analgesic Solutions, Asahi Kasei, Beckley, Biogen, Biosplice, Bsense, Cardialen, Centrexion, Chiesi, Clexio, Collegium, CombiGene, Confo, Continuum, Decibel, Eccogene, Editas, Eli Lilly, Emmes, Encoded, Endo, Epizon, Ethismos (equity), Eupraxia, Excure, GlaxoSmithKline, Glenmark, Gloriana, Hope, JucaBio, Kriya, Lotus, Mainstay, Merck, Mind Medicine (also equity), Neurana, NeuroBo, Noema, Novaremed, Novartis, OliPass, Orion, Oxford Cannabinoid Technologies, Pfizer, Q-State, Regenacy (also equity), Rho, Sangamo, Sanifit, Scilex, Semnur, SIMR Biotech, Sinfonia, SK Biopharmaceuticals, Sollis, SPM Therapeutics,

SPRIM Health, Tiefenbacher, Validae, Vertex, Vizuri, and WCG. In the past 36 months, J.G. has received consulting income from Algo Therapeutix, Eikonizo Therapeutics, Eli Lilly, GW Pharma, Hoba Therapeutics, Neurometrix, and Saluda Medical. She owns vesting shares in Eisana Corp. She has also received personal compensation for serving as Associate Editor for the *Clinical Journal of Pain*. I.G. has received support from Vertex and Combigene and has received grants from the Canadian Institutes of Health Research, Physicians’ Services Incorporated Foundation, and Queen’s University. Over the last 3 years, E.S. has had grant funding to his institution from NIH; editing payments from: Wolters-Kluwer; consulting fees from: Pear Therapeutics (ended), Eli Lilly and Company; honoraria for talks: Rutgers University (ended); medical devices supplied to his institution for his research: Masimo; and he has conducted medical-legal consultations. He also has served on the board of directors (unpaid) for a treatment program: Ashley Addiction Treatment. D.T. has received in the past 5 years research grants and contracts from the U.S. Food and Drug Administration, the U.S. National Institutes of Health, the U.S. National Institute of Occupational Safety and Health, and compensation for serving on advisory boards or consulting on clinical trial methods from GSK/Novartis and Vertex. He has also received compensation as the Editor-in-Chief of *The Clinical Journal of Pain* and as Associate Director of Analgesic, Anesthetic, and Addiction Clinical Trials Innovations, Opportunities, and Networks (ACTTION). U.W. serves on the External Consultant Board for the “NIH Preclinical Screening Platform for Pain” (NIH/NINDS). In her capacity as a special government employee of the U.S. Food and Drug Administration (FDA), she has served as a voting member of the FDA Anesthetic and Analgesic Drug Products Advisory Committee. In the past 3 years, she has received compensation for serving on advisory boards or for consulting activities for Aphrodite Health Inc., Wilmington, DE, Avenue Therapeutics Inc., New York, NY, Bayer Aktiengesellschaft, Leverkusen, Germany, Biohaven Pharmaceuticals, New Haven, CT, Seikagaku Corporation, Tokyo, Japan, and Syneos Health, Morrisville, NC, all unrelated to the submitted work. Other authors report no conflicts of interest.

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## Supplemental digital content

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