



Overview of Sex and Gender Differences in Human Pain

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The focus of the 2024 global campaign is on sex and gender disparities in pain. It seeks to highlight how sex/gender-related inequalities and inequities in pain occur, to better understand why this happens, and consider the implications for how we manage pain.

This fact sheet focuses on the key questions often asked: "Are there sex differences in pain?" and "Who is more sensitive to pain, men or women?" This reflects the focus of most research in this area, which has been to explore the differences and similarities between men and women.

Evidence suggests that women are generally more sensitive to pain, have a greater vulnerability to many painful conditions, and generally experience more pain across the lifespan. However, there is also variation in patterns, which need to be understood. [5-8; 10; 11]

Reasons reflect the complex interplay between the biological, psychological, and social influences thought to be involved. More recently, we are also recognizing the need to move beyond binary comparisons, and why we need to take an integrated sex and gender approach to pain.

Defining Sex and Gender

Given this focus on sex and gender disparities in pain, a good place to start is with some working definitions of these key terms.

[1: 4] Use of such terms can vary, which can cause confusion. For the purposes here:

Sex generally refers to the biological attributes that categorize people as male or female, which includes the variation in chromosomes, genes, hormones, and anatomy between groups. People are typically categorised a sex at birth, often based on inspection of their external genitalia. A small number of people may be categorised as intersex (also known as Variations of Sex Development).

Gender is often taken to reflect social factors and influences, and can be used to refer to aspects of an individuals' identity and expression. For example, how people perceive themselves, how they express their identity to others, and how they are treated based on this identity, can be viewed in relation to society's expectations and norms given their assigned sex. Individuals may have a gender identity or expression that aligns with their sex (sometimes known as cisgender), or may have diverse gender identities, such as non-binary, transgender, gender-queer, genderfluid, etc.

While sex and gender are often used in binary terms when exploring pain (e.g., comparing male vs. female), there can be variability within these binary categories. Characteristics related to sex and gender can also vary over time (e.g., hormone levels, gender identity). A challenge is how and when to move beyond the binary to better understand the variation in pain.

Are there Sex/Gender Differences in Clinical Pain?

There is a recognised gender-health paradox, where men show a lower life expectancy, whereas women experience higher levels of ill health.

Women live longer with long-term health conditions, including chronic pain. Chronic pain affects between 20–40% of adults, with women generally experiencing more pain across the lifespan when compared to men. One study that looked at pain across 17 countries found a prevalence of 45% in women and 31% in men.^[16] Women are more likely to present in pain clinics, also.^[5]

In painful conditions that occur in both men and women, women often show a greater vulnerability. For example, women are more likely to be diagnosed with chronic painful conditions, such as headache, musculoskeletal pain, abdominal pain, arthritis, as well as fibromyalgia, and temporomandibular disorder. Women are also more likely to experience greater acute and post-operative pain. Nevertheless, a few painful conditions are more likely to affect men (e.g., cluster headache).

This higher prevalence of chronic pain conditions in women has been found globally, and across different regions, but figures vary among countries.^[15; 17] Socioeconomic factors can play a role, as does age. For example, chronic pain conditions become more common in girls following puberty, with emerging evidence suggesting that gender-diverse youth are also at increased risk for chronic pain conditions.^[3; 9]

Are There Sex/Gender Differences in Experimental Pain?

Differences in pain sensitivity can be explored using experimental pain-induction techniques, where there is careful control over the type (e.g., thermal heat and cold, pressure pain, ischemic pain) and intensity of a stimulus used.^[5; 11]

Women generally show a lower pain threshold and pain tolerance, suggesting a greater sensitivity to pain, when compared to men. This difference has been found across a range of different types of induced pain, although the strength of the effect can depend on the method used. For example, stronger sex/gender effects have been reported for pressure pain, compared to when using ischemic pain.^[10]

Sex/gender differences in experimental pain are not consistently found in children, with differences between boys and girls seeming to appear around puberty. Less is known about sex/gender differences in experimental pain sensitivity in older adults.^[3]

The use of experimental techniques provides insights into potential pain mechanisms, as sex/gender differences are found in conditioned modulation (stronger in men) and temporal summation (greater in women). Changes in pain sensitivity have been found to occur across the menstrual cycle, and around menopause suggesting that sex hormones may also play a role^[6; 11]. However, patterns do vary, suggesting inconsistencies.

Sex/gender differences in experimental pain can also be moderated by psychological and social context.^[7] For example, gender-based beliefs (e.g., men are more stoic, women more expressive) around pain can affect pain threshold and tolerance levels (e.g., stereotypical masculine beliefs reduce pain expression). The presence of other people, including whether an observer is a man or a woman, can also affect sex/gender differences in experimental pain. It is possible that some of the differences between men and women might be due to differences in the willingness to express pain.

Are There Sex/Gender Differences in Pain Management

There are observed sex/gender differences in pain behaviors, including medication use. For example, women report using more pain-relieving medications than men; however, it remains unclear whether these observations represent true differences in analgesic usage patterns or reporting bias.

Differences in responsiveness to pharmacological and non-pharmacological pain interventions have been observed; however, these effects are not always consistent and appear dependent on the treatment type and characteristics of both the pain and the provider.^[5; 7]

Sex differences in analgesic efficacy relating to body composition, metabolism, and hormonal profiles have been demonstrated. Women also experience adverse drug reactions from approved drug products more often than men. Meta-analysis suggests that women might get better opioid analgesia, in response to experimental and post-operative pain. However, distinct differences in pharmaceutical response across drug classes and the lack of understanding of disease pathophysiology also exist between the sexes, which could lead to suboptimal drug therapy.

It is also unclear whether there are sex/gender differences in response to psychological and/or interdisciplinary treatment approaches. Meta-analysis of psychological treatments where it is possible to explore for sex/gender suggests few differences for children, and inconsistencies are reported across adult studies.^[2; 7]

Sexism and gender bias perpetuate inequities in pain research and care. [12-14] Women and female animals have long been excluded from pain research studies, with reasons including concerns over the impact of the estrous/menstrual cycle. Harmful gender-related biases, such as dismissing women's pain and expecting men to be stoic, are related to poorer pain management outcomes. This often intersects with other identities and social positions associated with marginalization (e.g., racialization, poverty) to compound pain inequities. [8]

Next Steps

Despite good evidence for sex and gender differences in pain, few treatment-outcome studies are set up to explore sex/gender differences.

Few studies directly explore sex/gender differences, or if they do, tend to account for them statistically to remove their effects. There is a paucity of sex/gender-specific reporting of results or subgroup analyses in most primary studies, emphasizing the need for future research to report on stratified data to allow for comprehensive, personalized treatment strategies.

At present, the available evidence is not strong enough to support the sex-specific tailoring of treatments; however, this is a conceivable outcome in the foreseeable future. Further research may unravel the various threads linking sex/gender effects on treatment-outcomes with the aim of individualizing treatment to optimize pain relief.

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