BMJ Open

An International Perspective on Healthcare Provider Gender Bias in Musculoskeletal Pain Management: A Scoping Review Protocol

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2021-059233
Article Type:	Protocol
Date Submitted by the Author:	30-Nov-2021
Complete List of Authors:	Wilford, Katherine; University of Saint Augustine - Austin Campus, College of Rehabilitative Sciences Physical Therapy; Texas Tech University Health Sciences Center, Center for Rehabilitation Research Mena-Iturriaga, Maria Jesus; Texas Tech University Health Sciences Center, Center for Rehabilitation Research; Universidad del Desarrollo Vugrin, Margaret; Texas Tech University Health Sciences Center, Preston Smith Library Wainer, Macarena; Universidad del Desarrollo, Physical Therapy School Sizer, Phillip S.; Texas Tech University Health Sciences Center, Center for Rehabilitation Research Seeber, Gesine; Carl von Ossietzky Universitat Oldenburg, University Hospital of Orthopaedics and Trauma Surgery Pius-Hospital Oldenburg; University of Groningen, University Medical Center Groningen, Department of Orthopedics
Keywords:	PAIN MANAGEMENT, Musculoskeletal disorders < ORTHOPAEDIC & TRAUMA SURGERY, Quality in health care < HEALTH SERVICES ADMINISTRATION & MANAGEMENT

An International Perspective on Healthcare Provider Gender Bias in Musculoskeletal Pain Management: A Scoping Review Protocol

Katherine Wilford*[1,2], Maria Jesus Mena-Iturriaga[2,3], Margaret Vugrin[4], Macarena Wainer[3], Phillip S. Sizer Jr[2], Gesine H. Seeber[2,5,6]

[1] College of Rehabilitative Sciences Physical Therapy, University of Saint Augustine for Health Sciences, Austin, Texas, USA

[2] Center for Rehabilitation Research, Texas Tech University Health Sciences Center, Lubbock, Texas, USA

[3] Physical Therapy School, Universidad del Desarrollo, Santiago, Chile

[4] Preston Smith Library, Texas Tech University Health Sciences Center, Lubbock, Texas, USA

[5] University Hospital of Orthopaedics and Trauma Surgery Pius-Hospital Oldenburg, University of Oldenburg, School of Medicine and Health Sciences, Oldenburg, Germany

[6] University of Groningen, University Medical Center Groningen, Department of Orthopedics, Groningen, The Netherlands

*Corresponding Author
Katherine Wilford
Assistant Professor, Doctor of Physical Therapy Program
University of St. Augustine for Health Sciences
5401 LaCrosse Avenue Austin, TX 78739
512-394-9766, ext. 3150
kwilford@usa.edu

ABSTRACT

INTRODUCTION Chronic pain affects millions of individuals worldwide. Healthcare provider gender bias in the management of these individuals has societal and individual ramifications. Yet, a thorough and comprehensive literature summary on this topic is lacking. Therefore, this study aims to systematically (1) identify and map the available scientific and grey literature as it relates to healthcare provider gender bias in the assessment, diagnosis, and management of (chronic) musculoskeletal pain, and (2) identify current gaps that necessitate further research.

METHODS AND ANLYSIS This scoping review will be conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR). The following databases will be searched: Pubmed® (National Library of Medicine), Embase® (Elsevier), Scopus® (Elsevier), CINAHL Complete® (Ovid), Academic Search Complete™ (Ebscohost), Pre-Prints Database® (National Library of Medicine), and Rehabilitation Reference Center from inception to September 2021. Additionally, relevant grey literature will be identified. All screening will be done by two independent reviewers during two stages: first title/abstract screening followed by full text screening. Data will be extracted from the bibliometric, study characteristics, and pain science families of variables. Results will be descriptively mapped, and the frequency of concepts, population, characteristics, and other details will be narratively reported. Additionally, results will be presented in tabular and graphical form.

ETHICS AND DISSEMINATION As this study will neither involve human subject participation nor utilization of protected data, ethical approval is not required. This study's methodological approach follows current recommendations. Study findings will be disseminated through

conference presentations and international peer-review journal publication. In addition, infographics available in English, Spanish, and German will be disseminated.

REGISTRATION DETAILS This project will be registered in Open Science Framework prior to data collection.

Word count: 281 words

Keywords: pain management, MSK disorders, quality in health care

Strengths and Limitations of This Study

- This will be the first study to systematically explore and summarize healthcare provider gender bias (HCP-GB) and its influence on patient care.
- The research team includes a scientific librarian with expertise in search strategies and Covidence will be used during this review process to ensure blinding reviewer consistency.
- Including only resources available in English, Spanish, and German may result in missing essential resources only available in other languages.
- While focusing on gender bias, the researchers acknowledge it is impossible to separate the intersectionality of gender with obesity, race, age, education level, and socioeconomic status, therefore specific conclusions about gender bias, specifically, may be difficult.
- Discrepancies in assessments, treatment, and outcomes between genders does not necessarily imply HCP-GB was present.

INTRODUCTION

Pain has become a global health problem.[1] Recent data reports that annual costs ranged from $560 to $635 billion in the United States for individuals with chronic pain, resulting in lower worker productivity.[2] Low back and neck pain are among the leading causes of years lived with prolonged disability worldwide.[3] The incidence of musculoskeletal (MSK) pain is projected to grow exponentially over the next two decades, further straining healthcare systems already stretched to their breaking points.[2]

In addition to the economic impact, (chronic) pain management has many widespread societal ramifications. Prescription opioid use is a common management option, used in 40-60% of primary health care settings.[4–10] However, its misuse can have severe ramifications that include heroin use, opioid overdose, and death.[4–10] Additionally, individuals with chronic pain are more likely to have mental health conditions such as anxiety and depression.[11] Approximately 20% of individuals with chronic pain demonstrate suicidal ideation, increasing the risk of death by suicide twofold versus the general population.[12] Due to the pervasive sequelae of mismanaged (chronic) pain for both the affected individual and society as a whole, care providers who treat individuals with (chronic) MSK pain are required to engage in thoughtful ongoing assessment and modification during the management sequence.

To better manage individuals with (chronic) pain, careful attention must be paid to the *management model* itself. Similar to models used by other healthcare providers, the physical therapist-patient management model contains many elements: examination, evaluation, diagnosis, prognosis, intervention, and outcomes.[13] The *examination* includes a history wherein the healthcare provider collects patient data on the current condition.[13] Following, tests and

measures are performed to rule in or rule out impairments. The healthcare provider must interpret available data from the entire examination process. This interpretation leads to crafting a diagnosis and prognosis, followed by the development of an overall management plan for the patient.[13] A failure to correctly collect or interpret data may result in suboptimal or even unfavorable clinical decisions that reduce patient outcomes.

Specific to the examination of individuals with (chronic) *MSK pain*, the affected individual's subjective self-report (i.e., verbally during medical history taking and/or by means of various written patient self-reported outcome measures) is the diagnostic gold standard.[14,15] As is common with verbal communication, however, many possible sources of error can exist between the clinician and patient during this verbal history-taking processs.[16] One possible source of error in communication can be related to the influence of bias.[16]

Bias, in general, describes a tendency, leaning, or prejudice toward an object or a person and can be either positive or negative.[17] Most biases are based on stereotypes rather than on actual knowledge.[17] Such prejudgment can result in injudicious decisions or discriminatory practices.[17] Biases delivered against other people are often based on the group that the biased individuals belong to and/or on an immutable physical characteristic they possess, such as their ethnicity, sexual orientation, age, or gender.[14,17,18] Individuals who act in a biased manner may or may not be aware of their biases. An unconscious bias, also known as "implicit bias," can have harmful consequences as stereotyping and prejudice ultimately influence both perceptions and decisions.

While highly trained in their respective fields, healthcare providers are not precluded from possessing implicit biases. The patient-healthcare provider interaction is a complicated

process wherein current scientific evidence, clinician experience, and patient expectations may collide. Serving as vectors who translate clinical knowledge and research into the patient-management process, healthcare providers must be aware of their implicit biases and possible consequences for their patients. Current literature suggests the existence of gender-related discrepancies in assessment, diagnosis, and management of (chronic) pain.[14,18–20] In comparison to male patients, women experience a delay in access to diagnostic and treatment options for chronic pain and are less likely to receive recommendations for analgesics, radiological examination, and physiotherapy.[21–23]

A systematic and thorough literature summary on the topic of gender bias in healthcare is currently lacking. The purpose of this scoping review is to systematically identify and comprehensively map available scientific literature and grey literature as they relate to healthcare provider-gender bias (HCP-GB) in the assessment, diagnosis, and management of (chronic) MSK pain. This study aims to examine: 1) the scope of literature on HCP-GB in MSK pain assessment, diagnosis, and management; 2) the effects of HCP-GB on patient outcomes; and 3) how HCP-GB varies across different countries and cultures.

METHODS AND ANALYSIS

Study Design

This scoping review will be conducted in accordance to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) and the recently updated PRIMSA checklists, as per current recommendations.[24,25] Furthermore, while not currently required for scoping reviews, this project will be registered in Open Science Framework prior to data collection.[26,27]

Data Sources

This scoping review will include both scientific research and grey literature (e.g., conference proceedings, dissertations). Relevant scientific studies will be identified in the electronic databases Pubmed® (National Library of Medicine), Embase® (Elsevier), Scopus® (Elsevier), CINAHL Complete® (Ovid), Academic Search Complete™ (Ebscohost), Pre-Prints Database® (National Library of Medicine), and Rehabilitation Reference Center from inception to September 2021. All databases will be accessed through the local university libraries. Grey literature will be identified by searching Trip database, Papers First, Conference Papers Index, and Clinical Trial Register Databases (Prospero, ClinicalTrials.gov, WHO International Clinical Trials Registry Platform (ICTRP), ISRCTN registry, ClinicalResearch.com, CenterWatch), and Google Scholar.[26,28,29] Google Scholar search will end when 20 consecutive links irrelevant to the search topic are found.

Search Strategy

Search terms will be developed using the P.C.C. framework summarized in Table 1.[26]

Table 1: P.C.C. framework

P opulation	Man, woman, adult, healthcare provider, professional
C oncept	Bias, gender, stereotype, gendered norm, inequity, sex, gender research
C ontext	Musculoskeletal pain, pain assessment, pain perception, treatment, pain management, rehabilitation, diagnosis, outcome, culture, equity in health

As search strategies will be specified for each data source, an experienced scientific librarian will be involved in final search strategy development.[27] A combination of Medical Subject Headings (MeSH)/concepts subject headings will be meaningfully linked, based on the targeted database and keywords. The snowball method will be used to identify additional papers from included studies' reference lists.[28–30] The full PubMed search strategy used during the pilot process is included in Appendix A.

Study Screening

The review management software Covidence (Veritas Health Innovation Ltd, Melbourne, Australia) will be used for study screening and data extraction. A three-reviewer model will be employed, wherein two blinded primary reviewers independently screen references for possible inclusion. A third blinded reviewer will solve emerging conflicts.[26,27] A two-part pilot process will be used to revise search criteria, refine the study selection process, and ensure a threshold of at least 75% agreement between reviewers prior to final study selection. Reviewers will screen title and abstract first followed by the full text of selected references prior to data extraction. The entire search will be limited to resources available in English, Spanish, and German. *In-vitro,* cadaveric, animal, or experimentally induced pain studies will be excluded.

Study Variables, Data Extraction, and Data Reporting

The following families of variables will be extracted from the full texts of included studies, using the three-reviewer model:[26,27]

- Bibliometric Variables (author; title; publishing journal; etc.)
- Study Characteristic Variables (design; purposes; aims; population; setting; etc.)
- Pain Science Variables (pain descriptors; diagnosis; outcomes; patient characteristics; bias explanation; etc.)

All extracted data will be summarized in a customized pre-piloted data extraction table using the Covidence software. To avoid possible duplication of extracted data, reviews and meta-analyses will be excluded from the extraction phase. As expected with scoping reviews, results will be descriptively mapped.[26,27] The data extraction format will be based on the specific variables and the reporting method is outline further in Table 2.

Patient and Public Involvement

Neither patients nor members of the public were involved during the design of this research. Moreover, neither of the two groups will be involved during the conduct of this scoping review due to the nature of the study's design. Prior to dissemination of the infographic, patient and clinician feedback will be sought and incorporated into the final product.

Table 2: Data extraction for bibliometric, study characteristics, and pain science variables

	Bibliometric	Study Characteristics	Pain Science
Variables to be extracted and mapped	• Author(s) • Type of study • Publication Year • Journal • DOI • Language • Country	• Study design • Setting • Sample/Population • Purpose(s) • Aim(s) • Level of evidence • Approach (Qualitative vs. Quantitative vs. Mixed methods)	• Healthcare provider specifications: profession, age, sex, gender, degree, years of experience, country, religion, ethnic background • Patient specifications: age, sex, gender, education level, socioeconomic status, country, religion, ethnic background, mental health status • Healthcare setting • Pain descriptors: location(s), intensity, onset, type • Diagnosis: outcome measures/assessment tools used, time from pain onset, timeline • Type of treatment prescribed: medication vs. rehab vs. psychological vs. other • Patient outcome after treatment • Bias explanation(s)
Reporting measures	• Author(s), type of study, publication year, country, methodology, etc. → absolute and relative frequencies • Purposes and aims →descriptively • Variables related to population age and sample size → mean (SD)/median (IQR) • Population gender and other characteristics → absolute or relative frequencies • Pain variables → descriptively and/or as absolute or relative frequencies		

DOI = digital object identifier; SD = Standard deviation, IQR = Interquartile range

Data Sharing

There is no additional data available for this scoping review protocol. Yet, all data relevant to the scoping review will be included in the final article and/or uploaded as supplementary information.

ETHICS AND DISSEMINATION

A persistent HCP-GB in the assessment, diagnosis, and management of (chronic) MSK pain is highly unethical. Furthermore, HCP-GB can lead to reduced treatment outcomes,

prolonged disability in certain populations, and contributes to a significant economic strain on society. Thus, this study will provide a systematic exploration and summary of HCP-GB and its influence on patient care. Literature suggests that gender biases occur at many health care delivery levels, damaging the health of millions of individuals worldwide.[31] The lack of HCP-GB awareness is a barrier to change.[32,33] Furthermore, a call to action is needed to protect the health and lives of millions of individuals with chronic pain. Minimizing HCP-GB in health systems will require a bold approach to raising awareness and transforming values among service providers.[31,32] This will be the first study to systematically explore and summarize HCP-GB and its influence on patient care. This study's results will identify gaps in current literature and aide future research needs in the field of (chronic) pain management. In addition, this study will challenge entrenched beliefs surrounding interactions with, and management of, individuals with (chronic) pain. By bringing to light HCP-GB and encouraging a self-reflective practice, individuals with (chronic) MSK pain should expect to receive ethical and unbiased care by empathetic healthcare providers.

Acknowledging the pervasive evidence-practice gap in health-care research and the difficulty converting research findings into clinical practice, the concept of knowledge translation has come to the foreground within the past several years. We will address knowledge translation via two strategies.[34] First, our study findings will be disseminated amongst the scientific community through conference presentations and an international peer-review journal publication. In addition, we strive to promote the integration of our findings into the clinical practice of healthcare providers outside the scientific environment. Informational graphics (also known as Infographics) have been suggested as an attractive and effective form

of knowledge dissemination among non-scientific audiences via simple visualization and plain language use.[35,36] As the current project involves researchers from three different countries (namely Chile, the United States of America, and Germany) that use different languages, this investigation's emerging infographic will be available in English, Spanish, and German. Once completed, we will devise a plan to disseminate the infographic throughout the physical therapy associations of countries that use these languages. By this means we hope to raise awareness about HCP-GB and to promote behavior change in a wide-reaching manner.

References

1. Goldberg DS, McGee SJ. Pain as a global public health priority. *BMC Public Health*. 2011;11(770). http://www.biomedcentral.com/1471-2458/11/770
2. Gaskin DJ, Richard P. The economic costs of pain in the United States. *J Pain*. 2012;13(8):715-724. doi:10.1016/j.jpain.2012.03.009
3. Vos T, Flaxman AD, Naghavi M, et al. Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet*. 2012;380(9859):2163-2196. doi:http://dx.doi.org/10.1016/S0140-6736(12)61729-2
4. Fleming M, Balousek S, Klessig C, Mundt M, Brown D. Substance use disorders in a primary care sample receiving daily opioid therapy. *J Pain*. 2007;8:573-582.
5. Volkow N, McLellan A. Opioid abuse in chronic pain - misconceptions and mitigation strategies. *N Engl J Med*. 2016;374:1253-1263.
6. Saunders KW, Dunn KM, Merrill JO, et al. Relationship of Opioid Use and Dosage Levels to Fractures in Older Chronic Pain Patients. *J Gen Intern Med*. 2010;25(4):310-315. doi:10.1007/s11606-009-1218-z
7. Dunn K, Saunders K, CM R, et al. Opioid prescriptions for chronic pain and overdose: a cohort studt. *Ann Intern Med*. 2010;152(2):85-92. http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=fulltext&D=ovft&CSC=Y&NEWS=N&SEARCH=00000605-201001190-00006.an
8. Franklin G, Mai J, Turner J, M S, Wickizer R, Fulton-Kehoe D. Bending the prescription opioid dosing and mortality curves: impact of the Washing State opioid dosing guideline. *AM J Ind Med*. 2012;55:325-331.
9. Michna E, Jamison RN, Pham L-D, et al. Urine Toxicology Screening Among Chronic Pain Patients on Opioid Therapy: Frequency and Predictability of Abnormal Findings. *Clin J Pain*. 2007;23(2):173-179. doi:10.1097/AJP.0b013e31802b4f95
10. Turk D, Swanson K, Gatchel R. Predicting opioid misuse by chronic pain patients: a systematic review and literature synthesis. *Clin J Pain*. 2008;24:497-508.
11. Hooten WM. Chronic Pain and Mental Health Disorders: Shared Neural Mechanisms, Epidemiology, and Treatment. *Mayo Clin Proc*. 2016;91(7):955-970. doi:10.1016/j.mayocp.2016.04.029
12. Tang N, Crane C. Suicidality in chronic pain: a review of the prevalence, risk factors, and psychological links. *Psycho Med*. 2006;36(5):575-586.
13. APTA. *Guide to Phsical Therapist Practice*. American Physical Therapy Association; 2021. https://guide.apta.org/
14. Zhang L, Losin EAR, Ashar YK, Koban L, Wager TD. Gender Biases in Estimation of Others' Pain. *J Pain*. 2021;00(00):1-12. doi:10.1016/j.jpain.2021.03.001
15. Casser H, Schaible H. Muskuloskeletaler Schmerz [Musculoskeletal pain]. *Schmerz*. 2015;29(5):486-488, 490-495. doi:10.1007/s00482-015-0046-9
16. Maitland G, Hengeveld E, Banks K, English K. Chatper 3: Communication. In: *Maitland's Vertebral Manipulation*. 4th ed. Elsevier; 2005.
17. Ellemers N. Gender Stereotypes. *Annu Rev Psychol*. 2018;4(69):275-298. doi:10.1146/annurev-psych-122216-011719. Epub 2017 Sep 27.

18. Bernardes SF, Keogh E, Lima ML. Bridging the gap between pain and gender research: A selective literature review. *Eur J Pain*. 2008;12(4):427-440. doi:10.1016/j.ejpain.2007.08.007
19. Seers T, Derry S, Seers K, Moore RA. Professionals underestimate patients' pain: A comprehensive review. *Pain*. 2018;159(5):811-818. doi:10.1097/j.pain.0000000000001165
20. Samulowitz A, Gremyr I, Eriksson E, Hensing G. "Brave Men" and "Emotional Women": A Theory-Guided Literature Review on Gender Bias in Health Care and Gendered Norms towards Patients with Chronic Pain. *Pain Res Manag*. 2018;2018. doi:10.1155/2018/6358624
21. Schäfer G, Prkachin KM, Kaseweter KA, Williams ACDC. *Health Care Providers' Judgments in Chronic Pain: The Influence of Gender and Trustworthiness*. Vol 157.; 2016. doi:10.1097/j.pain.0000000000000536
22. Stålnacke BM, Haukenes I, Lehti A, Wiklund AF, Wiklund M, Hammarström A. Is there a gender bias in recommendations for further rehabilitation in primary care of patients with chronic pain after an interdisciplinary team assessment? *J Rehabil Med*. 2015;47(4):365-371. doi:10.2340/16501977-1936
23. Margarit C, Roca R, Inda MDM, et al. Gender Bias and Genotype Influence on Opioid Safety Profile in Chronic Low Back Pain. *Clin J Pain*. 2020;36(6):420-429. doi:10.1097/AJP.0000000000000824
24. Tricco A, Lillie E, Zarin W, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med*. 2018;169(7):467-473. doi:10.7326/M18-0850
25. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*. 2021;372. doi:10.1136/bmj.n71
26. Peters M, Godfrey C, McInerney P, Munn Z, Tricco A, Khalil H. Chapter 11: Scoping Reviews (2020 version). In: Aromataris E, Munn Z, eds. *JBI Manual for Evidence Synthesis*. JBI; 2020.
27. Peters MDJ, Marnie C, Tricco AC, et al. Updated methodological guidance for the conduct of scoping reviews. *JBI Evid Synth*. 2020;18(10):2119-2126. doi:10.11124/JBIES-20-00167
28. Hofste A, Soer R, Hermens HJ, et al. Inconsistent descriptions of lumbar multifidus morphology: A scoping review. *BMC Musculoskelet Disord*. 2020;21(1):1-18. doi:10.1186/s12891-020-03257-7
29. Daniel M, Rencic J, Durning SJ, et al. Clinical reasoning assessment methods: A scoping review and practical guidance. *Acada Med*. 2019;94(6):902-912. doi:10.1097/ACM.0000000000002618
30. Cuff A, Parton S, Tyer R, Dikomitis L, Foster N, Littlewood C. Guidelines for the use of diagnostic imaging in musculoskeletal pain conditions on affecting the lower back, knee, and shoulder: A scoping review. *Muscuolskeletal Care*. Published online 2020:1-10. doi:10.1002/msc.1497
31. Sen G, Östlin P. Gender inequity in health: why it exists and how we can change it. *Glob Public Health*. 2008;3(sup 1):1-12. doi:10.1080/17441690801900795
32. Gupta G, Ooman N, Grown C, et al. Gender equality and gender norms: framing the opportunities for health. *Lancet*. 2019;393:2250-2562. doi:10.1016/S0140-6736(19)30651-8

33. George A. The outrageous as ordinary: primary health care workers' perspectives on accountability in Koppal district, Karnataka State, India. Published online 2007.
34. Kristensen N, Nymann C, Kondradsen H. Implementing research results in clinical practice- the experiences of healthcare professionals. *BMC Heal Serv Res*. 2015;16(48). doi:10.1186/s12913-016-1292-y
35. Houts P, Doak C, Doak L, Loscalzo M. The role of pictures in improving health communication: a review of research on attention, comprehension, recall, and adherence. *Patient Educ Couns*. 61(2):173-190. doi:10.1016/j.pec.2005.05.004
36. Canadian Institutes of Health Research. (2012). Guide to Knowledge Translation Planning at CIHR: Integrated and End-of-Grant Approaches. Canadian Institutes of Health Research.

Authors Contributions

Katherine Wilford- Conceptualization, Methodology, Funding acquisition, Writing – Original Draft

Maria Jesus Mena Iturriaga- Conceptualization, Methodology, Funding acquisition, Writing – Original Draft

Margaret Vugrin -Methodology, Funding acquisition, Resources

Macarena Wainer - Conceptualization, Methodology, Funding acquisition, Writing – Original Draft

Phillip S. Sizer Jr – Supervision, Funding acquisition, Writing – Review & Editing

Gesine H. Seeber- Conceptualization, Methodology, Funding acquisition, Writing – Original Draft, Writing – Review & Editing

All authors approved the final version of this manuscript.

Acknowledgements: The authors would like to acknowledge the intramural student support award from the Texas Tech University Health Sciences Center School of Health Professions Pain Science Scholar Development Award.

Conflicts of Interest: None to declare.

Word count: 1945

Appendix A: Pubmed Search Strategy Used during the Pilot Process

(Delivery of Health Care [Mesh] OR Attitude of Health Personnel [Mesh] OR Emotional Intelligence [Mesh] OR Health Personnel [Mesh] OR Clinical Reasoning [Mesh] OR Judgement [Mesh] OR Trust [Mesh] OR Professional-Patient Relations [Mesh] OR "Caregivers"[Mesh] OR "Clinical Decision-Making"[Mesh] OR healthcare [TIAB] OR attitude [TIAB] OR empathy [TIAB] OR self-motivation [TIAB] OR "self-awareness" [TIAB] OR "self-regulation" [TIAB] OR "social skill*"[TIAB] OR nurse* [tiab] OR "nursing staff" [TIAB] OR Doctor* [TIAB] OR "physical therapist*" [TIAB] OR physician OR "occupational therapist" [TIAB] OR Judgement [TIAB] OR trust [TIAB] OR "Professional Patient Relationship" [TIAB] OR bias [TIAB])

AND

(Sex Factors [Mesh] OR Sexism [Mesh] OR Gender Equity [Mesh] OR Prejudice [Mesh] OR Gender Equity [Mesh] OR Gender Identity [Mesh] OR "Sex Characteristics"[Mesh] OR "Sexuality"[TIAB] OR "Gender Identity"[TIAB] OR "Sex"[TIAB] OR sexism [TIAB] OR gender [TIAB] OR "Healthcare Disparities"[Mesh])

AND

Chronic Pain [Mesh] OR Musculoskeletal pain [Mesh] OR "Chronic Pain" [TIAB] OR "Musculoskeletal pain*" [TIAB] OR "Craniomandibular Disorders"[Mesh] OR "Temporomandibular Joint Disorders"[Mesh] OR "Temporomandibular Joint Dysfunction Syndrome"[Mesh] OR "Medial Tibial Stress Syndrome"[Mesh] OR "Myofascial Pain Syndromes"[Mesh] OR "Temporomandibular Joint Dysfunction Syndrome"[Mesh] OR "Tendinopathy"[Mesh] OR "Elbow Tendinopathy"[Mesh] OR "Tennis Elbow"[Mesh] OR "Enthesopathy"[Mesh] OR "Tendon Entrapment"[Mesh] OR "De Quervain Disease"[Mesh] OR "Trigger Finger Disorder"[Mesh] OR "Tenosynovitis"[Mesh] OR "Fibromyalgia"[Mesh] OR pain [TIAB] OR "Acute Pain"[Mesh] OR "Arthralgia"[Mesh] OR "Shoulder Pain"[Mesh] OR "Back Pain"[Mesh] OR "Failed Back Surgery Syndrome"[Mesh] OR "Low Back Pain"[Mesh] OR "Breakthrough Pain"[Mesh] OR "Facial Pain"[Mesh:NoExp] OR "Headache"[Mesh:NoExp] OR "Metatarsalgia"[Mesh] OR "Morton Neuroma"[Mesh] OR "Myalgia"[Mesh] OR "Pelvic Girdle Pain"[Mesh] OR "Neck Pain"[Mesh] OR "Piriformis Muscle Syndrome"[Mesh] OR "Pudendal Neuralgia"[Mesh] OR "Sciatica"[Mesh] OR "Nociceptive Pain"[Mesh:NoExp] OR "Pain, Intractable"[Mesh] OR "Pain, Postoperative"[Mesh] OR "Phantom Limb"[Mesh] OR "Pain, Procedural"[Mesh] OR "Pain, Referred"[Mesh] OR "Pelvic Pain"[Mesh:NoExp] OR tendinopat* [TIAB] OR Enthesopathy [TIAB] OR "tendon entrapment*" [TIAB] OR "De Quervain" [TIAB] OR "trigger finger" [TIAB] OR Tenosynovitis [TIAB] OR Fibromyalgia[TIAB] OR "acute pain" [TIAB] OR Arthralgia [TIAB] OR "Shoulder Pain"[TIAB] OR "Back Pain" OR "Failed Back Surgery" OR "Low Back Pain" OR "Breakthrough Pain" OR "Facial Pain" OR "Headache" OR "Metatarsalgia" OR "Morton Neuroma*" OR "Myalgia" OR "Pelvic Girdle Pain" OR "Neck Pain" OR "Piriformis Muscle Syndrome" OR "Pudendal Neuralgia" OR "Sciatica" OR "Nociceptive Pain" OR "Intractable pain" OR "Postoperative Pain" OR "Phantom Limb" OR "Procedural Pain" OR "Phantom Limb"[Mesh] OR "Pain, Procedural"[Mesh] OR "Pain, Referred"[Mesh] OR Pelvic Pain[TIAB] "[Mesh] OR "Pain, Procedural"[Mesh] OR "Pain, Referred"[Mesh] OR "Pelvic Pain"[TIAB] OR "Pelvic Pain"[TIAB]
AND

"Pain Management"[Mesh]

BMJ Open

An International Perspective on Healthcare Provider Gender Bias in Musculoskeletal Pain Management: A Scoping Review Protocol

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2021-059233.R1
Article Type:	Protocol
Date Submitted by the Author:	20-Apr-2022
Complete List of Authors:	Wilford, Katherine; University of Saint Augustine - Austin Campus, College of Rehabilitative Sciences Physical Therapy; Texas Tech University Health Sciences Center, Center for Rehabilitation Research Mena-Iturriaga, Maria Jesus; Texas Tech University Health Sciences Center, Center for Rehabilitation Research; Universidad del Desarrollo Vugrin, Margaret; Texas Tech University Health Sciences Center, Preston Smith Library Wainer, Macarena; Universidad del Desarrollo, Physical Therapy School Sizer, Phillip S.; Texas Tech University Health Sciences Center, Center for Rehabilitation Research Seeber, Gesine; Carl von Ossietzky Universitat Oldenburg, University Hospital of Orthopaedics and Trauma Surgery Pius-Hospital Oldenburg; University of Groningen, University Medical Center Groningen, Department of Orthopedics
Primary Subject Heading:	Patient-centred medicine
Secondary Subject Heading:	Research methods
Keywords:	PAIN MANAGEMENT, Musculoskeletal disorders < ORTHOPAEDIC & TRAUMA SURGERY, Quality in health care < HEALTH SERVICES ADMINISTRATION & MANAGEMENT

An International Perspective on Healthcare Provider Gender Bias in Musculoskeletal Pain Management: A Scoping Review Protocol

Katherine Wilford*[1,2], Maria Jesus Mena-Iturriaga[2,3], Margaret Vugrin[4], Macarena Wainer[3], Phillip S. Sizer Jr[2], Gesine H. Seeber[2,5,6]

[1] College of Rehabilitative Sciences Physical Therapy, University of Saint Augustine for Health Sciences, Austin, Texas, USA

[2] Center for Rehabilitation Research, Texas Tech University Health Sciences Center, Lubbock, Texas, USA

[3] Physical Therapy School, Universidad del Desarrollo, Santiago, Chile

[4] Preston Smith Library, Texas Tech University Health Sciences Center, Lubbock, Texas, USA

[5] University Hospital of Orthopaedics and Trauma Surgery Pius-Hospital Oldenburg, University of Oldenburg, School of Medicine and Health Sciences, Oldenburg, Germany

[6] University of Groningen, University Medical Center Groningen, Department of Orthopedics, Groningen, The Netherlands

*Corresponding Author
Katherine Wilford
Assistant Professor, Doctor of Physical Therapy Program
University of St. Augustine for Health Sciences
5401 LaCrosse Avenue Austin, TX 78739
512-394-9766, ext. 3150
kwilford@usa.edu

ABSTRACT

INTRODUCTION Chronic pain affects millions of individuals worldwide. Healthcare provider gender bias in the management of these individuals has societal and individual ramifications. Yet, a thorough and comprehensive literature summary on this topic is lacking. Therefore, this study aims to systematically (1) identify and map the available scientific and grey literature as it relates to healthcare provider gender bias in the assessment, diagnosis, and management of (chronic) musculoskeletal pain, and (2) identify current gaps that necessitate further research.

METHODS AND ANLYSIS This scoping review will be conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR). The following databases will be searched: Pubmed® (National Library of Medicine), Embase® (Elsevier), Scopus® (Elsevier), CINAHL Complete® (Ovid), Academic Search Complete™ (Ebscohost), Pre-Prints Database® (National Library of Medicine), and Rehabilitation Reference Center from inception to September 2021. Additionally, relevant grey literature will be identified. All screening will be done by two independent reviewers during two stages: first title/abstract screening followed by full text screening. Data will be extracted from the bibliometric, study characteristics, and pain science families of variables. Results will be descriptively mapped, and the frequency of concepts, population, characteristics, and other details will be narratively reported. Additionally, results will be presented in tabular and graphical form.

ETHICS AND DISSEMINATION As this study will neither involve human subject participation nor utilization of protected data, ethical approval is not required. This study's methodological approach follows current recommendations. Study findings will be disseminated through

conference presentations and international peer-review journal publication. In addition, infographics available in English, Spanish, and German will be disseminated.

REGISTRATION DETAILS This project will be registered in Open Science Framework prior to data collection.

Word count: 281 words

Keywords: pain management, MSK disorders, quality in health care

Strengths and Limitations of This Study

- This will be the first study to systematically explore and summarize healthcare provider gender bias (HCP-GB) and its influence on patient care with respect to musculoskeletal pain management.
- The research team includes a scientific librarian with expertise in search strategies and Covidence will be used during this review process to ensure blinding reviewer consistency.
- Including only resources available in English, Spanish, and German may result in missing essential resources only available in other languages.
- While focusing on gender bias, the researchers acknowledge it is difficult to separate the intersectionality of gender with other biological or societal determinants. The results of this project will add to a lager discussion on the intersectionality of gender with the above-mentioned constructs.

- Discrepancies in assessments, treatment, and outcomes between genders does not necessarily imply HCP-GB was present. For example, certain conditions are more prevalent in one gender over the other, therefore, a gender-specific management strategy would not support a HCP-GB.

INTRODUCTION

Pain has become a global health problem.[1] Recent data reports that annual costs ranged from $560 to $635 billion in the United States for individuals with chronic pain, resulting in lower worker productivity.[2] Low back and neck pain are among the leading causes of years lived with prolonged disability worldwide.[3] The incidence of musculoskeletal (MSK) pain is projected to grow exponentially over the next two decades, further straining healthcare systems already stretched to their breaking points.[2]

In addition to the economic impact, (chronic) pain management has many widespread societal ramifications. Prescription opioid use is a common management option, used in 40-60% of primary health care settings.[4–10] However, its misuse can have severe ramifications that include heroin use, opioid overdose, and death.[4–10] Additionally, individuals with chronic pain are more likely to have mental health conditions such as anxiety and depression.[11] Approximately 20% of individuals with chronic pain demonstrate suicidal ideation, increasing the risk of death by suicide twofold versus the general population.[12] Due to the pervasive sequelae of mismanaged (chronic) pain for both the affected individual and society as a whole, care providers who treat individuals with (chronic) MSK pain are required to engage in thoughtful ongoing assessment and modification during the management sequence.

To better manage individuals with (chronic) pain, careful attention must be paid to the *management model* itself. The healthcare-patient management model contains many elements: examination, evaluation, diagnosis, prognosis, intervention, and outcomes.[13–15] The *examination* includes a history wherein the healthcare provider collects patient data on the current condition.[13] Following, tests and measures are performed to rule in or rule out impairments. The healthcare provider must interpret available data from the entire examination process. This interpretation leads to crafting a diagnosis and prognosis, followed by the development of an overall management plan for the patient.[13] A failure to correctly collect or interpret data may result in suboptimal or even unfavorable clinical decisions that reduce patient outcomes.

Specific to the examination of individuals with (chronic) *MSK pain*, the affected individual's subjective self-report (i.e., verbally during medical history taking and/or by means of various written patient self-reported outcome measures) is the diagnostic gold standard.[16,17] As is common with verbal communication, however, many possible sources of error can exist between the clinician and patient during this verbal history-taking processs.[18] One possible source of error in communication can be related to the influence of bias.[18]

Bias, in general, describes a tendency, leaning, or prejudice toward an object or a person and can be either positive or negative.[19] Most biases are based on stereotypes rather than on actual knowledge.[19] Such prejudgment can result in injudicious decisions or discriminatory practices.[19] Biases delivered against other people are often based on the group that the biased individuals belong to and/or on an immutable physical characteristic they possess, such as their ethnicity, sexual orientation, age, or gender.[16,19,20] Individuals who act in a biased manner may

or may not be aware of their biases. An unconscious bias, also known as "implicit bias," can have harmful consequences as stereotyping and prejudice ultimately influence both perceptions and decisions.

While highly trained in their respective fields, healthcare providers are not precluded from possessing implicit biases. The patient-healthcare provider interaction is a complicated process wherein current scientific evidence, clinician experience, and patient expectations may collide. Serving as vectors who translate clinical knowledge and research into the patient-management process, healthcare providers must be aware of their implicit biases and possible consequences for their patients. Current literature suggests the existence of gender-related discrepancies in assessment, diagnosis, and management of (chronic) pain.[16,20–22] Gender, defined as behavioral, cultural, or psychological traits typically associated with one sex, will be used throughout this manuscript rather than sex, defined as either of two forms of individuals that are distinguished based on reproductive organs and structures,[23] as the authors aim to capture healthcare consequences of gender and will, therefore, be describing cultural ramifications rather than simply biological differences. In comparison to men, women experience a delay in access to diagnostic and treatment options for chronic pain and are less likely to receive recommendations for analgesics, radiological examination, and physiotherapy.[24–26]

A systematic and thorough literature summary on the topic of gender bias in healthcare is currently lacking. While a theory-guided review on gender bias in the treatment of pain is available,[22] to the best of our knowledge, the topic of gender bias in healthcare is lacking a systematic approach and mapping. Moreover, previous literature does not include the entire

patient management model or a strict focus on musculoskeletal pain. The purpose of this scoping review is to systematically identify and comprehensively map available scientific literature and grey literature as they relate to healthcare provider-gender bias (HCP-GB) in the assessment, diagnosis, and management of (chronic) MSK pain. This study aims to examine: 1) the scope of literature on HCP-GB in MSK pain assessment, diagnosis, and management; 2) the effects of HCP-GB on patient outcomes; and 3) how HCP-GB varies across different countries and cultures.

METHODS AND ANALYSIS

Study Design

This scoping review will be conducted in accordance to recent guidelines[27,28] and reported via the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR), as per current recommendations.[29,30] Furthermore, while not currently required for scoping reviews, this project will be registered in Open Science Framework prior to data collection.[27,28]

Data Sources

This scoping review will include both scientific research and grey literature (e.g., conference proceedings, dissertations). Relevant scientific studies will be identified in the electronic databases Pubmed® (National Library of Medicine), Embase® (Elsevier), Scopus® (Elsevier), CINAHL Complete® (Ovid), Academic Search Complete™ (Ebscohost), Pre-Prints Database® (National Library of Medicine), and Rehabilitation Reference Center from inception to September 2021. All databases will be accessed through the local university libraries. Grey

literature will be identified by searching Trip database, Papers First, Conference Papers Index, and Clinical Trial Register Databases (Prospero, ClinicalTrials.gov, WHO International Clinical Trials Registry Platform (ICTRP), ISRCTN registry, ClinicalResearch.com, CenterWatch), and Google Scholar.[27,31,32] Google Scholar search will end when 20 consecutive links irrelevant to the search topic are found.

Search Strategy

Search terms will be developed in accordance with previous recommendations for scoping reviews using the P.C.C. framework summarized in Table 1.[27]

Table 1: P.C.C. framework

P opulation	Man, woman, adult, healthcare provider, professional
C oncept	Bias, gender, stereotype, gendered norm, inequity, sex, gender research
C ontext	Musculoskeletal pain, pain assessment, pain perception, treatment, pain management, rehabilitation, diagnosis, outcome, culture, equity in health

As search strategies will be specified for each data source, an experienced scientific librarian will be involved in final search strategy development.[28] A combination of Medical Subject Headings (MeSH)/concepts subject headings will be meaningfully linked, based on the targeted database and keywords. The snowball method will be used to identify additional papers from included studies' reference lists.[31–33] The full PubMed search strategy used during the pilot process is included in Appendix A.

Study Screening

The review management software Covidence (Veritas Health Innovation Ltd, Melbourne, Australia) will be used for study screening and data extraction. A three-reviewer model will be employed, wherein two blinded primary reviewers (K.W. and M.J.M.) independently screen

references for possible inclusion. A third blinded reviewer (G.H.S.) will solve emerging conflicts.[27,28] A two-part pilot process will be used to revise search criteria, refine the study selection process, and ensure a threshold of at least 75% agreement between reviewers prior to final study selection. The above-mentioned reviewers will screen title and abstract first followed by the full text of selected references prior to data extraction. The entire search will be limited to resources available in English, Spanish, and German. *In-vitro,* cadaveric, animal, or experimentally induced pain studies will be excluded from title/abstract screening. Studies will be excluded from full text screening for the following reasons: pain not evaluated, non MSK pain, no healthcare provider bias, unable to find full text, language other than English, German, or Spanish.

Study Variables, Data Extraction, and Data Reporting

The following families of variables will be extracted from the full texts of included studies, using the same three-reviewer model outlined in the previous section:[27,28]

- Bibliometric Variables (author; title; publishing journal; etc.)
- Study Characteristic Variables (design; purposes; aims; population; setting; etc.)
- Pain Science Variables (pain descriptors; diagnosis; outcomes; patient characteristics; bias explanation; etc.)

All extracted data will be summarized in a customized pre-piloted data extraction table using the Covidence software. To avoid possible duplication of extracted data, reviews and meta-analyses will be excluded from the extraction phase. Rather, the reference list of reviews and meta-analyses will be mined for relevant studies for inclusion. Only original studies will be used for data extraction. As expected with scoping reviews, results will be descriptively

mapped.[27,28] The data extraction format will be based on the specific variables and the reporting method is outline further in Table 2.

Patient and Public Involvement

Neither patients nor members of the public were involved during the design of this research. Moreover, neither of the two groups will be involved during the conduct of this scoping review due to the nature of the study's design. Prior to dissemination of the infographic, patient and clinician feedback will be sought and incorporated into the final product.

Table 2: Data extraction for bibliometric, study characteristics, and pain science variables

	Bibliometric	Study Characteristics	Pain Science
Variables to be extracted and mapped	• Author(s) • Type of study • Publication Year • Journal • DOI • Language • Country	• Study design • Setting • Sample/Population • Purpose(s) • Aim(s) • Level of evidence • Approach (Qualitative vs. Quantitative vs. Mixed methods)	• Healthcare provider specifications: profession, age, sex, gender, degree, years of experience, country, religion, ethnic background • Patient specifications: age, sex, gender, education level, socioeconomic status, country, religion, ethnic background, mental health status, comorbidities, severity of health issue, familial history, accessibility to healthcare • Healthcare setting • Pain descriptors: location(s), intensity, onset, type • Diagnosis: outcome measures/assessment tools used, time from pain onset, timeline, sex-related prevalence, diagnostic criteria available • Type of treatment prescribed: medication vs. rehab vs. psychological vs. other • Patient outcome after treatment • Bias explanation(s)
Reporting measures	• Author(s), type of study, publication year, country, methodology, etc. → absolute and relative frequencies • Purposes and aims →descriptively • Variables related to population age and sample size → mean (SD)/median (IQR) • Population gender and other characteristics → absolute or relative frequencies • Pain variables → descriptively and/or as absolute or relative frequencies		

DOI = digital object identifier; SD = Standard deviation, IQR = Interquartile range

ETHICS AND DISSEMINATION

A persistent HCP-GB in the assessment, diagnosis, and management of (chronic) MSK pain is highly unethical. Furthermore, HCP-GB can lead to reduced treatment outcomes, prolonged disability in certain populations, and contributes to a significant economic strain on society. Thus, this study will provide a systematic exploration and summary of HCP-GB and its

influence on patient care. Literature suggests that gender biases occur at many health care delivery levels, damaging the health of millions of individuals worldwide.[34] The lack of HCP-GB awareness is a barrier to change.[35,36] Furthermore, a call to action is needed to protect the health and lives of millions of individuals with chronic pain. Minimizing HCP-GB in health systems will require a bold approach to raising awareness and transforming values among service providers.[34,35] This will be the first study to systematically explore and summarize HCP-GB and its influence on patient care. This study's results will identify gaps in current literature and aide future research needs in the field of (chronic) pain management. In addition, this study will challenge entrenched beliefs surrounding interactions with, and management of, individuals with (chronic) pain. By bringing to light HCP-GB and encouraging a self-reflective practice, individuals with (chronic) MSK pain should expect to receive ethical and unbiased care by empathetic healthcare providers.

Acknowledging the pervasive evidence-practice gap in health-care research and the difficulty converting research findings into clinical practice, the concept of knowledge translation has come to the foreground within the past several years. We will address knowledge translation via two strategies.[37] First, our study findings will be disseminated amongst the scientific community through conference presentations and an international peer-review journal publication. In addition, we strive to promote the integration of our findings into the clinical practice of healthcare providers outside the scientific environment. Informational graphics (also known as Infographics) have been suggested as an attractive and effective form of knowledge dissemination among non-scientific audiences via simple visualization and plain language use.[38,39] As the current project involves researchers from three different countries

(namely Chile, the United States of America, and Germany) that use different languages, this investigation's emerging infographic will be available in English, Spanish, and German. Once completed, we will devise a plan to disseminate the infographic throughout the physical therapy associations of countries that use these languages. By this means we hope to raise awareness about HCP-GB and to promote behavior change in a wide-reaching manner.

Contributorship statement: KW, MJM, and MW contributed to the conceptualization, methodology, writing of the original draft and revised drafts of the manuscript. MV contributed to the methodology and assisted securing required resources. PSS supervised the project and assisted with reviewing and editing drafts of the manuscript. GHS contributed to the conceptualization, methodology, writing of the original draft and revised drafts of the manuscript, and supervised reviewing and editing of critical revisions. All authors approved the final version of this manuscript.

Competing Interests: None to declare.

Funding: There are no funders to reports for this submission.

Data Sharing: There is no additional data available for this scoping review protocol. Yet, all data relevant to the scoping review will be included in the final article and/or uploaded as supplementary information.

Word count: 2165

References

1. Goldberg DS, McGee SJ. Pain as a global public health priority. *BMC Public Health*. 2011;11(770). http://www.biomedcentral.com/1471-2458/11/770
2. Gaskin DJ, Richard P. The economic costs of pain in the United States. *J Pain*. 2012;13(8):715-724. doi:10.1016/j.jpain.2012.03.009
3. Vos T, Flaxman AD, Naghavi M, et al. Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet*. 2012;380(9859):2163-2196. doi:http://dx.doi.org/10.1016/S0140-6736(12)61729-2
4. Fleming M, Balousek S, Klessig C, Mundt M, Brown D. Substance use disorders in a primary care sample receiving daily opioid therapy. *J Pain*. 2007;8:573-582.
5. Volkow N, McLellan A. Opioid abuse in chronic pain - misconceptions and mitigation strategies. *N Engl J Med*. 2016;374:1253-1263.
6. Saunders KW, Dunn KM, Merrill JO, et al. Relationship of Opioid Use and Dosage Levels to Fractures in Older Chronic Pain Patients. *J Gen Intern Med*. 2010;25(4):310-315. doi:10.1007/s11606-009-1218-z
7. Dunn K, Saunders K, CM R, et al. Opioid prescriptions for chronic pain and overdose: a cohort studt. *Ann Intern Med*. 2010;152(2):85-92. http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=fulltext&D=ovft&CSC=Y&NEWS=N&SEARCH=00000605-201001190-00006.an
8. Franklin G, Mai J, Turner J, M S, Wickizer R, Fulton-Kehoe D. Bending the prescription opioid dosing and mortality curves: impact of the Washing State opioid dosing guideline. *AM J Ind Med*. 2012;55:325-331.
9. Michna E, Jamison RN, Pham L-D, et al. Urine Toxicology Screening Among Chronic Pain Patients on Opioid Therapy: Frequency and Predictability of Abnormal Findings. *Clin J Pain*. 2007;23(2):173-179. doi:10.1097/AJP.0b013e31802b4f95
10. Turk D, Swanson K, Gatchel R. Predicting opioid misuse by chronic pain patients: a systematic review and literature synthesis. *Clin J Pain*. 2008;24:497-508.
11. Hooten WM. Chronic Pain and Mental Health Disorders: Shared Neural Mechanisms, Epidemiology, and Treatment. *Mayo Clin Proc*. 2016;91(7):955-970. doi:10.1016/j.mayocp.2016.04.029
12. Tang N, Crane C. Suicidality in chronic pain: a review of the prevalence, risk factors, and psychological links. *Psycho Med*. 2006;36(5):575-586.
13. APTA. *Guide to Phsical Therapist Practice*. American Physical Therapy Association; 2021. https://guide.apta.org/
14. Kranz F. Therapie mit System. Ergotherapeutische Prozessmodelle. *Ergopraxis*. 2015;8(10):12-13. doi:DOI: 10.1055/s-0041-106562
15. Toney-Butler T, Thayer J. Nursing Process. In: *StatPearls [Internet]*. StatPearls Publishing; 2022. https://www.ncbi.nlm.nih.gov/books/NBK499937/
16. Zhang L, Losin EAR, Ashar YK, Koban L, Wager TD. Gender Biases in Estimation of Others' Pain. *J Pain*. 2021;00(00):1-12. doi:10.1016/j.jpain.2021.03.001
17. Casser H, Schaible H. Muskuloskeletaler Schmerz [Musculoskeletal pain]. *Schmerz*. 2015;29(5):486-488, 490-495. doi:10.1007/s00482-015-0046-9

18. Maitland G, Hengeveld E, Banks K, English K. Chatper 3: Communication. In: *Maitland's Vertebral Manipulation*. 4th ed. Elsevier; 2005.
19. Ellemers N. Gender Stereotypes. *Annu Rev Psychol*. 2018;4(69):275-298. doi:10.1146/annurev-psych-122216-011719. Epub 2017 Sep 27.
20. Bernardes SF, Keogh E, Lima ML. Bridging the gap between pain and gender research: A selective literature review. *Eur J Pain*. 2008;12(4):427-440. doi:10.1016/j.ejpain.2007.08.007
21. Seers T, Derry S, Seers K, Moore RA. Professionals underestimate patients' pain: A comprehensive review. *Pain*. 2018;159(5):811-818. doi:10.1097/j.pain.0000000000001165
22. Samulowitz A, Gremyr I, Eriksson E, Hensing G. "Brave Men" and "Emotional Women": A Theory-Guided Literature Review on Gender Bias in Health Care and Gendered Norms towards Patients with Chronic Pain. *Pain Res Manag*. 2018;2018. doi:10.1155/2018/6358624
23. Dictionary. Merriam-Webster. Published 2020. Accessed December 5, 2020. https://www.merriam-webster.com/.
24. Schäfer G, Prkachin KM, Kaseweter KA, Williams ACDC. *Health Care Providers' Judgments in Chronic Pain: The Influence of Gender and Trustworthiness*. Vol 157.; 2016. doi:10.1097/j.pain.0000000000000536
25. Stålnacke BM, Haukenes I, Lehti A, Wiklund AF, Wiklund M, Hammarström A. Is there a gender bias in recommendations for further rehabilitation in primary care of patients with chronic pain after an interdisciplinary team assessment? *J Rehabil Med*. 2015;47(4):365-371. doi:10.2340/16501977-1936
26. Margarit C, Roca R, Inda MDM, et al. Gender Bias and Genotype Influence on Opioid Safety Profile in Chronic Low Back Pain. *Clin J Pain*. 2020;36(6):420-429. doi:10.1097/AJP.0000000000000824
27. Peters M, Godfrey C, McInerney P, Munn Z, Tricco A, Khalil H. Chapter 11: Scoping Reviews (2020 version). In: Aromataris E, Munn Z, eds. *JBI Manual for Evidence Synthesis*. JBI; 2020.
28. Peters MDJ, Marnie C, Tricco AC, et al. Updated methodological guidance for the conduct of scoping reviews. *JBI Evid Synth*. 2020;18(10):2119-2126. doi:10.11124/JBIES-20-00167
29. Tricco A, Lillie E, Zarin W, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med*. 2018;169(7):467-473. doi:10.7326/M18-0850
30. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*. 2021;372. doi:10.1136/bmj.n71
31. Hofste A, Soer R, Hermens HJ, et al. Inconsistent descriptions of lumbar multifidus morphology: A scoping review. *BMC Musculoskelet Disord*. 2020;21(1):1-18. doi:10.1186/s12891-020-03257-7
32. Daniel M, Rencic J, Durning SJ, et al. Clinical reasoning assessment methods: A scoping review and practical guidance. *Acada Med*. 2019;94(6):902-912. doi:10.1097/ACM.0000000000002618
33. Cuff A, Parton S, Tyer R, Dikomitis L, Foster N, Littlewood C. Guidelines for the use of diagnostic imaging in musculoskeletal pain conditions on affecting the lower back, knee, and shoulder: A scoping review. *Muscuolskeletal Care*. Published online 2020:1-10.

doi:10.1002/msc.1497

34. Sen G, Östlin P. Gender inequity in health: why it exists and how we can change it. *Glob Public Health*. 2008;3(sup 1):1-12. doi:10.1080/17441690801900795
35. Gupta G, Ooman N, Grown C, et al. Gender equality and gender norms: framing the opportunities for health. *Lancet*. 2019;393:2250-2562. doi:10.1016/S0140-6736(19)30651-8
36. George A. The outrageous as ordinary: primary health care workers' perspectives on accountability in Koppal district, Karnataka State, India. Published online 2007.
37. Kristensen N, Nymann C, Kondradsen H. Implementing research results in clinical practice- the experiences of healthcare professionals. *BMC Heal Serv Res*. 2015;16(48). doi:10.1186/s12913-016-1292-y
38. Houts P, Doak C, Doak L, Loscalzo M. The role of pictures in improving health communication: a review of research on attention, comprehension, recall, and adherence. *Patient Educ Couns*. 61(2):173-190. doi:10.1016/j.pec.2005.05.004
39. *Guide to Knowledge Translation Planning at CIHR: Integrated and End-of-Grant Approaches*. Canadian Institutes of Health Research; 2012.

Acknowledgements: The authors would like to acknowledge the intramural student support award from the Texas Tech University Health Sciences Center School of Health Professions Pain Science Scholar Development Award.

Appendix A: Pubmed Search Strategy Used during the Pilot Process

(Delivery of Health Care [Mesh] OR Attitude of Health Personnel [Mesh] OR Emotional Intelligence [Mesh] OR Health Personnel [Mesh] OR Clinical Reasoning [Mesh] OR Judgement [Mesh] OR Trust [Mesh] OR Professional-Patient Relations [Mesh] OR "Caregivers"[Mesh] OR "Clinical Decision-Making"[Mesh] OR healthcare [TIAB] OR attitude [TIAB] OR empathy [TIAB] OR self-motivation [TIAB] OR "self-awareness" [TIAB] OR "self-regulation" [TIAB] OR "social skill*"[TIAB] OR nurse* [tiab] OR "nursing staff" [TIAB] OR Doctor* [TIAB] OR "physical therapist*" [TIAB] OR physician OR "occupational therapist" [TIAB] OR Judgement [TIAB] OR trust [TIAB] OR "Professional Patient Relationship" [TIAB] OR bias [TIAB])

AND

(Sex Factors [Mesh] OR Sexism [Mesh] OR Gender Equity [Mesh] OR Prejudice [Mesh] OR Gender Equity [Mesh] OR Gender Identity [Mesh] OR "Sex Characteristics"[Mesh] OR "Sexuality"[TIAB] OR "Gender Identity"[TIAB] OR "Sex"[TIAB] OR sexism [TIAB] OR gender [TIAB] OR "Healthcare Disparities"[Mesh])

AND

Chronic Pain [Mesh] OR Musculoskeletal pain [Mesh] OR "Chronic Pain" [TIAB] OR "Musculoskeletal pain*" [TIAB] OR "Craniomandibular Disorders"[Mesh] OR "Temporomandibular Joint Disorders"[Mesh] OR "Temporomandibular Joint Dysfunction Syndrome"[Mesh] OR "Medial Tibial Stress Syndrome"[Mesh] OR "Myofascial Pain Syndromes"[Mesh] OR "Temporomandibular Joint Dysfunction Syndrome"[Mesh] OR "Tendinopathy"[Mesh] OR "Elbow Tendinopathy"[Mesh] OR "Tennis Elbow"[Mesh] OR "Enthesopathy"[Mesh] OR "Tendon Entrapment"[Mesh] OR "De Quervain Disease"[Mesh] OR "Trigger Finger Disorder"[Mesh] OR "Tenosynovitis"[Mesh] OR "Fibromyalgia"[Mesh] OR pain [TIAB] OR "Acute Pain"[Mesh] OR "Arthralgia"[Mesh] OR "Shoulder Pain"[Mesh] OR "Back Pain"[Mesh] OR "Failed Back Surgery Syndrome"[Mesh] OR "Low Back Pain"[Mesh] OR "Breakthrough Pain"[Mesh] OR "Facial Pain"[Mesh:NoExp] OR "Headache"[Mesh:NoExp] OR "Metatarsalgia"[Mesh] OR "Morton Neuroma"[Mesh] OR "Myalgia"[Mesh] OR "Pelvic Girdle Pain"[Mesh] OR "Neck Pain"[Mesh] OR "Piriformis Muscle Syndrome"[Mesh] OR "Pudendal Neuralgia"[Mesh] OR "Sciatica"[Mesh] OR "Nociceptive Pain"[Mesh:NoExp] OR "Pain, Intractable"[Mesh] OR "Pain, Postoperative"[Mesh] OR "Phantom Limb"[Mesh] OR "Pain, Procedural"[Mesh] OR "Pain, Referred"[Mesh] OR "Pelvic Pain"[Mesh:NoExp] OR tendinopat* [TIAB] OR Enthesopathy [TIAB] OR "tendon entrapment*" [TIAB] OR "De Quervain" [TIAB] OR "trigger finger" [TIAB] OR Tenosynovitis [TIAB] OR Fibromyalgia[TIAB] OR "acute pain" [TIAB] OR Arthralgia [TIAB] OR "Shoulder Pain"[TIAB] OR "Back Pain" OR "Failed Back Surgery" OR "Low Back Pain" OR "Breakthrough Pain" OR "Facial Pain" OR "Headache" OR "Metatarsalgia" OR "Morton Neuroma*" OR "Myalgia" OR "Pelvic Girdle Pain" OR "Neck Pain" OR "Piriformis Muscle Syndrome" OR "Pudendal Neuralgia" OR "Sciatica" OR "Nociceptive Pain" OR "Intractable pain" OR "Postoperative Pain" OR "Phantom Limb" OR "Procedural Pain" OR "Phantom Limb"[Mesh] OR "Pain, Procedural"[Mesh] OR "Pain, Referred"[Mesh] OR Pelvic Pain[TIAB] "[Mesh] OR "Pain, Procedural"[Mesh] OR "Pain, Referred"[Mesh] OR "Pelvic Pain"[TIAB] OR "Pelvic Pain"[TIAB]
AND

"Pain Management"[Mesh]

BMJ Open

An International Perspective on Healthcare Provider Gender Bias in Musculoskeletal Pain Management: A Scoping Review Protocol

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2021-059233.R2
Article Type:	Protocol
Date Submitted by the Author:	23-May-2022
Complete List of Authors:	Wilford, Katherine; University of Saint Augustine - Austin Campus, College of Rehabilitative Sciences Physical Therapy; Texas Tech University Health Sciences Center, Center for Rehabilitation Research Mena-Iturriaga, Maria Jesus; Texas Tech University Health Sciences Center, Center for Rehabilitation Research; Universidad del Desarrollo Vugrin, Margaret; Texas Tech University Health Sciences Center, Preston Smith Library Wainer, Macarena; Universidad del Desarrollo, Physical Therapy School Sizer, Phillip S.; Texas Tech University Health Sciences Center, Center for Rehabilitation Research Seeber, Gesine; Carl von Ossietzky Universitat Oldenburg, University Hospital of Orthopaedics and Trauma Surgery Pius-Hospital Oldenburg; University of Groningen, University Medical Center Groningen, Department of Orthopedics
Primary Subject Heading:	Patient-centred medicine
Secondary Subject Heading:	Research methods
Keywords:	PAIN MANAGEMENT, Musculoskeletal disorders < ORTHOPAEDIC & TRAUMA SURGERY, Quality in health care < HEALTH SERVICES ADMINISTRATION & MANAGEMENT

An International Perspective on Healthcare Provider Gender Bias in Musculoskeletal Pain Management: A Scoping Review Protocol

Katherine Wilford*[1,2], Maria Jesus Mena-Iturriaga[2,3], Margaret Vugrin[4], Macarena Wainer[3], Phillip S. Sizer Jr[2], Gesine H. Seeber[2,5,6]

[1] College of Rehabilitative Sciences Physical Therapy, University of Saint Augustine for Health Sciences, Austin, Texas, USA

[2] Center for Rehabilitation Research, Texas Tech University Health Sciences Center, Lubbock, Texas, USA

[3] Universidad del Desarrollo, Kinesiologia, Facultad de Medicina Clínica Alemana, Santiago, Chile

[4] Preston Smith Library, Texas Tech University Health Sciences Center, Lubbock, Texas, USA

[5] University Hospital of Orthopaedics and Trauma Surgery Pius-Hospital Oldenburg, University of Oldenburg, School of Medicine and Health Sciences, Oldenburg, Germany

[6] University of Groningen, University Medical Center Groningen, Department of Orthopedics, Groningen, The Netherlands

*Corresponding Author
Katherine Wilford
Assistant Professor, Doctor of Physical Therapy Program
University of St. Augustine for Health Sciences
5401 LaCrosse Avenue Austin, TX 78739
512-394-9766, ext. 3150
kwilford@usa.edu

ABSTRACT

INTRODUCTION Chronic pain affects millions of individuals worldwide. Healthcare provider gender bias in the management of these individuals has societal and individual ramifications. Yet, a thorough and comprehensive literature summary on this topic is lacking. Therefore, this study aims to systematically (1) identify and map the available scientific and grey literature as it relates to healthcare provider gender bias in the assessment, diagnosis, and management of (chronic) musculoskeletal pain, and (2) identify current gaps that necessitate further research.

METHODS AND ANLYSIS This scoping review will be conducted in accordance with recent guidelines and the results will be reported via the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR). The following databases will be searched: Pubmed® (National Library of Medicine), Embase® (Elsevier), Scopus® (Elsevier), CINAHL Complete® (Ovid), Academic Search Complete™ (Ebscohost), Pre-Prints Database® (National Library of Medicine), and Rehabilitation Reference Center from inception to August 2022. Additionally, relevant grey literature will be identified. All screening will be done by two independent reviewers during two stages: first title/abstract screening followed by full text screening. Data will be extracted from the bibliometric, study characteristics, and pain science families of variables. Results will be descriptively mapped, and the frequency of concepts, population, characteristics, and other details will be narratively reported. Additionally, results will be presented in tabular and graphical form.

ETHICS AND DISSEMINATION As this study will neither involve human subject participation nor utilization of protected data, ethical approval is not required. This study's methodological approach follows current recommendations. Study findings will be disseminated through

conference presentations and international peer-review journal publication. In addition, infographics available in English, Spanish, and German will be disseminated.

REGISTRATION DETAILS This project will be registered in Open Science Framework prior to data collection.

Word count: 290 words

Keywords: pain management, MSK disorders, quality in health care

Strengths and Limitations of This Study

- This will be the first study to systematically explore and summarize healthcare provider gender bias (HCP-GB) and its influence on patient care with respect to musculoskeletal pain management.
- The research team includes a scientific librarian with expertise in search strategies and Covidence will be used during this review process to ensure blinding reviewer consistency.
- Including only resources available in English, Spanish, and German may result in missing essential resources only available in other languages.
- While focusing on gender bias, the researchers acknowledge it is difficult to separate the intersectionality of gender with other biological or societal determinants. The results of this project will add to a lager discussion on the intersectionality of gender with the above-mentioned constructs.

- Discrepancies in assessments, treatment, and outcomes between genders does not necessarily imply HCP-GB was present. For example, certain conditions are more prevalent in one gender over the other, therefore, a gender-specific management strategy would not support a HCP-GB.

INTRODUCTION

Pain has become a global health problem.[1] Recent data reports that annual costs ranged from $560 to $635 billion in the United States for individuals with chronic pain, resulting in lower worker productivity.[2] Low back and neck pain are among the leading causes of years lived with prolonged disability worldwide.[3] The incidence of musculoskeletal (MSK) pain is projected to grow exponentially over the next two decades, further straining healthcare systems already stretched to their breaking points.[2]

In addition to the economic impact, (chronic) pain management has many widespread societal ramifications. Prescription opioid use is a common management option, used in 40-60% of primary health care settings.[4–10] However, its misuse can have severe ramifications that include heroin use, opioid overdose, and death.[4–10] Additionally, individuals with chronic pain are more likely to have mental health conditions such as anxiety and depression.[11] Approximately 20% of individuals with chronic pain demonstrate suicidal ideation, increasing the risk of death by suicide twofold versus the general population.[12] Due to the pervasive sequelae of mismanaged (chronic) pain for both the affected individual and society as a whole, care providers who treat individuals with (chronic) MSK pain are required to engage in thoughtful ongoing assessment and modification during the management sequence.

To better manage individuals with (chronic) pain, careful attention must be paid to the *management model* itself. The healthcare-patient management model contains many elements: examination, evaluation, diagnosis, prognosis, intervention, and outcomes.[13–15] The *examination* includes a history wherein the healthcare provider collects patient data on the current condition.[13] Following, tests and measures are performed to rule in or rule out impairments. The healthcare provider must interpret available data from the entire examination process. This interpretation leads to crafting a diagnosis and prognosis, followed by the development of an overall management plan for the patient.[13] A failure to correctly collect or interpret data may result in suboptimal or even unfavorable clinical decisions that reduce patient outcomes.

Specific to the examination of individuals with (chronic) *MSK pain*, the affected individual's subjective self-report (i.e., verbally during medical history taking and/or by means of various written patient self-reported outcome measures) is the diagnostic gold standard.[16,17] As is common with verbal communication, however, many possible sources of error can exist between the clinician and patient during this verbal history-taking processs.[18] One possible source of error in communication can be related to the influence of bias.[18]

Bias, in general, describes a tendency, leaning, or prejudice toward an object or a person and can be either positive or negative.[19] Most biases are based on stereotypes rather than on actual knowledge.[19] Such prejudgment can result in injudicious decisions or discriminatory practices.[19] Biases delivered against other people are often based on the group that the biased individuals belong to and/or on an immutable physical characteristic they possess, such as their ethnicity, sexual orientation, age, or gender.[16,19,20] Individuals who act in a biased manner may

or may not be aware of their biases. An unconscious bias, also known as "implicit bias," can have harmful consequences as stereotyping and prejudice ultimately influence both perceptions and decisions.

While highly trained in their respective fields, healthcare providers are not precluded from possessing implicit biases. The patient-healthcare provider interaction is a complicated process wherein current scientific evidence, clinician experience, and patient expectations may collide. Serving as vectors who translate clinical knowledge and research into the patient-management process, healthcare providers must be aware of their implicit biases and possible consequences for their patients. Current literature suggests the existence of gender-related discrepancies in assessment, diagnosis, and management of (chronic) pain.[16,20–22] Gender, defined as behavioral, cultural, or psychological traits typically associated with one sex, will be used throughout this manuscript rather than sex, defined as either of two forms of individuals that are distinguished based on reproductive organs and structures,[23] as the authors aim to capture healthcare consequences of gender and will, therefore, be describing cultural ramifications rather than simply biological differences. In comparison to men, women experience a delay in access to diagnostic and treatment options for chronic pain and are less likely to receive recommendations for analgesics, radiological examination, and physiotherapy.[24–26]

A systematic and thorough literature summary on the topic of gender bias in healthcare is currently lacking. While a theory-guided review on gender bias in the treatment of pain is available,[22] to the best of our knowledge, the topic of gender bias in healthcare is lacking a systematic approach and mapping. Moreover, previous literature does not include the entire

patient management model or a strict focus on musculoskeletal pain. The purpose of this scoping review is to systematically identify and comprehensively map available scientific literature and grey literature as they relate to healthcare provider-gender bias (HCP-GB) in the assessment, diagnosis, and management of (chronic) MSK pain. This study aims to examine: 1) the scope of literature on HCP-GB in MSK pain assessment, diagnosis, and management; 2) the effects of HCP-GB on patient outcomes; and 3) how HCP-GB varies across different countries and cultures.

METHODS AND ANALYSIS

Study Design

This scoping review will be conducted in accordance to recent guidelines[27,28] and reported via the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR), as per current recommendations.[29,30] Furthermore, while not currently required for scoping reviews, this project will be registered in Open Science Framework prior to data collection.[27,28]

Data Sources

This scoping review will include both scientific research and grey literature (e.g., conference proceedings, dissertations). Relevant scientific studies will be identified in the electronic databases Pubmed® (National Library of Medicine), Embase® (Elsevier), Scopus® (Elsevier), CINAHL Complete® (Ovid), Academic Search Complete™ (Ebscohost), Pre-Prints Database® (National Library of Medicine), and Rehabilitation Reference Center from inception to August 2022. All databases will be accessed through the local university libraries. Grey

literature will be identified by searching Trip database, Papers First, Conference Papers Index, and Clinical Trial Register Databases (Prospero, ClinicalTrials.gov, WHO International Clinical Trials Registry Platform (ICTRP), ISRCTN registry, ClinicalResearch.com, CenterWatch), and Google Scholar.[27,31,32] Google Scholar search will end when 20 consecutive links irrelevant to the search topic are found.

Search Strategy

Search terms will be developed in accordance with previous recommendations for scoping reviews using the P.C.C. framework summarized in Table 1.[27]

Table 1: P.C.C. framework

P opulation	Man, woman, adult, healthcare provider, professional
C oncept	Bias, gender, stereotype, gendered norm, inequity, sex, gender research
C ontext	Musculoskeletal pain, pain assessment, pain perception, treatment, pain management, rehabilitation, diagnosis, outcome, culture, equity in health

As search strategies will be specified for each data source, an experienced scientific librarian will be involved in final search strategy development.[28] A combination of Medical Subject Headings (MeSH)/concepts subject headings will be meaningfully linked, based on the targeted database and keywords. The snowball method will be used to identify additional papers from included studies' reference lists.[31–33] The full PubMed search strategy used during the pilot process is included in Appendix A.

Study Screening

The review management software Covidence (Veritas Health Innovation Ltd, Melbourne, Australia) will be used for study screening and data extraction. A three-reviewer model will be employed, wherein two blinded primary reviewers (K.W. and M.J.M.) independently screen

references for possible inclusion. A third blinded reviewer (G.H.S.) will solve emerging conflicts.[27,28] A two-part pilot process will be used to revise search criteria, refine the study selection process, and ensure a threshold of at least 75% agreement between reviewers prior to final study selection. The above-mentioned reviewers will screen title and abstract first followed by the full text of selected references prior to data extraction. The entire search will be limited to resources available in English, Spanish, and German. *In-vitro,* cadaveric, animal, or experimentally induced pain studies will be excluded from title/abstract screening. Studies will be excluded from full text screening for the following reasons: pain not evaluated, non MSK pain, no healthcare provider bias, unable to find full text, language other than English, German, or Spanish.

Study Variables, Data Extraction, and Data Reporting

The following families of variables will be extracted from the full texts of included studies, using the same three-reviewer model outlined in the previous section:[27,28]

- Bibliometric Variables (author; title; publishing journal; etc.)
- Study Characteristic Variables (design; purposes; aims; population; setting; etc.)
- Pain Science Variables (pain descriptors; diagnosis; outcomes; patient characteristics; bias explanation; etc.)

All extracted data will be summarized in a customized pre-piloted data extraction table using the Covidence software. To avoid possible duplication of extracted data, reviews and meta-analyses will be excluded from the extraction phase. Rather, the reference list of reviews and meta-analyses will be mined for relevant studies for inclusion. Only original studies will be used for data extraction. As expected with scoping reviews, results will be descriptively

mapped.[27,28] The data extraction format will be based on the specific variables and the reporting method is outline further in Table 2.

Patient and Public Involvement

Neither patients nor members of the public were involved during the design of this research. Moreover, neither of the two groups will be involved during the conduct of this scoping review due to the nature of the study's design. Prior to dissemination of the infographic, patient and clinician feedback will be sought and incorporated into the final product.

Table 2: Data extraction for bibliometric, study characteristics, and pain science variables

	Bibliometric	Study Characteristics	Pain Science
Variables to be extracted and mapped	• Author(s) • Type of study • Publication Year • Journal • DOI • Language • Country	• Study design • Setting • Sample/Population • Purpose(s) • Aim(s) • Level of evidence • Approach (Qualitative vs. Quantitative vs. Mixed methods)	• Healthcare provider specifications: profession, age, sex, gender, degree, years of experience, country, religion, ethnic background • Patient specifications: age, sex, gender, education level, socioeconomic status, country, religion, ethnic background, mental health status, comorbidities, severity of health issue, familial history, accessibility to healthcare • Healthcare setting • Pain descriptors: location(s), intensity, onset, type • Diagnosis: outcome measures/assessment tools used, time from pain onset, timeline, sex-related prevalence, diagnostic criteria available • Type of treatment prescribed: medication vs. rehab vs. psychological vs. other • Patient outcome after treatment • Bias explanation(s)
Reporting measures	• Author(s), type of study, publication year, country, methodology, etc. → absolute and relative frequencies • Purposes and aims →descriptively • Variables related to population age and sample size → mean (SD)/median (IQR) • Population gender and other characteristics → absolute or relative frequencies • Pain variables → descriptively and/or as absolute or relative frequencies		

DOI = digital object identifier; SD = Standard deviation, IQR = Interquartile range

ETHICS AND DISSEMINATION

A persistent HCP-GB in the assessment, diagnosis, and management of (chronic) MSK pain is highly unethical. Furthermore, HCP-GB can lead to reduced treatment outcomes, prolonged disability in certain populations, and contributes to a significant economic strain on society. Thus, this study will provide a systematic exploration and summary of HCP-GB and its

influence on patient care. Literature suggests that gender biases occur at many health care delivery levels, damaging the health of millions of individuals worldwide.[34] The lack of HCP-GB awareness is a barrier to change.[35,36] Furthermore, a call to action is needed to protect the health and lives of millions of individuals with chronic pain. Minimizing HCP-GB in health systems will require a bold approach to raising awareness and transforming values among service providers.[34,35] This will be the first study to systematically explore and summarize HCP-GB and its influence on patient care. This study's results will identify gaps in current literature and aide future research needs in the field of (chronic) pain management. In addition, this study will challenge entrenched beliefs surrounding interactions with, and management of, individuals with (chronic) pain. By bringing to light HCP-GB and encouraging a self-reflective practice, individuals with (chronic) MSK pain should expect to receive ethical and unbiased care by empathetic healthcare providers.

Acknowledging the pervasive evidence-practice gap in health-care research and the difficulty converting research findings into clinical practice, the concept of knowledge translation has come to the foreground within the past several years. We will address knowledge translation via two strategies.[37] First, our study findings will be disseminated amongst the scientific community through conference presentations and an international peer-review journal publication. In addition, we strive to promote the integration of our findings into the clinical practice of healthcare providers outside the scientific environment. Informational graphics (also known as Infographics) have been suggested as an attractive and effective form of knowledge dissemination among non-scientific audiences via simple visualization and plain language use.[38,39] As the current project involves researchers from three different countries

(namely Chile, the United States of America, and Germany) that use different languages, this investigation's emerging infographic will be available in English, Spanish, and German. Once completed, we will devise a plan to disseminate the infographic throughout the physical therapy associations of countries that use these languages. By this means we hope to raise awareness about HCP-GB and to promote behavior change in a wide-reaching manner.

Contributorship statement: KW, MJM, and MW contributed to the conceptualization, methodology, writing of the original draft and revised drafts of the manuscript. MV contributed to the methodology and assisted securing required resources. PSS supervised the project and assisted with reviewing and editing drafts of the manuscript. GHS contributed to the conceptualization, methodology, writing of the original draft and revised drafts of the manuscript, and supervised reviewing and editing of critical revisions. All authors approved the final version of this manuscript.

Competing Interests: None to declare.

Funding: There are no funders to reports for this submission.

Data Sharing: There is no additional data available for this scoping review protocol. Yet, all data relevant to the scoping review will be included in the final article and/or uploaded as supplementary information.

Word count: 2165

References

1. Goldberg DS, McGee SJ. Pain as a global public health priority. *BMC Public Health*. 2011;11(770). http://www.biomedcentral.com/1471-2458/11/770
2. Gaskin DJ, Richard P. The economic costs of pain in the United States. *J Pain*. 2012;13(8):715-724. doi:10.1016/j.jpain.2012.03.009
3. Vos T, Flaxman AD, Naghavi M, et al. Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet*. 2012;380(9859):2163-2196. doi:http://dx.doi.org/10.1016/S0140-6736(12)61729-2
4. Fleming M, Balousek S, Klessig C, Mundt M, Brown D. Substance use disorders in a primary care sample receiving daily opioid therapy. *J Pain*. 2007;8:573-582.
5. Volkow N, McLellan A. Opioid abuse in chronic pain - misconceptions and mitigation strategies. *N Engl J Med*. 2016;374:1253-1263.
6. Saunders KW, Dunn KM, Merrill JO, et al. Relationship of Opioid Use and Dosage Levels to Fractures in Older Chronic Pain Patients. *J Gen Intern Med*. 2010;25(4):310-315. doi:10.1007/s11606-009-1218-z
7. Dunn K, Saunders K, CM R, et al. Opioid prescriptions for chronic pain and overdose: a cohort studt. *Ann Intern Med*. 2010;152(2):85-92. http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=fulltext&D=ovft&CSC=Y&NEWS=N&SEARCH=00000605-201001190-00006.an
8. Franklin G, Mai J, Turner J, M S, Wickizer R, Fulton-Kehoe D. Bending the prescription opioid dosing and mortality curves: impact of the Washing State opioid dosing guideline. *AM J Ind Med*. 2012;55:325-331.
9. Michna E, Jamison RN, Pham L-D, et al. Urine Toxicology Screening Among Chronic Pain Patients on Opioid Therapy: Frequency and Predictability of Abnormal Findings. *Clin J Pain*. 2007;23(2):173-179. doi:10.1097/AJP.0b013e31802b4f95
10. Turk D, Swanson K, Gatchel R. Predicting opioid misuse by chronic pain patients: a systematic review and literature synthesis. *Clin J Pain*. 2008;24:497-508.
11. Hooten WM. Chronic Pain and Mental Health Disorders: Shared Neural Mechanisms, Epidemiology, and Treatment. *Mayo Clin Proc*. 2016;91(7):955-970. doi:10.1016/j.mayocp.2016.04.029
12. Tang N, Crane C. Suicidality in chronic pain: a review of the prevalence, risk factors, and psychological links. *Psycho Med*. 2006;36(5):575-586.
13. APTA. *Guide to Phsical Therapist Practice*. American Physical Therapy Association; 2021. https://guide.apta.org/
14. Kranz F. Therapie mit System. Ergotherapeutische Prozessmodelle. *Ergopraxis*. 2015;8(10):12-13. doi:DOI: 10.1055/s-0041-106562
15. Toney-Butler T, Thayer J. Nursing Process. In: *StatPearls [Internet]*. StatPearls Publishing; 2022. https://www.ncbi.nlm.nih.gov/books/NBK499937/
16. Zhang L, Losin EAR, Ashar YK, Koban L, Wager TD. Gender Biases in Estimation of Others' Pain. *J Pain*. 2021;00(00):1-12. doi:10.1016/j.jpain.2021.03.001
17. Casser H, Schaible H. Muskuloskeletaler Schmerz [Musculoskeletal pain]. *Schmerz*. 2015;29(5):486-488, 490-495. doi:10.1007/s00482-015-0046-9

18. Maitland G, Hengeveld E, Banks K, English K. Chatper 3: Communication. In: *Maitland's Vertebral Manipulation*. 4th ed. Elsevier; 2005.
19. Ellemers N. Gender Stereotypes. *Annu Rev Psychol*. 2018;4(69):275-298. doi:10.1146/annurev-psych-122216-011719. Epub 2017 Sep 27.
20. Bernardes SF, Keogh E, Lima ML. Bridging the gap between pain and gender research: A selective literature review. *Eur J Pain*. 2008;12(4):427-440. doi:10.1016/j.ejpain.2007.08.007
21. Seers T, Derry S, Seers K, Moore RA. Professionals underestimate patients' pain: A comprehensive review. *Pain*. 2018;159(5):811-818. doi:10.1097/j.pain.0000000000001165
22. Samulowitz A, Gremyr I, Eriksson E, Hensing G. "Brave Men" and "Emotional Women": A Theory-Guided Literature Review on Gender Bias in Health Care and Gendered Norms towards Patients with Chronic Pain. *Pain Res Manag*. 2018;2018. doi:10.1155/2018/6358624
23. Dictionary. Merriam-Webster. Published 2020. Accessed December 5, 2020. https://www.merriam-webster.com/.
24. Schäfer G, Prkachin KM, Kaseweter KA, Williams ACDC. *Health Care Providers' Judgments in Chronic Pain: The Influence of Gender and Trustworthiness*. Vol 157.; 2016. doi:10.1097/j.pain.0000000000000536
25. Stålnacke BM, Haukenes I, Lehti A, Wiklund AF, Wiklund M, Hammarström A. Is there a gender bias in recommendations for further rehabilitation in primary care of patients with chronic pain after an interdisciplinary team assessment? *J Rehabil Med*. 2015;47(4):365-371. doi:10.2340/16501977-1936
26. Margarit C, Roca R, Inda MDM, et al. Gender Bias and Genotype Influence on Opioid Safety Profile in Chronic Low Back Pain. *Clin J Pain*. 2020;36(6):420-429. doi:10.1097/AJP.0000000000000824
27. Peters M, Godfrey C, McInerney P, Munn Z, Tricco A, Khalil H. Chapter 11: Scoping Reviews (2020 version). In: Aromataris E, Munn Z, eds. *JBI Manual for Evidence Synthesis*. JBI; 2020.
28. Peters MDJ, Marnie C, Tricco AC, et al. Updated methodological guidance for the conduct of scoping reviews. *JBI Evid Synth*. 2020;18(10):2119-2126. doi:10.11124/JBIES-20-00167
29. Tricco A, Lillie E, Zarin W, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med*. 2018;169(7):467-473. doi:10.7326/M18-0850
30. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*. 2021;372. doi:10.1136/bmj.n71
31. Hofste A, Soer R, Hermens HJ, et al. Inconsistent descriptions of lumbar multifidus morphology: A scoping review. *BMC Musculoskelet Disord*. 2020;21(1):1-18. doi:10.1186/s12891-020-03257-7
32. Daniel M, Rencic J, Durning SJ, et al. Clinical reasoning assessment methods: A scoping review and practical guidance. *Acada Med*. 2019;94(6):902-912. doi:10.1097/ACM.0000000000002618
33. Cuff A, Parton S, Tyer R, Dikomitis L, Foster N, Littlewood C. Guidelines for the use of diagnostic imaging in musculoskeletal pain conditions on affecting the lower back, knee, and shoulder: A scoping review. *Muscuolskeletal Care*. Published online 2020:1-10.

doi:10.1002/msc.1497

34. Sen G, Östlin P. Gender inequity in health: why it exists and how we can change it. *Glob Public Health*. 2008;3(sup 1):1-12. doi:10.1080/17441690801900795
35. Gupta G, Ooman N, Grown C, et al. Gender equality and gender norms: framing the opportunities for health. *Lancet*. 2019;393:2250-2562. doi:10.1016/S0140-6736(19)30651-8
36. George A. The outrageous as ordinary: primary health care workers' perspectives on accountability in Koppal district, Karnataka State, India. Published online 2007.
37. Kristensen N, Nymann C, Kondradsen H. Implementing research results in clinical practice- the experiences of healthcare professionals. *BMC Heal Serv Res*. 2015;16(48). doi:10.1186/s12913-016-1292-y
38. Houts P, Doak C, Doak L, Loscalzo M. The role of pictures in improving health communication: a review of research on attention, comprehension, recall, and adherence. *Patient Educ Couns*. 61(2):173-190. doi:10.1016/j.pec.2005.05.004
39. *Guide to Knowledge Translation Planning at CIHR: Integrated and End-of-Grant Approaches*. Canadian Institutes of Health Research; 2012.

Acknowledgements: The authors would like to acknowledge the intramural student support award from the Texas Tech University Health Sciences Center School of Health Professions Pain Science Scholar Development Award.

Appendix A: Pubmed Search Strategy Used during the Pilot Process

(Delivery of Health Care [Mesh] OR Attitude of Health Personnel [Mesh] OR Emotional Intelligence [Mesh] OR Health Personnel [Mesh] OR Clinical Reasoning [Mesh] OR Judgement [Mesh] OR Trust [Mesh] OR Professional-Patient Relations [Mesh] OR "Caregivers"[Mesh] OR "Clinical Decision-Making"[Mesh] OR healthcare [TIAB] OR attitude [TIAB] OR empathy [TIAB] OR self-motivation [TIAB] OR "self-awareness" [TIAB] OR "self-regulation" [TIAB] OR "social skill*"[TIAB] OR nurse* [tiab] OR "nursing staff" [TIAB] OR Doctor* [TIAB] OR "physical therapist*" [TIAB] OR physician OR "occupational therapist" [TIAB] OR Judgement [TIAB] OR trust [TIAB] OR "Professional Patient Relationship" [TIAB] OR bias [TIAB])

AND

(Sex Factors [Mesh] OR Sexism [Mesh] OR Gender Equity [Mesh] OR Prejudice [Mesh] OR Gender Equity [Mesh] OR Gender Identity [Mesh] OR "Sex Characteristics"[Mesh] OR "Sexuality"[TIAB] OR "Gender Identity"[TIAB] OR "Sex"[TIAB] OR sexism [TIAB] OR gender [TIAB] OR "Healthcare Disparities"[Mesh])

AND

Chronic Pain [Mesh] OR Musculoskeletal pain [Mesh] OR "Chronic Pain" [TIAB] OR "Musculoskeletal pain*" [TIAB] OR "Craniomandibular Disorders"[Mesh] OR "Temporomandibular Joint Disorders"[Mesh] OR "Temporomandibular Joint Dysfunction Syndrome"[Mesh] OR "Medial Tibial Stress Syndrome"[Mesh] OR "Myofascial Pain Syndromes"[Mesh] OR "Temporomandibular Joint Dysfunction Syndrome"[Mesh] OR "Tendinopathy"[Mesh] OR "Elbow Tendinopathy"[Mesh] OR "Tennis Elbow"[Mesh] OR "Enthesopathy"[Mesh] OR "Tendon Entrapment"[Mesh] OR "De Quervain Disease"[Mesh] OR "Trigger Finger Disorder"[Mesh] OR "Tenosynovitis"[Mesh] OR "Fibromyalgia"[Mesh] OR pain [TIAB] OR "Acute Pain"[Mesh] OR "Arthralgia"[Mesh] OR "Shoulder Pain"[Mesh] OR "Back Pain"[Mesh] OR "Failed Back Surgery Syndrome"[Mesh] OR "Low Back Pain"[Mesh] OR "Breakthrough Pain"[Mesh] OR "Facial Pain"[Mesh:NoExp] OR "Headache"[Mesh:NoExp] OR "Metatarsalgia"[Mesh] OR "Morton Neuroma"[Mesh] OR "Myalgia"[Mesh] OR "Pelvic Girdle Pain"[Mesh] OR "Neck Pain"[Mesh] OR "Piriformis Muscle Syndrome"[Mesh] OR "Pudendal Neuralgia"[Mesh] OR "Sciatica"[Mesh] OR "Nociceptive Pain"[Mesh:NoExp] OR "Pain, Intractable"[Mesh] OR "Pain, Postoperative"[Mesh] OR "Phantom Limb"[Mesh] OR "Pain, Procedural"[Mesh] OR "Pain, Referred"[Mesh] OR "Pelvic Pain"[Mesh:NoExp] OR tendinopat* [TIAB] OR Enthesopathy [TIAB] OR "tendon entrapment*" [TIAB] OR "De Quervain" [TIAB] OR "trigger finger" [TIAB] OR Tenosynovitis [TIAB] OR Fibromyalgia[TIAB] OR "acute pain" [TIAB] OR Arthralgia [TIAB] OR "Shoulder Pain"[TIAB] OR "Back Pain" OR "Failed Back Surgery" OR "Low Back Pain" OR "Breakthrough Pain" OR "Facial Pain" OR "Headache" OR "Metatarsalgia" OR "Morton Neuroma*" OR "Myalgia" OR "Pelvic Girdle Pain" OR "Neck Pain" OR "Piriformis Muscle Syndrome" OR "Pudendal Neuralgia" OR "Sciatica" OR "Nociceptive Pain" OR "Intractable pain" OR "Postoperative Pain" OR "Phantom Limb" OR "Procedural Pain" OR "Phantom Limb"[Mesh] OR "Pain, Procedural"[Mesh] OR "Pain, Referred"[Mesh] OR Pelvic Pain[TIAB] "[Mesh] OR "Pain, Procedural"[Mesh] OR "Pain, Referred"[Mesh] OR "Pelvic Pain"[TIAB] OR "Pelvic Pain"[TIAB]
AND

"Pain Management"[Mesh]