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REVIEW ARTICLE

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On the contextuality of gender biases in pain care: theory and evidence

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ABSTRACT

Pain is a universal human experience and the most common reason to seek medical care. Although women report more frequent and disabling pains than men, their pains are more often underassessed and undertreated in clinical encounters. Understanding the 'whens' and 'whys' of this gender paradox is vital to promote pain care equity and efficiency. Yet, the atheoretical and descriptive nature of most studies on provider gender biases in pain care is stalling the research field. To overcome this gap, we first propose the novel *Gender Biases in Pain Care Model,* which conceptualises the contextual nature of gender biases in pain care. It is an interaction-based socioecological model that integrates assumptions of gender-related theories and dual process models of person perception and stereotyping. Second, we conduct a theory-driven review of current evidence addressing the model's theoretical contentions. Sixty-six articles (8 reviews and 58 primary studies), mostly published in 2010–2024, were included. Although findings provide preliminary support for the model's four contentions, important empirical gaps are still unaddressed. We discuss how this model is a steppingstone to the generation of novel research questions and testable hypotheses that may fill current knowledge gaps and contribute to the development of equitable pain practices and policies.

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Pain; gender bias; gender schemas; healthcare providers; socioecological model

Pain is one of the most common reasons for people to seek medical care worldwide (Finley et al., 2018). In many healthcare settings around the globe, pain is referred to as the 'fifth vital sign' (P5VS) to emphasise the need for its routine assessment alongside traditional vital signs, such as temperature, pulse, respiratory rate, and blood pressure (Scher et al., 2018). As acute pain signals tissue damage and/or a disease, its early assessment and treatment may save lives, improve recovery and prevent pain from becoming chronic (Koneti & Jones, 2013). Chronic pain, i.e., pain that persists beyond a conventional healing time of 3 months, is currently considered a chronic disease on its own right by the *International Classification of Diseases* (ICD-11; Treede et al., 2019). Given the profound impact of chronic pain on individuals' and families' quality of life and its huge socioeconomic burden (Kapos et al., 2024; Katzman & Gallagher, 2024), its proper assessment and management is also paramount.

Given the complex, personal and invisible nature of pain experiences, proper pain care is, however, no simple deed. According to the Social Communication Model of Pain (Craig, 2009;

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Hadjistavropoulos et al., 2011) and the Empathy Model of Pain (Goubert et al., 2005), like many other social inference processes, the way healthcare providers assess and treat pain may be determined by countless factors. These factors pertain to the individual with pain (e.g., demographic characteristics, facial expressions), the provider making the judgment (e.g., dispositional empathy, implicit biases) and the context in which the experience occurs (e.g., social setting, time pressure). In response to the 2024 *International Association for the study of Pain* (IASP) Global Year awareness campaign on 'Sex and Gender Disparities in Pain', this article specifically addresses how gender, in all its complexities, may shape providers' pain assessment and treatment decisions in clinical settings.

The gender paradox in pain care: a conceptual challenge

Women are more sensitive to experimental pain than men (Racine et al., 2012) and, from puberty onwards, report more frequent, generalised, severe and disabling chronic pains and are more likely to seek specialised pain care (Fillingim, 2017; Fillingim et al., 2009; Keogh, 2022; Zimmer et al., 2022). Paradoxically, in clinical contexts, women's pain seems to be often underassessed and undertreated compared to men's pain (Hoffmann et al., 2022; Hoffmann & Tarzian, 2001). This gender paradox in pain care was first noticed by Hoffman and Tarzian's seminal article (2001), and since then hundreds of papers have investigated healthcare providers' gender biases in pain-related clinical practices (Farcas et al., 2023; Hoffmann et al., 2022; Ruben et al., 2018; Samulowitz et al., 2018; Thurston et al., 2023), i.e., their unjustified tendency to (un)favour a group of individuals over another based on their sex/gender categorisation (Brewer, 2017). Provider gender biases may lead to inadequate pain care, which often results in harmful mental and physical health consequences (King & Fraser, 2013). Therefore, as such biases may contribute to unjustifiable and unfair sex-related differences in the burden of (chronic) pain, understanding them is paramount to promote healthcare efficiency, equity and inclusiveness.

To do so, in this review we will first take stock of the state-of-the art on provider gender biases in pain-related clinical practices. We will briefly show that current evidence points out that gender biases in pain care do not occur consistently across all clinical encounters, suggesting this is a dynamic, transactional and contextual phenomenon. We will argue that, as most published studies so far have been a-theoretical and descriptive, such variability has often been dismissed as mere inconsistencies instead of conceptualised and, hence, accounted for. To overcome this major shortcoming, we address this conceptual challenge by proposing the *Gender Biases in Pain Care Model*, analysing the extent to which most current evidence supports its major contentions and identifying evidence gaps. Finally, we will show how this novel theoretical proposal informs future research on such gender biases and the development of interventions and policies to increase gender equity and inclusiveness in pain care.

Preliminary conceptual and methodological notes

Before presenting our theory-informed review, a few conceptual and methodological notes are warranted. *Conceptually*, sex is a merely descriptive term used to categorise human beings based on their sex characteristics (Bernardes et al., 2008; Boerner et al., 2018; Keogh, 2021). For the purposes of this review, as most research on this topic has been conducted with cisgender individuals, i.e., females/males who self-identify as women/men, the term *sex* will be used for descriptive comparisons between males/men and females/women. For simplicity's sake, henceforth, the terms *women/men* will be used herein to refer to cisgender women/men. The terms *male/female* will only be used in their adjectival form to modify nouns such as provider or patient (e.g., female provider, male patient). Individuals whose gender identities or expressions differ from what is culturally expected for their assigned sex at birth will be generally referred to as transgender and gender diverse (TGD; Coleman et al., 2022). Moreover, the term 'gender' will also encompass a variety of dimensional constructs accounting for the social and relational nature (Bernardes et al., 2008; Boerner et al., 2018;

Keogh, 2021) of the unjustified sex-related differences in providers' pain assessment and treatment practices, henceforth, gender biases in pain care. Finally, we will use the term 'patients' to refer, exclusively, to individuals with acute or chronic pains who are receiving care within clinical or healthcare settings.

As for methods, it is important to clarify the methodological procedures underpinning theory building and the literature review. First, the theoretical model we present in this article resulted from constant iteration between two common strategies used in theory building in applied sciences (Lynham, 2002): (1) *research-to-theory*, i.e., going from observation, analysis and identification of patterns in evidence to formalising these patterns in theoretical axioms, and (2) *theory-to-research*, i.e., develop and explicitly state theoretical axioms and then produce and/or analyse evidence that may confirm or disconfirm them. The embryo of the present model was developed in the final stages of the doctoral studies of the first author (Bernardes, 2010), and refined shortly after (Bernardes, 2010, 2012). Then, progress in model refinement was partially stalled by lack of further evidence. Nearly 15 years later, the availability of a bulk of novel evidence allowed resuming the process of theory refinement, this time with the collaboration of the second author. This latter stage of theory building, once again, involved a combination of inductive and deductive reasoning, moving iteratively between data interpretation and conceptualisation, ultimately resulting in the model in its current form.

As for the literature review, although we did not aim for a systematic review, we thoroughly searched four electronic databases (PubMed, Scopus, Cinahl, PsycInfo) using the search term 'pain' combined with 'sex or gender bias', 'sex or gender prejudice', sex or gender stereotype', 'sex or gender discrimination', 'sex or gender disparity', 'sex or gender inequity', 'sex or gender inequality', 'implicit bias', 'femininity', 'masculinity', 'gender roles', 'sexism'. We limited the search to articles published in English in 2010–2024, to prioritise most recent research. However, because the primary studies of literature review articles were also considered, we reviewed a few studies reaching back to the beginning of the century. In the first stage, all articles, regardless of their design/methods, directly addressing provider gender biases in pain assessment, communication and/or treatment were selected for full screening. Studies addressing laypeople's gender biases in pain judgements were excluded. Overall, 90 articles were identified and completed with 12 articles found through scanning articles' reference lists. In the second stage, all these articles were fully screened by the second author. Only the articles that directly or indirectly addressed at least one of the model's theoretical contentions were selected for inclusion, regardless of their evidence supporting or not supporting their assumptions. At this stage, many articles were excluded mainly because: (a) they did not address the variability of provider gender biases in pain care; (b) their results were difficult to attribute to biased processes; and/or (c) pain was treated as a secondary symptom amidst larger clusters of signs and symptoms. Overall, 65% of the articles screened ($n = 66$) were included in the review. In the third stage, data pertinent to the model's theoretical contentions was extracted by the second author, and both authors discussed until reaching consensus on how to position each finding regarding these contentions. Table S1 (in supplementary file) provides an overview of the studies that contributed with evidence regarding each model's contentions, along with details on their design/methods and authors' countries. Regardless of the level of evidence for our model, all these articles are cited in the following subsections describing evidence for each theoretical contention.

Finally, although we consistently use the general term *provider*, most included studies have focused on physicians, nurses or paramedics. Gender biases in pain care by physiotherapists, dentists, social workers, occupational therapists, and psychologists were less frequently investigated. Noteworthy, none of the included articles focused on provider gender biases in pain care of TGD individuals.

Gender biases in pain-related clinical practices: a descriptive overview

Recent literature reviews show provider gender biases in pain assessment, management and communication in acute and chronic pain-related clinical encounters. Many of the reviewed studies show

biases against women. Although women are faster than men at recognising the signs and symptoms of acute coronary syndromes (e.g., chest pain), they wait longer to access the emergency medical system after seeking help (Farcas et al., 2023). Women also report more intense post-operative pain yet receive less pain medication than men (Thurston et al., 2023). Furthermore, women's chronic pains are more often psychologised, mistrusted and they receive more referrals to psychological treatments, less effective pain relief, fewer opioid analgesics and more antidepressants (Samulowitz et al., 2018).

Despite many studies pointing to provider biases against women, the pattern of findings is not entirely consistent. On one hand, some studies suggest biases against men. A meta-analysis showed that providers significantly underestimate patients' pain, especially when most of the patients in the study sample were men (Ruben et al., 2018). Some of the studies reviewed by Thurston et al. (2023) addressing postoperative pain medication found biases against men. On the other hand, quite a few studies report an absence of provider gender biases. For example, Farcas et al.'s review (2023) showed no clear consensus on gender biases in prehospital interventions for acute coronary syndrome (e.g., ECG, aspirin or nitroglycerin) nor prehospital pain management. A few studies reviewed by Thurston et al. (2023) showed no sex-related differences in postoperative pain medications.

In sum, provider gender biases in clinical practice against women exist but not always. The contextual nature of these biases may underlie such apparent inconsistencies, but these have been seriously under conceptualised. To the best of our knowledge, there is currently no integrated account of the social psychological processes that explain the '*whens*' and '*whys*' of provider gender biases in pain care. Existing theoretical models on gender and pain, such as the *Gender Context Model of Pain* (Keogh, 2021) and the recently proposed *Ecological-Systems Model of Understanding Pain in TGD Youth* (Boerner et al., 2023) mainly seek to explain how gender shapes individuals' pain, pain expressions and/or chronic pain adjustment outcomes. Despite its focus on individuals' gendered pain experiences, Keogh's model also generally proposes that observers' (e.g., providers) gender-related identities and beliefs may influence how men's and women's pain is appraised and responded to, which in turn may be influenced by dynamic gendered interpersonal exchanges around pain. Although this general prediction may begin to shed light on the apparent fluctuating nature of provider gender biases in pain care, the model lacks specificity about the mechanisms (whys) and conditions (whens) under which (provider) gender biases occur. We aim to bridge this gap by proposing a social psychological account of the contextuality of provider gender biases in pain care and assessing the extent to which current evidence supports its main contentions.

On the contextuality of provider gender biases in pain care: from theory to evidence

Figure 1 depicts the novel *Gender Biases in Pain Care Model*. This model integrates assumptions of gender-related theories at different levels of analysis (Bernardes et al., 2008; Boerner et al., 2018; Keogh, 2021) and of dual process models of person perception and stereotyping (Gawronski et al., 2024; Kunda & Spencer, 2003; Macrae & Bodenhausen, 2000). It is a *socioecological model* positing that to understand the nature of provider gender biases in pain care we need to go beyond the individual/provider and consider the nested social contexts in which providers assess and treat pain, namely: the clinical encounter with the pain patient, the healthcare setting in which it occurs and the wider societal/cultural background. The model is also *interaction-based,* stressing how dynamic links between gender-related processes occurring at each ecological level justify the enduring yet fluctuating and contextual nature of provider gender biases in pain care.

As evident in Figure 1, the model sets its focus on the *proximal determinants* of provider gendered (re)actions in pain-related clinical encounters, namely: (1) providers' gender-related information processing, and (2) the gendered provider-patient interactions occurring within the clinical encounter (Deaux & LaFrance, 1998; Deaux & Major, 1987). Given the phenomenon under conceptualisation, the model sets its main analytic focus on the perspective of the provider. Although

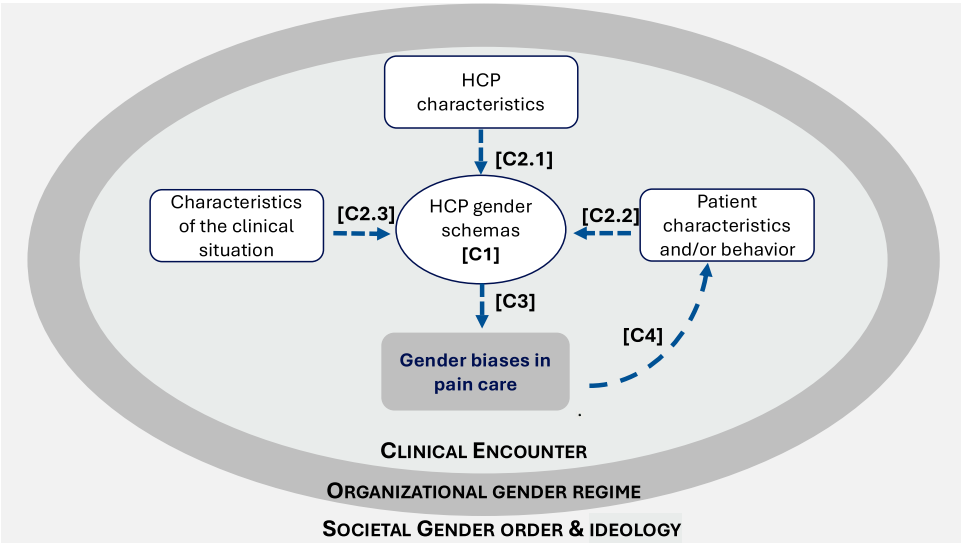


Figure 1. The Gender Biases in Pain Care Model.

Note: Numbers refer to the theoretical contentions (C) of the model described in the text. HCP = Healthcare provider.

provider-patient reciprocal social influence processes are considered, patient characteristics/actions are acknowledged insofar as they constitute the interpersonal context that may trigger, amplify or suppress provider biases in pain care. The model also considers how *distal determinants*, namely, largely institutionalised gender ideologies (Connell, 1987, 1995, 2002), and the gender-related social status asymmetries they produce (Amâncio & Oliveira, 2006; Lorenzi-Cioldi, 2002), trickle down shaping proximal determinants of provider biases in pain care. Largely shared gender ideologies are not merely a background context but enduring active forces that shape (gendered) healthcare setting practices, the social exchanges occurring in clinical encounters and, ultimately, providers' gender-related information processing regarding pain patients.

These meta-theoretical assumptions are unpacked and articulated through *four central theoretical contentions*, illustrated in Figure 1. Before describing the model's contentions, a caveat should be highlighted. This model is likely most suitable to understand the contextuality of provider gender biases in pain care of cisgender men and women. This stems from two factors: (1) the theoretical foundations of the model, namely, how limited the literature has been in applying mainstream gender-related theories and models on person perception and stereotyping to TGD populations (Gallagher & Bodenhausen, 2021; Paganini et al., 2025), and (2) the previously mentioned lack of evidence on provider biases in pain care of TGD individuals.

That said, in the following sub-sections, we will move *from theory to evidence*, i.e., each theoretical contention will first be explained, followed by an analysis of the extent to which current empirical evidence supports them or not. In the final discussion section, we will move from *evidence to theory*, i.e., we will critically analyse existing evidence and its significance for the proposed theoretical contentions.

Contention 1 – providers may produce gender biases in pain care via the (often automatic and unintentional) activation and application of their gender schemas, whose contents often reflect and reinforce dominant gender ideologies

Clinical decision-making processes are vulnerable to biases often stemming from the need to apply prior knowledge structures or *schemas* in processing new information (Croskerry et al., 2013; Saposnik et al., 2016). Schemas facilitate the interpretation of events based on previously acquired

knowledge (*top-down information processing*). They allow us, relatively efficiently, to detect consistencies in our surrounding environment, making it more predictable. As such, schemas influence how we encode new information, remember previously acquired information and make inferences about missing information (Bodenhausen et al., 2012; Kunda & Spencer, 2003; Macrae & Bodenhausen, 2000). This top-down processing contrasts with a b*ottom-up* or *data-driven* processing of information, which is individuated, focused on the specific, idiosyncratic attributes of people, social or clinical events. This more systematic processing allows flexible adaptation to variants in our surrounding environment (Bodenhausen et al., 2012; Kunda & Spencer, 2003; Macrae & Bodenhausen, 2000).

Gender schemas are a particular type of schema encompassing all the socially acquired knowledge associated with the social groups of men, women, and TGD people (Bem, 1981; Starr & Zurbriggen, 2017). Gender schemas include various independent and not often correlated dimensions, which develop along distinct trajectories from early childhood to adulthood (Bigler, 2017; Signorella, 1999; Spence, 1993), and encompass gender stereotypes, attitudes towards gender roles and self-representations of gender or gender identity (Deaux & LaFrance, 1998). Gender socialisation processes, starting at infancy, ensure that most human beings understand the most appropriate ways of being and acting according to one's sex categorisation, as well as learn to evoke this network of cognitive/affective gender-based associations to interpret new events and inform other peoples' perceptions (Bem, 1981; Starr & Zurbriggen, 2017).

In most societies across human history, such gender socialisation processes are strongly shaped by widespread and institutionalised gender ideologies, i.e., largely shared systems of gender-related beliefs, norms and values that justify a certain gender order, most often the dominance of men over women or patriarchy (Connell, 1987, 1995, 2002). Societal gender order and dominant gender ideologies are geographically and historically situated (outer layer of Figure 1). Despite being remarkably stable over time, their meanings and social functions may evolve with shifts in social, political and economic contexts (Connell, 2016). In patriarchal societies, the contents of gender schemas often reflect and reinforce a dominant gender ideology termed *Hegemonic Masculinity*. In many contemporary societies, hegemonic masculinity glorifies the values of authority, autonomy, strength and endurance, emotional restraint, rationality, achievement and heterosexuality (Connell, 1995, 2016; Connell & Messerschmidt, 2005). Consequently, the schematic contents associated with men are not just often different but more valued than the contents associated with women or TGD people (Connell, 1995, 2002).

Healthcare providers bring into the clinical encounters their gender schemas, whose contents are often unconscious, seldom changed by their formal training (Morais et al., 2022) and often reflecting and reinforcing dominant gender ideologies. The activation in memory and application of gender schematic contents (either general or pain-specific) to encode, interpret, make inferences, and remember information about pain patients and their pain behaviours may underlie gender biases in pain care (Figure 1(C1)).

Evidence for contention 1. As it can be seen in Table S1 (in Supplementary File), 5 literature reviews (including a total of 92 articles) and 8 primary studies provide abundant evidence for contention 1. A review focusing on gender norms in chronic pain contexts, covering 77 studies published in 2000–2015, conducted in 16 countries (Samulowitz et al., 2018), revealed that like laypeople, providers hold general and pain-specific gender schematic knowledge, which underlies gender biases in pain care.

In pain-related clinical encounters, some providers hold general stereotypical gender norms (Samulowitz et al., 2018), i.e., expectations about how men and women are or should be or behave (e.g., '*women are/should be emotional and empathic*', or '*men are/should be logical and autonomous*'). Some also hold positive attitudes towards traditional gender roles, such as regarding men as income-earners who should prioritise work ahead of family and women expected to manage paid work along with responsibilities for household, family, and self-care.

Evidence also suggests that providers hold specific gender stereotypical norms regarding several dimensions of pain experiences. First, some types of pains have strong gender connotations. For example, nurses (like laypeople) mostly associated traumatic back and musculoskeletal everyday pains with the 'typical man', but the pattern of everyday pains associated with the 'typical woman' was more complex and differentiated. This pattern included pains in several parts of the body (head, abdomen, back), mostly with an internal origin (e.g., due to hormonal/reproductive system), hence naturalised in women's bodies (Bernardes et al., 2014). Chronic pain per se is also gendered, especially pain with (so far) medically unexplained symptoms or primary chronic pains (i.e., pain that is not associated with another chronic disease, Treede et al., 2019), which are associated with femininity and women (Claréus & Renström, 2019).

Second, providers also show gendered norms regarding pain sensitivity, pain tolerance and pain communication (Samulowitz et al., 2018). For example, in public places such as healthcare contexts, men are expected to be stoic, to endure, tolerate and, underreport pain (Keogh, 2021; Samulowitz et al., 2018; Schäfer et al., 2016; Wesolowicz et al., 2018). In contrast, women are described as more sensitive to and more willing to report pain, sometimes exaggerating and fabricating it (Guzikevits et al., 2024; Hayes et al., 2010; Keogh, 2021; Samulowitz et al., 2018; Schäfer et al., 2016; Vigouroux et al., 2023; Wesolowicz et al., 2018), which is more often attributed to psychological distress (Harbell et al., 2023; Hirsh et al., 2013; Samulowitz et al., 2018; Schäfer et al., 2016).

Third, concerning pain coping, providers also expect men with chronic pain to distance themselves from their pain, its origin and its treatments, to maintain their sense of masculinity. Women, on the other hand, are expected to accept chronic pain and learn how to live with it (Samulowitz et al., 2018). Women are also expected to use a wider range of more complex pain coping strategies than men, yet several of these strategies (e.g., emotion-focused strategies and asking for social support) were considered less effective, as they were associated with increased pain interference (El-Shormilisy et al., 2015; Keogh, 2022; Samulowitz et al., 2018).

Fourth, it must be noted that the contents of providers' gender schemas do not just expect men and women to be and behave differently in pain encounters. Such gender schematic knowledge reflects and reinforces the hegemonic masculinity ideology (Connell & Messerschmidt, 2005), as they see masculine (vs. feminine) ways of being and acting when in pain as referent and more valued. Some argue that the biomedical system reinforces the institutionalisation of such values (Hoffmann et al., 2022; Samulowitz et al., 2018), where men and their needs are perceived as normative, whereas women's needs and expressions have become invisible, hidden behind the supposed gender neutrality in medicine (Hølge-Hazelton & Malterud, 2009). This might explain the low status of women-dominated chronic (pain) conditions in the hierarchy of medical diagnoses (Album et al., 2017). For example, certain chronic pain conditions such as fibromyalgia, irritable bowel syndrome and chronic Lyme disease have been called 'contested illnesses' and feminised, by being associated with distress (Hoffmann et al., 2022).

Contention 2 – provider gender biases in pain care depend on contextual cues pertaining to the provider, the pain patient and the (clinical) situation

Providers will only base their judgments and/or behaviours on gender schemas once these are activated in memory and applied to make inferences or assimilate new information. Many authors underscore both the independence of schema activation and application processes, as well as their conditionality (Bodenhausen et al., 2012; Fiske et al., 1999; Kunda & Spencer, 2003; Macrae & Bodenhausen, 2000). The first premise suggests that, even with the activation of a schematic structure, making it more accessible in memory, it is not always applied. The second premise suggests that, although schematic processing can occur automatically with the salience of given stereotypical cues, various factors may increase or diminish the likelihood of gender schematic processing. Three types of factors can increase the likelihood of provider gender schematic processing in a clinical encounter (Deaux & LaFrance, 1998; Deaux & Major, 1987):

1. *Factors involving the provider* (Figure 1(C2.1)) – Individual differences in providers' predisposition (e.g., strong endorsement of traditional gender roles and norms) and/or motivation to use gender schemas to encode, interpret, remember, or make inferences about themselves as well as others (Bem, 1981; Starr & Zurbriggen, 2017). Providers will be more motivated to engage in gender schematic processing if they have lower needs for control and understanding, i.e., they are less driven to predict and manage uncertainty or find accurate explanations for the clinical situation, respectively (Bodenhausen et al., 2012; Fiske et al., 1999; Kunda & Spencer, 2003). In similar lines, providers less driven to protect their self-image, with lower need for social belonging and avoiding being prejudiced, will also more likely engage in gender schematic processing (Bodenhausen et al., 2012; Fiske et al., 1999; Kunda & Spencer, 2003).
2. *Factors involving the pain patient* (Figure 1(C2.2)) – Certain pain patients' physical characteristics (e.g., body size, stature, muscularity, physical attractiveness), presentation styles and/or nonverbal mannerisms (e.g., voice pitch, posture, clothing, make-up, pain talk) may trigger a gender schematic processing (Deaux & LaFrance, 1998; Deaux & Major, 1987). Indeed, the likelihood of stereotypical processing seems to increase with its greater congruence and relevance vis-à-vis the social category activated (Bodenhausen et al., 2012; Fiske et al., 1999). For example, a petit woman with a high-pitched voice, openly expressing her pain-related distress while rubbing the painful area, by being more gender stereotypical, may increase the likelihood of gender schematic processing. Conversely, incongruent information with the activated category (e.g., a petit man with a soft voice expressing pain-related distress) may either lead to re-categorising (e.g., activation and application of subtypes of stereotypes) or, with information that is difficult to categorise, to individuating or data-driven processing (Bodenhausen et al., 2012; Fiske et al., 1999).
3. *Factors involving the clinical situation* (Figure 1(C2.3)) – These factors refer to features of the clinical (e.g., pain characteristics) and/or interpersonal situation (e.g., time pressure) in which the pain is assessed and/or managed. They may increase the likelihood of schematic processing depending not only on the type of information available, but also on the extent to which it influences providers' motivations and cognitive resources. First, clinical characteristics (e.g., type of pain conditions) by being more gender stereotypical may increase the likelihood of gender schematic processing. Second, situational circumstances that tax providers' cognitive resources increase the likelihood of gender schematic processing. Situations that entail complex judgments, competing tasks that interfere with attention processes or high physiological activation, although they may impede the activation of stereotypes, facilitate their application once made available in memory (Kunda & Spencer, 2003). For example, in many clinical circumstances (e.g., in emergency rooms), fatigue, time pressure and the emergency nature of given situations can easily lead providers (due to the need for comprehension) to use stereotypes to make certain judgments, mainly when stereotypical information is relevant in the clinical profile shown (e.g., stereotypical information on the prevalence of symptoms according to sex). Third, clinical circumstances can also increase the likelihood of schematic processing by reducing providers' motivation to undertake individuating processing, such as those that imply: (a) lower interdependence between the provider and the person with pain; (b) lower accountability; (c) lower risk of being perceived as prejudiced; (d) the less serious consequences of an error in judgment; (e) lower risk of losing the other's esteem and acceptance; and (f) increased costs associated with slowness or indecision in judgments (Kunda & Spencer, 2003). For instance, a situation that emphasises a greater need for understanding or control (e.g., complex judgments with ambiguous information), threatens the provider's self-image, does not entail interdependence between the provider and the person in pain, gives a pretext for the application of stereotypes without the risk of being judged as prejudiced, or entails time pressure will lead to an increased likelihood of activating/applying gender schemas. It is also noteworthy that, in each situation, various motives may become salient, with contradicting influences, with the most salient determining the means of processing information in such cases (Kunda & Spencer, 2003).

Evidence for contention 2. As it can be seen in Table S1 (Supplementary File), 4 reviews including a total of 63 articles and 34 primary studies address contention 2. More specifically, current research shows that certain provider characteristics, patient characteristics/behaviours and different circumstances regarding the clinical encounter may amplify provider gender biases in pain care, likely via the modulation of gender schematic processing.

Provider characteristics. Thirteen included articles (1 review including 8 relevant articles and 12 primary studies) addressed the role of provider characteristics. Even though there are examples where providers' sexism ratings did not affect their treatment recommendations (Hirsh et al., 2014), some experimental studies showed that providers with high ratings on sexism and conformity to traditional gender role ideology underestimated women's pain and showed less willingness to offer them support (Prego-Jimenez et al., 2022), confirming the assumption that providers' gender schematic predispositions increase the likelihood of gender biases in pain care.

Research including providers' sex, age and level of experience is not entirely conclusive but showed patterns where gender bias against women occurred more frequently when providers were men (Bernardes et al., 2013; Bernardes & Lima, 2011a; Chakkalakal et al., 2013; Miron-Shatz et al., 2020; Napoli et al., 2014), older (Bartley et al., 2015) and more experienced (Miron-Shatz et al., 2020). It's reasonable to believe that older and/or more experienced male providers might have lower needs of understanding, control, protection of their self-image and social belonging, consequently they might be more predisposed to engage in gender schematic processing. In addition, we would expect (cisgender) male physicians to be less engaged in countering the gender order, as this might alter power balance and privileges that go along with hegemonic masculinity (Connell, 1995, 2002). However, the complex interplay between the sex of the provider and the person with pain must be considered (Deepmala et al., 2013), e.g., the dynamics in same-sex and different-sex dyads (Nestler et al., 2017; Vigil et al., 2017). Studies analysing gender bias held by providers with different professional backgrounds are few and inconclusive (Bernardes et al., 2021; Wandner et al., 2014).

Patient characteristics/behaviours. Some articles addressed the modulating role of patient characteristics/behaviours (n = 7; 2 reviews including 33 relevant articles and 5 primary studies). Many of these articles show that patients' signs of distress moderate the activation of provider's gender schemas and gender biases in pain care (Bernardes & Lima, 2011a, 2011b; Braksmajer, 2018; Falk et al., 2016; Samulowitz et al., 2018). Emotionality, vulnerability, and mental frailty are associated with femininity and women with pain (Keogh, 2021; Samulowitz et al., 2018). Women with pain are, contrary to men, expected to show their pain and to display mental distress. However, it seems that distress expressed by women can lead to a psychologisation and dismissal of their pain (Braksmajer, 2018; Samulowitz et al., 2018), implying that gender schemas are activated when women act according to gender norms. On the other hand, when women do not behave in line with expected gender stereotypes, when they show no signs of distress, their pain might also be undervalued or even not believed (Bernardes & Lima, 2011b; Falk et al., 2016).

Even socioeconomic factors might trigger gender schematic processing, probably reflecting general gender schemas related to women's subordinated role as income-earners and stereotypes about the robustness and life hardship of working-class women. Low-educated women were less often referred to specialised pain rehabilitation compared to high-educated women; a pattern not found among men (Hammarström et al., 2014).

Characteristics of the clinical situation. Twenty articles (1 review including 22 relevant articles and 19 primary studies) addressed the modulating role of various characteristics of clinical situations. The type of pain condition can modulate provider gender biases in pain assessment and treatment. A study on opioid administration at the emergency department showed that men were more likely to receive opioids than women, but only for certain pain categories, like traumatic pain, flank pain, abdominal pain and headache (Lau et al., 2021). Pain conditions stereotypically associated with women, especially conditions without clear pathophysiology and/or primary chronic pains,

seem to increase the likelihood of provider gender biases against women. Indeed, data from a multicentre cohort study at five different emergency departments showed that women, compared to men, waited longer for pain medication for abdominal pain but not for fracture pain (Siddiqui et al., 2015). In a vignette study depicting patients with low-back pain, in the absence of diagnostic evidence of pathology women's pain was significantly more attributed to psychological causes and judged as less credible by female nurses. Conversely, in the presence of diagnostic evidence, female nurses perceived women's pain as more credible and disabling than men's pain (Bernardes & Lima, 2011b). In addition, it has been demonstrated that women are over-diagnosed, and men under-diagnosed with medical conditions associated with women and femininity, like fibromyalgia and migraine (Lipton et al., 2013; Wolfe et al., 2018), supporting the assumption that pain conditions associated with women might trigger the activation of gender schemas.

Another aspect of the clinical situation concerns time pressure and the emergency of a condition which might lead to the activation of gender schemas. Gender biases in the treatment of acute chest pain are frequently explored and consistently shown (Dawson et al., 2023; Gelber et al., 2022; Lewis et al., 2019; Liakos & Parikh, 2018; Meisel et al., 2010; Mnatzaganian et al., 2020; Steenblik et al., 2021), suggesting that time pressure might play a role in the activation of gender schemas. However, gender biases have been reported in the emergency department, primary care and specialised clinics (Al Sad & Start, 2022; Guzikevits et al., 2024; Lewis et al., 2019; Sempere et al., 2023; Stenberg et al., 2014) and, to our knowledge, direct associations between time pressure and gender bias have not been explored yet in clinical research. Noteworthy, some studies did not show gender bias in the emergency treatment of acute pain. However, most of them were related to specific conditions, e.g., very young patients with acute coronary syndrome (Papathanasiou et al., 2024), treatment at a specialised chest pain unit (Arzuan et al., 2023), use of a standardised protocol (Uri et al., 2015), and acute trauma among military servants (Karas et al., 2022), circumstances that may have counteracted the activation of gender schemas.

Contention 3 – assessment and treatment of women's pain is more strongly influenced by gender schematic processing, hence, more contextually dependent

As aforementioned, *Hegemonic Masculinity* is a gender ideology that justifies and maintains patriarchy in many contemporary Western societies. It glorifies the values of individuality, independence, self-determinism, responsibility and rationality, and is institutionalised in everyday discourses and practices (Connell, 1995, 2002; Connell & Messerschmidt, 2005). Social representations of sex groups do not have symmetrical positions relative to this idealised image of a human being. Social representations of 'typical men' overlap with the idealised representation of a person, thus assuming a position of referent. In contrast, social representations of 'typical women' are naturalised, sexualised and limited to the functions of affection and objects of desire, relegating them to a position of alterity (Amâncio, 1993; Amâncio & Oliveira, 2006; Lorenzi-Cioldi, 2002). This symbolic asymmetry is responsible for the different positions that sex groups occupy in a hierarchy of prestige and status (Amâncio & Oliveira, 2006; Connell, 2002; Lorenzi-Cioldi, 2002).

This status asymmetry affects how men's and women's behaviour is interpreted. Social groups of higher status – such as 'men' – are perceived as a heterogeneous collection of specific, idiosyncratic individualities – *collection groups* (Lorenzi-Cioldi, 2002; Lorenzi-Cioldi et al., 1998). Thus, even when gender schemas are activated, men's behaviour is more often attributed to factors involving individual dispositions, and the role of interactive contexts or individuals' social positions within them is more often disregarded. In contrast, groups of lower status – such as 'women' – are perceived as a more homogenous collection of non-differentiated individualities – *aggregate groups* (Lorenzi-Cioldi, 2002; Lorenzi-Cioldi et al., 1998). Thus, when gender schemas are activated, women's behaviour is typically attributed to characteristics that are biological or stable in nature, permanent and shared by all members of the group. Consequently, whereas men are given the privilege of individuality, women are more often seen as members of a social group whose boundaries are restricted and difficult to overcome. In other words, gender schematic content has a stronger normative role in

the case of women compared to men, making interpretations of women's pain behaviours more dependent on contextual cues compared to men's pain behaviours, which are more often attributed to their idiosyncrasies as opposed to their group membership.

Evidence for contention 3. A bulk of empirical data addresses contention 3 ($n = 24$ articles; 1 review including 10 relevant articles and 23 primary studies; see Table S1) by demonstrating the lower independence from context of judgments involving women's pains (Figure 1(C3)). First, diagnostic evidence of pathology has been found to be decisive for women's pain to be taken seriously and to be treated effectively (Bernardes & Lima, 2011b; Siddiqui et al., 2015). Without a clear pathophysiology, women's pain risks to be dismissed or psychologised, a pattern not seen in the assessment of men's pain (Bernardes & Lima, 2011b; Samulowitz et al., 2018; Siddiqui et al., 2015). In addition, a cross-sectional study showed that only female patients (not male patients) with no diagnostic evidence of pathology perceived providers' attitudes as more negative (Claréus & Renström, 2019).

Second, different patient and pain characteristics also seem to activate gender schematic processing in the assessment and treatment of women's but nor men's pain. High pain intensity, multiple pain sites, varying pain location and lower levels of education were negatively associated with selection to multimodal pain rehabilitation in women, a pattern not observed in men (Enthoven et al., 2017; Hammarström et al., 2014; Haukenes et al., 2015). In addition, compared to men, women's appearances can more often affect providers' pain assessment negatively, like looking too healthy or too sick, showing or not showing psychological distress, appearing as untrustworthy or having excess weight (Driscoll et al., 2018; Samulowitz et al., 2018; Schäfer et al., 2016; Wiklund et al., 2016). Indeed, in several qualitative studies, women describe a dilemma in pain encounters which is not often found in men's reports: if they look too healthy or capable their pain might be mistrusted but if they do not look good enough, they might be judged as unreliable (Samulowitz et al., 2018; Wiklund et al., 2016). Therefore, whereas women need to struggle to find the right balance to make their pain condition visible and to appear as 'proper' women (Lehti et al., 2017; Werner & Malterud, 2003; Wiklund et al., 2016), men do not seem to report this experience in clinical encounters (Driscoll et al., 2018; Lehti et al., 2017).

Third, evidence suggests a more individualised assessment of men's pain compared to women's pain (e.g., referrals to supplementary diagnostic evaluations and specialised care), when men and women seek health care with the same symptoms. This is seen in a wide range of pain conditions like chest pain (Bösner et al., 2011; Daugherty et al., 2017; Dawson et al., 2023; Liaudat et al., 2018; Mnatzaganian et al., 2020; Steenblik et al., 2021), low back pain (Margarit et al., 2020; Schilter et al., 2024), inflammatory bowel disease (Sempere et al., 2023), wrist pain (Billig et al., 2018), hip pain (Jüni et al., 2010), and workers with shoulder injuries (Razmjou et al., 2016). Some studies have even concluded an overuse of diagnostics or an overevaluation of men (Bösner et al., 2011; Schilter et al., 2024; Steenblik et al., 2021).

Contention 4 – provider actions may activate patient gender schemas, shaping their pain experience and communication, which may confirm provider gendered expectations

Like providers, pain patients also enter the clinical situation with their own gender schemas, which may guide their behaviours when activated in memory. Patient gender schemas are more likely to be activated and applied in interactions when providers' actions (e.g., verbal and non-verbal communication) trigger them (Deaux & LaFrance, 1998; Deaux & Major, 1987). Under certain circumstances, when patients' gender schemas are activated and influence their behaviours, patients' actions may confirm providers' expectations (Deaux & LaFrance, 1998; Deaux & Major, 1987). Such behavioural confirmation processes will be more likely when, for example: (a) providers' gendered expectations meet patients' core gendered self-conceptions; (b) such expectations are socially desirable; and/or (c) the situation provides strong and salient cues to guide the gendered behaviours (Deaux & LaFrance, 1998; Deaux & Major, 1987). Ultimately, such behavioural confirmation processes may amplify the likelihood of gender biases in clinical encounters (Figure 1(C4)). When providers'

actions convey negative gendered expectations, they may lead to patients' experiencing what has been termed stereotype threat (Burgess et al., 2010). Stereotype threat triggers harmful physiological and psychological processes (e.g., heightened arousal, anxiety, interference in working memory capacity), which may negatively interfere in the clinical encounters (e.g., communication, engagement, adherence; Aronson et al., 2013) and fuel gender biases in pain care.

Noteworthy, pain patients may not always confirm providers' gendered expectations. For example, this is more likely when providers' gendered expectations are discrepant from the patient self-concept, patients are aware of such discrepancy and are more motivated to maintaining consistency between their internal and overt behaviour (self-verification motives) than concerned about how they are seen and evaluated by the provider (self-presentation motives) (Deaux & LaFrance, 1998; Deaux & Major, 1987).

Evidence for contention 4. Two reviews (including 14 studies) and 6 primary studies address this contention (Table S1). Most existing evidence pertains to providers' invalidating and stigmatising responses to women's pain experiences that are rooted in pain-related negative gender stereotypes such as women being 'hysterical, malingerers, or feigning pain'. Evidence shows that women treated with gender-driven mistrust, invalidation and stigma by their provider can react in diverse ways. Some women will respond with legitimate signs of distress, which can in turn cause providers to judge their pain as less serious or less likely to need medical attention, leading to a vicious circle of psychologisation (Samulowitz et al., 2018; Tait et al., 2009). Other women, treated with suspicion or neglect, start doubting themselves (Cole et al., 2021; Samulowitz et al., 2018,). For example, misbelieved women with endometriosis felt the urge to adopt a '*crazy hypochondriac woman*' identity (Cole et al., 2021, p. 182), which might confirm providers in their assumption that the woman's pain is not real. Conversely, some women feel the need to take on more proactive, demanding and 'combative' stances in clinical encounters to legitimise their pain experiences (Vigouroux et al., 2023; Werner & Malterud, 2003). Unfortunately, such reactions may be interpreted as signs of distress coming from 'difficult patients', also contributing to a downward spiral of devaluation and stigmatisation. Indeed, the frustration over not being taken seriously can sometimes lead to a spiral of anger and impatience between the patient and the provider (Hayes et al., 2010).

Such tense interactions not only influence communication and the quality of patient-provider relationship but may also hamper treatment adherence. For example, providers sometimes (appropriately) prescribe antidepressants to reduce chronic pain. But if women already feel psychologised (stereotype threat), they might refuse to take antidepressants as they do not feel depressed and reject the stereotype that women's pain is caused by psychological distress (Arman et al., 2020). This reaction might in turn reinforce provider stereotypes about 'hysterical women'. All these tensions in the patient-provider encounter might also explain why women with chronic pain often experience the need to go to several doctors until they eventually find someone who takes their pain seriously (Björkman et al., 2014; Werner & Malterud, 2003).

Discussion

After taking stock of the state-of-the art, we showed that provider gender biases in pain care do not occur consistently across all clinical encounters, being a dynamic, transactional and contextual phenomenon. To theoretically account for such variability, we proposed *the Gender Biases in Pain Care Model* (Figure 1), which is an interaction-based socioecological model that stresses the contextual nature of gendered actions occurring in pain-related clinical encounters, which are greatly shaped by multilevel proximal and distal gendered social contexts in which they are enacted. We also presented existing evidence of 66 articles that addressed the model's four theoretical contentions. In this section, we will critically analyse the extent to which current evidence supports the proposed model, pinpointing existing knowledge trends and gaps. Finally, after highlighting some limitations, we will show how this novel theoretical proposal may be further developed, and

inform future research, practice and public policies. Table 1 summarises the models' contentions, respective evidence trends, gaps and main future directions for research and model refinement.

From evidence to theory: a critical appraisal of the model

Appraisal of evidence for contention 1

Many findings from different parts of the globe support *contention 1* (Figure 1(C1)). Contention 1 proposes that providers, like laypeople, hold general and pain-specific gender schematic knowledge that often reflects and reinforces dominant gender ideologies, which, when activated in memory and applied, may lead to gender biases in pain care. Although some studies showed that some providers hold general stereotypical gender norms and traditional attitudes towards gender roles (Samulowitz et al., 2018), most evidence focuses on pain-specific gender norms. This evidence shows that certain pains are gendered and that some providers expect gender differences in pain-related sensitivity, tolerance, coping and communication. Noteworthy, these gender norms, by reflecting and reinforcing the hegemonic masculinity ideology (Connell, 1995, 2002; Connell & Messerschmidt, 2005), depict masculine (vs. feminine) ways of being and acting when in pain as referent and more valued (Samulowitz et al., 2018).

Despite the abundant evidence, some knowledge gaps can still be found. First, most studies have explored pain-related gender norms regarding white, middle-class, middle-aged cisgender adults, with little regard as to the extent to which such norms may change considering other intersecting social categories such as race/ethnicity, socioeconomic status, age and developmental stage, sexual orientation, diversity in gender identification (e.g., TGD individuals), etc. In other words, our understanding of the similarities and differences in pain-specific gender schematic contents across men and women occupying diverse positions within the intersecting systems of power and oppression (Collins, 1990; Crenshaw, 1989) remains very limited.

Second, most studies seem to overlook the situational nature of social norms and the possibility that providers may hold different expectations for different situations (Cislaghi & Heise, 2020). Indeed, a grounded theory developed upon the narratives of Portuguese nurses (and laypeople) showed that gender role expectations regarding pain coping and communication are often moderated by the characteristics of the pain experience, the interpersonal, sociocultural and developmental contexts (Bernardes et al., 2010). For example, men were expected to react with more stoicism towards pain than women mostly in public places (e.g., hospitals), in the presence of peers (especially during adolescence), when pain was mild, acute and traumatic. Conversely, women were expected to react with more stoicism towards pain than men mostly in private/domestic places, in the presence of family/children and when pain was mild and with internal causes (Bernardes et al., 2010).

Third, the direct link between providers' general and pain-related gender schemas and gender biases in pain care is often highlighted in qualitative studies exploring the perspectives of individuals with (chronic) pain (Arman et al., 2020; Björkman et al., 2014; Vigouroux et al., 2023). This link has been much less investigated with quantitative and experimental study designs, and the few existing findings seem to be inconsistent. For instance, in one vignette study, gender biases in the assessment and treatment of low back pain were only marginally affected by providers' sexist attitudes (Hirsh et al., 2014). Conversely, in another study, providers' sexism and gender role ideology were associated with more gender biases in pain assessment and treatment (Prego-Jimenez et al., 2022).

Appraisal of evidence for contention 2

Some evidence addresses *contention 2*, predicting that certain contextual cues may enhance providers' likelihood of gender schematic processing and subsequent gender bias in pain care (Figure 1(C2)). Despite some variability in findings, much of the existing evidence shows the moderating role of providers' sex (provider characteristic) and patients' signs of distress (patient behaviour) on gender biases in pain assessment and treatment. These findings suggest that gender biases in

Table 1. Taking stock of evidence for the *Gender Biases in Pain Care Model*: main trends, gaps and future directions for research and model refinement.

Theoretical contentions	Evidence trends	Evidence gaps	Future directions for research and model refinement
Contention 1 Providers may produce gender biases in pain care via the activation and application of their gender schemas, whose contents often reflect and reinforce dominant gender ideologies.	Providers hold pain-specific gender norms regarding types of pain, pain sensitivity, pain tolerance, pain coping, and pain communication. Provider pain-specific gender schema contents often reflect and reinforce the hegemonic masculinity ideology.	Scarce evidence on pain-specific gender norms associated with other intersecting social positions (e.g., race/ethnicity, age, socioeconomic status, TGD individuals, sexual minorities). The situational nature of pain-specific gender norms has been largely overlooked. Scarce quantitative evidence on the direct link between gender schemas activation/application and gender biases in pain care.	Explore contents of pain-specific gender schemas for different situations and regarding TGD individuals and men/women in intersecting social positions (e.g., subordinate and marginalised masculinities and femininities). Measure general and pain-specific gender schematic knowledge and use quantitative studies to directly assess their underlying link to provider gender biases in pain care.
Contention 2 Provider gender biases in pain care depend on contextual cues pertaining to the provider, the pain patient and the (clinical) situation.	Certain provider characteristics (e.g., being a man), patient characteristics and/or behaviours (e.g., showing signs of distress) and clinical situation characteristics (e.g., chronic primary pains) may increase the likelihood of gender bias in pain care.	Few studies directly test the moderating role of contextual cues on provider gender biases in pain care via the activation/application of gender schemas. Evidence only on a small range of contextual cues pertaining to the provider, patient and clinical situation that moderate gender biases in pain care. No evidence on intersectional processes affecting gender schemas' activation and application. Dearth of research on the moderating role of healthcare organisational characteristics on gender biases in pain care. Lack of knowledge on how contextual cues interact to shape gender bias in pain care.	Use well-designed and powered studies to directly investigate the contextuality of provider gender schematic processing and ensuing gender bias in pain care. Study a wider range of relevant contextual cues, pertaining to the provider, patient and clinical situation, which may modulate gender biases in pain care. Use novel intersectional stereotyping theories to identify contextual cues that may predict the likelihood that provider gender bias may be shaped by intersecting systems of oppression. Consider how gendered dimensions of healthcare organisations may shape pain-related clinical interactions and, ultimately, provider gender bias.
Contention 3 Assessment and treatment of women's pain is more strongly influenced by gender schematic processing, hence, more contextually dependent.	The assessment and treatment of women's pain is more dependent on the presence/absence of medical evidence of pathology, levels of patient distress and physical appearance. The assessment and treatment of men's pain is more individualised.	Lack of quantitative findings, with more balanced sex/gender samples of pain patients. Existing evidence covers a small range of contextual cues that influence providers' assessment and treatment of women's (but not men's) pain. No direct research on the underlying role of social status on provider gender schematic processing and	Produce more direct quantitative evidence on the effects of gender-related social status dynamics on provider gender schematic processing in pain care contributing to the increased contextuality of their assessment and treatment decisions regarding cis women's pains. Investigate whether the prescriptive and proscriptive

(*Continued*)

Table 1. Continued.

Theoretical contentions	Evidence trends	Evidence gaps	Future directions for research and model refinement
		gender bias in pain care. No evidence on whether the likelihood of gender schematic processing is shaped by social status asymmetries underlying subordinate or marginalised forms of masculinities and femininities.	effects of gender schematic knowledge on provider's pain care are shaped by social status asymmetries underlying subordinate and marginalised forms of masculinities and femininities, including TGD individuals.
Contention 4 Provider actions may activate patient gender schemas, shaping their pain experience and communication, which may confirm provider gendered expectations.	Providers' gender-driven mistrust, invalidation and stigmatisation towards women's pain can lead to increased distress, self-doubt, resignation or resistance (e.g., anger, impatience). These women's responses to provider's dismissal can, in turn, confirm provider's gendered expectations and lead to a vicious circle of psychologisation, distrust and frustration.	Lack of findings on adaptive and protective behavioural strategies that women may use when facing stereotype threat and counteracting gender bias in pain-related clinical encounters. No evidence of contextual cues (including patient and provider intersecting social positions) that may increase the likelihood that pain patients behave in ways that confirm or disconfirm providers' gendered expectations. Lack of studies investigating how gendered responses of patients in clinical encounters may be shaped and reinforced through repeated healthcare interactions across the life course.	Investigate the effectiveness of behavioural strategies that empower women (and TGD people) when facing stereotype threat and counteract gender biases in pain care. Explore potential contextual cues that may modulate the patient's behavioural confirmations processes in pain-related clinical encounters. Address how patient and provider intersecting social positions may modulate gender-related behavioural confirmation processes or the effectiveness of patient empowerment strategies in the clinical encounter. Use developmentally informed prospective research to study how gendered responses of pain patients are shaped from childhood through repeated interactions with the healthcare system across the life span.

pain care against women are, as predicted, more likely when providers are men and when patients show high levels of distress. A few studies also suggest that gender biases against women might be more salient when patients report chronic primary pains (characteristic of the clinical situation), i.e., pain conditions not associated with other chronic diseases, which often do not present objective medical evidence of pathology and/or are mostly associated with femininity and women.

Although these findings provide some support to contention 2, this contention has been much less systematically or intentionally investigated than contention 1. Indeed, only a few studies have set forth to directly test the contextuality of gender biases in pain care (Bernardes & Lima, 2011a, 2011b). Therefore, many other potentially relevant contextual conditions pertaining to the provider, the patient and the clinical situation, which may modulate provider gender biases in pain care, are still under investigated.

Regarding provider characteristics, knowledge on the potential influence of providers' age, clinical experience, race/ethnicity, sexual and gender identity is lacking. There is also a need for studies directly addressing the extent to which providers' sexism, attitudes towards gender roles and conformity to general and pain-specific gender norms may modulate gender bias in pain care.

As for patient characteristics, little is known about the role of intersecting social categories, namely whether, for example, provider gender biases in pain care would be more likely, for example, towards lesbian or black women of lower socioeconomic positions. This is a concerning gap considering that, despite conflicting findings, novel intersectional models in social cognition begin to suggest that, depending on certain circumstances, the contents of the activated and applied stereotypes may be shaped by individual's multiple social identities (Petsko et al., 2022; Petsko & Bodenhausen, 2020). Also, the modulating role of certain verbal (e.g., use of pain descriptors) and non-verbal pain communication (e.g., gestures, facial expressions, body language) on gender biases in pain care is under investigated.

Many other potentially relevant contextual conditions pertaining to the clinical situation, which may modulate provider gender biases in pain care, are also still under investigated. There is only indirect evidence suggesting that characteristics of the clinical situation like time pressure or the emergency of the condition may play a role in the activation of gender schemas. Many studies show gender biases in the treatment of acute pain in emergency settings but there are, to our knowledge, no studies directly addressing whether gender bias in pain care are more likely under conditions that tax providers' cognitive resources. Also, we still need to learn more about how different painful conditions (e.g., acute vs. chronic) may modulate provider gender biases in pain care.

In addition, health care systems in themselves are gendered (Hay et al., 2019; Heise et al., 2019; Heymann et al., 2019). Healthcare settings are characterised by gender regimes (see middle layer of Figure 1), i.e., institutionalised patterns of gender relations that often reflect and reinforce the dominant gender order (e.g., patriarchy) and gender ideology (e.g., hegemonic masculinity; Connell, 1987, 2002). Such gender regimes shape organisational power relations, the division of labour, and the emotional and symbolic relations reflected in its policies and guidelines (Hay et al., 2019; Heise et al., 2019; Heymann et al., 2019). These gender regimes may ultimately shape gender biases in patient-provider encounters (Hay et al., 2019). Yet, so far, there is a lack of studies exploring the impact of healthcare organisational structure and functioning on provider's gender-schematic processing and ensuing gender bias in pain care.

Noteworthy, provider, patient and clinical situation characteristics co-exist, and their mutual and interactive influence is still unexplored. For instance, despite some existing research, there are still considerable knowledge gaps about how the sex/gender of the provider and the sex/gender of the patient interact in the patient-provider encounter (Deepmala et al., 2013; Nestler et al., 2017; Vigil et al., 2017).

Appraisal of evidence for contention 3

Evidence directly addressing *contention 3* is more abundant. This evidence showed that the assessment and treatment of women's pain is more contextually dependent than men's pain. Several characteristics of the patient and the clinical situation such as the absence/presence of medical evidence of pathology, certain pain characteristics, pain communication styles and appearances seem to activate providers' gender schematic processing and influence pain assessment, communication and treatment only in clinical encounters with women but not with men. For instance, the strong influence of women's appearances and signs of distress on providers' judgements and treatment decisions (e.g., looking too healthy or too sick, having excess weight, being too distressed or too calm) has been amply demonstrated. This phenomenon has not often been reported in clinical encounters with men in pain. Beautiful, proper and weak bodies are associated with femininity and women (Stenberg et al., 2022), which might explain why providers more readily and automatically include women's but not men's appearances in their pain assessments. Another pattern, clearly demonstrated in numerous recent studies, concerns the more individualised assessment and treatment of men's pain compared to women's pain.

Despite the supporting evidence, several of the referred studies are qualitative, based on patients' perceptions of the patient-provider encounter. Even though patients contribute with important

insights, there is a need to complete qualitative data with quantitative/experimental or observational research. In addition, more women than men participated in the included qualitative studies, which might have made women's experiences more visible than men's. Also, current evidence covers a small range of contextual cues that influence providers' assessment and treatment of women's (but not men's) pains. Finally, and to the best of our knowledge, there are currently no studies that directly address the underlying role of social status on provider gender schematic processing and gender biases in pain care. This gap is relevant especially considering that due to intersecting social positions, not all men/women and masculinities/femininities bear equal value and prestige within the gender order (Connell & Messerschmidt, 2005; Hamilton et al., 2019; Schippers, 2007). Intersecting systems of oppression – such as race/ethnicity, age, social class, sexual orientation – produce subordinate or marginalised masculinities/femininities (e.g., gay/lesbian white men/women, black working-class men/women; Connell & Messerschmidt, 2005; Hamilton et al., 2019; Schippers, 2007). The extent to which the likelihood of gender schematic processing may be shaped by the social status asymmetries underlying different forms of masculinities and femininities is largely unknown.

Appraisal of evidence for contention 4

As for the final contention 4 (Figure 1(C4)), several qualitative studies clearly show how patients with pain perceive and react to providers' gendered attitudes and behaviours. Patients' experiences provide valuable information about the importance of the patient-provider relation. The clearest patterns reflect women's reactions to pain invalidation, stigmatisation and psychologisation. More specifically, evidence shows that women's responses signalling distress, conformity to perceived gender norms and a more demanding attitude can all lead to a confirmation of providers' gendered expectations, often resulting in an escalation of mutual frustration with potentially serious consequences for pain management and rehabilitation.

If most existing evidence stresses how pain patients' (mostly women's) behaviours may feed into a vicious cycle of misunderstanding and gender biased interactions in clinical encounters, very little is currently known about adaptive and protective behavioural strategies that women may use to counteract stereotype threat and gender bias in pain-related clinical encounters. Also, to the best of our knowledge, there is still no research on contextual factors (including patient and providers intersecting social positions) that may modulate such behavioural confirmation processes, i.e., increase the likelihood that a pain patient behaves in a way that confirms or disconfirms providers' gendered expectations. Finally, most existing studies rely on cross-sectional, post-pubertal samples, overlooking how gendered responses of pain patients in clinical encounters may be shaped since childhood and reinforced through repeated healthcare interactions across the life course.

Limitations and future directions

This work has some limitations that should be highlighted. First, albeit comprehensive, this is not a systematic review; hence, it is possible that some evidence related to our model might have been left out. More importantly, we made no formal assessment of the quality of the included studies, so conclusions regarding the quality of the evidence supporting our model's contentions are unwarranted. Third, as we did not search nor included papers that directly aimed to study other types of provider biases in pain care (e.g., based on race/ethnicity, or social class/socioeconomic status), we might have missed evidence on how the intersection between gender and other social positions may shape gender biases in pain care. Furthermore, intersectional models on person perception processes are still in their early stages of development (Petsko et al., 2022; Petsko & Bodenhausen, 2020), preventing us from clearly and fully integrating an intersectional lens to the model herein. Finally, as previously mentioned, considering that the theoretical and empirical foundations of the model are mostly grounded in cisnormative perspectives, the extent to which it may account for provider gender biases in pain care of TGD individuals is yet unknown.

Nonetheless, the *Gender Biases in Pain Care Model* (Figure 1), by identifying the social psychological processes accounting for provider gender biases variability ('whys') and predicting the conditions under which such biases in pain care are enhanced or suppressed ('whens'), may bear important contributions for research, practice and policy (see Table 1). Also, like any theorical contribution, this model has the potential to evolve and be further refined and expanded as new evidence emerges. In the next subsections, we start by pinpointing new areas for research and model refinement, followed by implications for practice and policy.

Future directions for research and model refinement

This work sets out important directions for research on provider gender biases in pain assessment, communication and treatment (Table 1), which may bear important contributions to model refinement. In general, our new model and its supporting evidence are an important steppingstone to the generation of novel research questions and testable hypotheses. Theory-driven specific research questions may fuel novel primary studies, but also systematic reviews where the use of standardised procedures for assessing study quality and risk-of-bias (e.g., ROBINS-E; Higgins et al., 2024) will increase confidence in available evidence on provider gender biases in pain care of cisgender individuals. Investigating the validity and explanatory power of this model in accounting for provider biases in pain care of TGD individuals is also an important future line of inquiry, and a potential fruitful contribution to the model's refinement and expansion. Another very important area of model refinement is striving to incorporate intersectionality (Collins, 1990; Crenshaw, 1989). Given that our model is not just a general framework but an interaction-based process model, these refinements will likely depend on the future availability of more robust evidence supporting emerging models on intersectional stereotyping (Petsko et al., 2022; Petsko & Bodenhausen, 2020).

Beyond these overarching claims, the model's four theoretical contentions open new specific research and model refinement paths that may fill current knowledge gaps and move the field forward. First, and regarding the contents of providers' pain-specific gender schematic knowledge (contention 1; Table 1), the model implies this is not a homogeneous and fixed set of beliefs/attitudes applied universally to every person and situation. Providers may have different expectations in different situations and regarding different patients. Designing studies that seek to understand the nuances of the contents of gender schemas and how they may vary depending on the contexts (e.g., type of pain) and patient characteristics like age, race/ethnicity, socioeconomic position is paramount. For example, a sequential mixed-methods study combining similitude and thematic analysis, showed that nurses hold different expectations of pain interference and coping regarding women with chronic pain of low vs. middle socioeconomic position (Diniz et al., 2020). Indeed, future studies exploring the contents of pain-specific schematic knowledge drawing upon an intersectional lens may bring important novel insights into this field of research (Macgregor et al., 2023). Most research has investigated the pain-specific norms associated with hegemonic masculinity and emphasised femininity (Connell & Messerschmidt, 2005) or hegemonic femininity (Schippers, 2007). Future studies should investigate the likely possibility that these norms and role expectations may change for TGD individuals and other forms of masculinity and femininity that are subordinate and/or marginalised due to intersections with other axes of social oppression such as race/ethnicity, age, social class or sexual orientation (Connell & Messerschmidt, 2005; Schippers, 2007).

Also, given the current dearth of evidence supporting the direct link between the activation and application of provider gender schemas to gender biases in pain care, future studies should also include valid measures of providers' gender schematic knowledge (e.g., general and pain-related gender norms, attitudes towards gender roles). By assessing these constructs, it will be possible to quantitatively test whether providers' adherence to specific pain-related gender norms influences gender biases in pain assessment and treatment. The current challenges around valid and reliable measurement of general and pain-specific gender-related constructs (Boerner et al., 2018; Keogh & Boerner, 2024) are one of the major barriers to this endeavour, which urgently needs to be overcome.

Second, and regarding the contextuality of provider gender biases in pain care (contention 2; Table 1), the model steers researchers beyond the question of whether such gender biases exist or not, providing the conceptual tools to account for their variability. Based on the model's predictions, researchers can design studies that directly investigate the contextual moderators of provider gender biases in pain care, i.e., the conditions under which these biases are more likely enhanced and, more importantly, the conditions that may minimise them. Large well-designed and properly powered experimental and clinical studies are needed to provide more direct evidence on the extent to which a wider range of relevant variables pertaining to the provider (e.g., gender schematic knowledge, motivation and cognitive resources to counter gender schematic processing), the patient (e.g., intersecting social positions, verbal and non-verbal pain communication) and the clinical situation (e.g., emergency vs. primary care or acute vs. chronic pain) may moderate the presence of gender biases in pain decoding and clinical decision-making.

Noteworthy, emerging theories in intersectional stereotyping drawing upon compartmentalisation assumptions (e.g., Petsko et al., 2022; Petsko & Bodenhausen, 2020) may, once properly supported by robust evidence, be very valuable in the future to fully integrate an intersectional lens in contention 2. For example, according to these novel theories (Petsko et al., 2022; Petsko & Bodenhausen, 2020), providers could perceive a black female patient just as 'a woman' (gender stereotyping) or as a 'black woman' (intersectional stereotyping) depending on the extent to which these categories were accessible, served the goals of the provider, fit to and were distinctive in the social context of the clinical encounter. These assumptions, once backed up by robust evidence, could help us go beyond just predicting the contextuality of provider gender bias in pain care but also accounting for how other intersecting social positions could shape this phenomenon.

Finally, although our model hypothesises that organisational characteristics, namely its gender regime, may contribute to enhance or minimise provider gender biases in pain care, this is an entirely novel and potentially valuable future field of research. Healthcare organisational cultures and policies, leaderships styles, workforce composition and training, and clinical guidelines and protocols are examples of work-related and organisational characteristics that may bear the potential to enhance or minimise provider biases in clinical encounters (Kuhlmann & Annandale, 2012; Pineault et al., 2017). We urge researchers to investigate how gendered organisational characteristics may modulate gendered clinical interactions and, ultimately, gender biases in pain care. This change in research focus will reduce the likelihood of blaming the providers exclusively for gender biases in pain care and may also open new avenues for intervention that go beyond the immediate clinical encounter.

Third, contention 3 directly brings to fore social status issues underlying gender biases in pain care (Table 1). Although gender may be conceptualised as a synonym of social status (Bernardes et al., 2008), current researchers have rarely looked at the status and power dynamics surrounding gendered pain-related clinical situations. Considering how intersecting social systems of oppression may shape provider gender biases in pain care is, consequently, an important future avenue of research that stresses the role of power and social status. As noted earlier, men and women at subordinate or marginalised social positions that deviate from hegemonic expectations – e.g., racialised, low social class, gay/lesbian, young – experience lower valued and sometimes stigmatised masculinities and femininities (Connell, 1995, 2002; Hamilton et al., 2019; Schippers, 2007). Therefore, we urge researchers to produce direct evidence on whether the prescriptive and proscriptive effects of gender schematic knowledge on provider's pain assessment and treatments are shaped by social status asymmetries underlying subordinate or marginalised forms of masculinities and femininities. For example, current evidence shows that compared to men, providers assessment and treatment decision regarding women's pain is much more dependent on how their communicate pain and present themselves. Whether this is equally true for women of different socioeconomic positions or different racial/ethnic backgrounds is yet under investigated. In addition, TGD people may be particularly vulnerable to the activation and application of gender schemas in clinical contexts. Some studies show a tendency for providers to misattribute health issues to a person's transgender identity rather than directly addressing the health problem, a phenomenon colloquially termed 'trans broken arm syndrome' (Wall et al.,

2023). Conversely, future studies should also investigate whether providers' individuation of men's pain may lead to discounting the social (gendered) roots of their pain experiences and behaviours, reducing providers' sensitivity to psychosocial aspects of men's pain care.

Finally, contention 4 (Table 1) stresses the active role pain patients may also play in clinical encounters, whose (gendered) characteristics/behaviours may either trigger or suppress provider gender biases in pain care. Instead of conceiving pain patients as passive receivers of prejudice and discrimination, by stressing their active role in clinical interactions we highlight the potential for studies on pain patient engagement and empowerment (Raina & Thawani, 2016; Snow, 2022). Future research addressing the effectiveness of behavioural strategies (e.g., communication skills, self-affirmation) that may empower women (and TGD individuals) when facing stereotype threat and counteracting gender biases in pain care is needed. Also, understanding whether potential contextual cues may modulate the use and effectiveness of patient behavioural confirmation processes in pain-related clinical encounters is warranted. Noteworthy, drawing upon an intersectional perspective, research on how patient and provider intersecting social positions that may modulate gender-related behavioural confirmation processes or the effectiveness of patient empowerment strategies in the clinical encounter is sorely needed. Finally, future developmentally informed prospective research may uncover how gendered responses in clinical encounters may be shaped from childhood onwards through repeated interactions with the healthcare system.

Future directions for practice and policy

Despite the knowledge gaps presented in Table 1, the proposed model bears some general implications for practice and policy. First and foremost, the model implies that effective interventions seeking to minimise provider gender biases in pain care should address its multiple and interrelated proximal and distal socio psychological determinants. In other words, effectively changing gender biases in pain care will likely involve integrated, multilayered, interdisciplinary interventions at the level of the providers, pain patients, healthcare settings, and healthcare policy.

The most common recommendations to reduce gender biases often focus on raising providers' gender awareness in healthcare (Hammarström et al., 2016), either by integrating sex/gender and related intersectionality issues in healthcare curricula and formal education (Labaka et al., 2023; Moretti et al., 2023; Morris et al., 2019) or by implementing gender awareness training modules (Morais et al., 2022; Vela et al., 2022). Besides increasing providers' evidence-based knowledge about sex/gender, intersectionality and pain and promoting positive attitudes towards gender equity in pain care, such gender awareness modules could increase providers' ability to: (a) recognise own (un)conscious pain-specific gender schematic contents and the extent to which these reflect and reinforce dominant gender ideologies; (b) identify contextual cues that may trigger gender schematic processing and gender biases in pain care; and (c) integrate person-centered communication in pain-related clinical encounters. Considering the existing evidence, some contextual factors should be particularly highlighted, e.g., the role of signs of distress. To take mental illness into account in pain care, without psychologisation or stigmatisation is a demanding balancing act. There is great potential for improvement in clinical practice by addressing the complex interplay between chronic pain, mental wellbeing, and gender stereotypes.

Learning from the literature on racial biases in pain care, provider awareness training might, however, be insufficient, especially when it comes to sustainable long-term behavioural changes (FitzGerald et al., 2019; Lindsay et al., 2019; Vela et al., 2022). Interventions at the level of the provider must be complemented with changes in healthcare setting gender regimes (Hammarström et al., 2016; Hay et al., 2019). Healthcare settings should find ways to tackle gender bias purposefully and persistently at an organisational and policy level, without placing the entire responsibility on providers. Gender mainstreaming in healthcare settings is an important strategy that may help increase the salience of gender equity in organisational culture, policy and workforce and the implementation of sex/gender sensitive standardised pain assessment and management protocols and guidelines (Alcalde-Rubio et al., 2020; Harbell et al., 2023).

At a wider level, advocacy and healthcare policy to reduce stigmatisation of mental illness in chronic pain care and legitimise chronic primary pains, raising their status among pain conditions may be important. Only recently, 'chronic primary pain' has been included in the ICD-11 (Treede et al., 2019). This is a major step towards the acknowledgment that chronic pain can be a condition in its own right (Nicholas et al., 2019). Health care policies and guidelines explicitly addressing the complexities in the assessment and treatment of chronic primary pains contribute to the legitimisation of chronic primary pains, predominantly reported by women, and hence to reducing the stigmatisation of women with chronic primary pain complaints.

Finally, although pain patients are not responsible for providers enacted gender biases, the model stresses their active role in the patient-provider encounter. In addition, pain patients, especially women and gender-diverse people, must often deal with the negative consequences of gender bias in pain care. Therefore, future interventions aiming at patients' empowerment in pain-related clinical encounters may prove useful. Patient empowerment training could raise awareness about gender stereotype threat and the risk of an unwanted escalation of mutual misunderstanding in clinical encounters, build patients communication skills and strategies to cope with gender prejudice and discrimination in pain encounters.

Conclusion

Current evidence shows that provider gender biases in pain care are a dynamic, transactional and contextual phenomenon. By connecting the subfields of health and social psychology and sociology, the proposed *Gender Biases in Pain Care Model* has the potential to account for and raise predictions regarding the variability of this phenomenon. The reviewed evidence begins to support the model's four main contentions, suggesting that only by embracing gender in all its complexities and interrelated levels of analysis we may understand the proximal and distal socioecological and psychological determinants of provider gender biases in pain care. We believe that this novel theoretical proposal may be a valuable steppingstone for moving this research field forward, by addressing some of the identified knowledge gaps and, in time, developing more inclusive, equitable and effective pain-related clinical practices and policies.

Disclosure statement

The authors declare that the work reported herein did not require ethics approval as it did not involve animal or human participation. The authors declare no conflicts of interest. During the preparation of this work, the authors used SCOPUS AI to search for relevant theoretical and empirical articles. The conceptual roots of this model trace back to the final stages of the first author's PhD. She is deeply grateful to Luísa Lima for her close support and supervision during that early formative period, and to Lígia Amâncio for generously sharing her deep expertise in gender studies. The authors sincerely thank the anonymous reviewers for their thoughtful critical appraisal and constructive feedback on this manuscript.

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