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Sex and gender terminology: A glossary for gender-inclusive epidemiology

Charlie RIOUX,¹⁻³ Ash PARÉ,⁴ Kira LONDON-NADEAU,^{5,6} Robert-Paul JUSTER,⁷⁻⁹
Scott WEEDON,¹⁰ Sydney LEVASSEUR-PUHACH,¹ Makayla FREEMAN,^{3,11}
Leslie E. ROOS,^{1,2} Lianne M. TOMFOHR-MADSEN^{3,11-14}

¹Department of Psychology, University of Manitoba, Winnipeg, Manitoba, Canada

²Children's Hospital Research Institute of Manitoba, Winnipeg, Manitoba, Canada

³Department of Psychology, University of Calgary, Calgary, Alberta, Canada

⁴School of Social Work, McGill University, Montreal, Quebec, Canada

⁵Department of Psychology, University of Montreal, Montreal, Quebec, Canada

⁶Ste-Justine University Hospital Research Centre, Montreal, Quebec Canada

⁷Department of Psychiatry and Addictology, University of Montreal, Montreal, Quebec, Canada

⁸Research Centre of the Montreal Mental Health University Institute, Montreal, Quebec, Canada

⁹Centre on Sex*Gender, Allostasis, and Resilience, Montreal, Quebec, Canada

¹⁰Department of English, Texas Tech University, Lubbock, Texas, USA

¹¹Department of Educational and Counselling Psychology and Special Education, University of British Columbia, Vancouver, British Columbia, Canada

¹²Department of Pediatrics, University of Calgary, Calgary, Alberta, Canada

¹³Alberta Children's Hospital Research Institute, Calgary, Alberta, Canada

¹⁴Libin Cardiovascular Institute of Alberta, Calgary, Alberta, Canada

Corresponding author: Charlie Rioux, Department of Psychology, University of Manitoba, P404 Duff Road Building, 190 Dysart Rd, Winnipeg MB, R3T 2N2, Canada. email: charlie.rioux@umanitoba.ca

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ABSTRACT

There is increased interest in inclusion, diversity, and representativeness in epidemiological and community health research. Despite this progress, misunderstanding and conflation of sex and gender have precluded both the accurate description of sex and gender as sample demographics and their inclusion in scientific enquiry aiming to distinguish health disparities due to biological systems, gendered experiences, or their social and environmental interactions. The present glossary aims to define and improve understanding of current sex- and gender-related terminology as an important step to gender-inclusive epidemiological research. Effectively, a proper understanding of sex, gender, and their subtleties as well as acknowledgement and inclusion of diverse gender identities and modalities can make epidemiology not only more equitable, but also more scientifically accurate and representative. In turn, this can improve public health efforts aimed at promoting the well-being of all communities and reducing health inequities.

Keywords: sexual and gender minorities, gender identity, LGBT, transgender, non-binary, gender binary, social determinants of health, social epidemiology

INTRODUCTION

While public and academic discussions around gender are relatively recent, with research interest in the population-level health of gender-diverse people starting to increase in the past decade,[1] gender diversity is not a new phenomenon. Gender diversity has been long been recognized in cultures around the world.[2] Meanwhile, in Western countries, data on gender beyond sex assigned at birth is rarely collected,[3, 4] with Canada being the first country to include gender in its 2021 national census.[5] Despite this inability to properly quantify gender diversity, non-cisgender identities and experiences were always present in Western societies but have a long history of being repressed, oppressed, and pathologized. Gender diversity gradually gained visibility in Western societies, first through transgender rights groups, followed by increased representation in policy, popular culture, the traditional media, and online spaces.[6, 7] This created opportunities for interactions and the development of communities where people can authentically express and define their own sense of identity, in turn leading to the opportunity to develop a lexicon describing human diversity in gender modalities and identities.[8, 9] This lexicon, however, remains largely absent in the epidemiological literature.

Despite increased awareness of the importance of inclusion, diversity, and representativeness, most of the epidemiological literature remains framed dichotomously when referring to sex and gender. Moreover, the inclusion of gender beyond the concept of women and men is still in its infancy.[10, 11] The first step to gender-inclusive epidemiological research is a proper understanding of sex, gender, and related terminology. Indeed, the proper distinction of terms related to sex and gender, and clarification of their meaning, is essential to support both the accurate description of gender as a sample demographic and its inclusion in scientific inquiry into the biological and social determinants of health.

To address this, the present glossary covers current sex- and gender-related terminology. Several sources were consulted as an overall basis for the definitions provided in this glossary: The American Psychological Association,[12] PFLAG,[13] Thorne et al.,[14] Chang et al.,[15] and the experience of authors of this article – additional references that are statement-specific are provided throughout.

SEX AND GENDER

While sex and gender may represent different constructs, they remain frequently conflated in epidemiological research and the terms are often used interchangeably.[10, 16-18] Their respective usages have a long history that is shaped by cultural and political forces as much as scientific research.[19, 20] Many researchers use “sex” to refer to the systematic classification as male, female, or intersex assigned at birth based on visual anatomy assessment. Sex includes several biological processes thought to be linked to external morphology, including reproductive organs, genes, hormones, gonads, chromosomes, secondary sex characteristics, and the brain. These features, however, are not perfectly correlated and can change across time, with no boundary or biological marker clearly delineating “male” and “female” sexes.[21, 22] Accordingly, while sex is often thought to be an exclusively biological feature, it is a socially constructed classification in that sex is attributed based exclusively on the assessment of external genitalia at birth based on expectations of “biological normalcy,” where statistical norms and culturally informed assumptions about what bodies should look like impart ideas about how biological features co-exist.[23, 24] This makes sex a judgment imbued with assumptions and informed by social expectations and practices anchored in an epistemological framework where there are two biological sexes and those who do not conform have a “disorder of sex

development.”[21] This view conceives many biological differences that do not affect an individual’s health as a disorder requiring treatment instead of acknowledging that biological systems are complex and do not perfectly align with our social framework.[21, 25] Since sex assigned at birth may or may not correspond, within a person and over time, with chromosomes, hormones, secondary sex characteristics, genitalia, and/or reproductive organs, and not all components of our biology are included in what we describe as sex, the Endocrine Society Clinical Practice Guidelines recommend that the term “biological” sex be avoided.[26]

Gender is a social configuration that gathers the roles, behaviors, activities, feelings, attitudes, and attributes that a given society typically associates with being masculine or feminine. Importantly, while *male*, *female*, and *intersex* are sexes, *women* and *men* are two of many gender identities (see below) – using the terms “male” and “female” as nouns to describe humans and their gender identity is derogatory. Gender differs from sexual orientation and romantic orientation, which have separate and intersecting implications for health outcomes and determinants[27-29] and broadly refer to the degree to which a person feels sexual attraction and/or emotional or romantic attraction as well as to the directionality of these attractions in terms of gender(s) – see [12, 30]. Sexual and romantic orientations are independent from sex and gender, in that people of all genders can identify as heterosexual or non-heterosexual, and there is no sexual or romantic orientation that is gender-specific.

Sex and gender are both important for epidemiological research. A strong body of research supports that there are both differences and similarities in the epidemiology, pathogenesis, manifestation, and diagnosis of physical and mental illness based on sex and gender.[31-33] Importantly, when sex and gender are not examined separately, results may be

attributed to sex when they are more specifically related to gender or to the interaction between sex and gender.[34]

Overall, sex and gender capture different aspects of epidemiological susceptibility. On the one hand, sex differences are thought to stem from genetic, epigenetic, hormonal, and/or physiological factors, and usually examined in terms of different biological systems leading to differences in disease susceptibility and manifestation.[32] On the other hand, gender differences stem from power structures, social position, inequalities, and restrictive behavioural norms influencing patterns of risk exposure, health behaviours, care access, and other pathways to health and wellbeing.[31] Accordingly, using “sex” and “gender” interchangeably leads to inaccurate scientific reporting of two important constructs that have different implications for population health.

By conflating sex and gender in epidemiology, one cannot properly understand whether observed differences and similarities are due to biological systems, gendered experiences, or their interaction, in turn affecting the quality of public health interventions that may require targeting gender discrimination, gendered behaviour, and gendered socialization.[35] Note that while sex assigned at birth may be used in epidemiological cohort studies as a proxy of biological systems, the limitations of this measure in terms of correspondence with genitalia, organs, genetics and hormones should be acknowledged. For instance, research shows that even when genetics, reproductive organs, and genitalia (sometimes referred to as (genetic-gonadal-genitals sex (3G-sex)) are dimorphic and consistent, characteristics commonly associated with sex, including hormones, brain systems, and anatomy other than genitalia (e.g., breasts, facial/body hair), are not dimorphic or internally consistent.[36]

Going forward, distinguishing phenotypic, genotypic, and hormonal sex, as well as measuring hormones, organ systems and physiological processes themselves could improve the understanding of the role of sex features as dynamic and multidimensional determinants of health that can change over time in interaction with the environment to predict health outcomes – see [10, 37, 38]. Sex itself is a multidimensional construct that cannot be encompassed by a categorical variable given wide inter- and intra-individual variability. In acknowledging this multidimensionality, a sex contextualism framework can be adopted, in that sex is operationalized, contextualized, and justifiably measured based on the research context, see [39].

We note that feminist scholars of science and technology studies have further pushed thinking about the relegation of sex to biology and gender to sociocultural determinants, as seemingly hard biological facts that instantiate sex can still be shaped by cultural, social, and economic determinants. The concept of “gender/sex” has been proposed as a terminological strategy to entangle socialization, history, biology, health, and evolution together and better address sex and gender in their multifaceted complexity.[23, 38, 40, 41] This social science and humanities research highlights that as epidemiology moves towards a better understanding of sex, gender, and their interaction, we need to remain mindful that a complete separation of sex and gender as determinants of health may not be possible due to bio-socio-cultural entanglements.

THE GENDER/SEX BINARY

The tendency for epidemiological research to only refer to men and women when mentioning gender[10, 16-18] and to exclusively use external genitalia assessed at birth to measure sex reflects how this research remains rooted in the gender/sex binary. The gender/sex binary refers

to a *belief system* where sex and gender are considered binary, with two mutually exclusive categories representing men and women.

Bias towards the gender/sex binary is not unique to epidemiological research, and is present in health research in general (e.g., clinical medicine,[42] psychology,[43] neuroscience,[34] neuroendocrinology[34]). This stems from the gender/sex binary having been the main social system of Western societies. This binary is not harmless, as the gender/sex binary is still the main Western ideology legitimizing the assignment of gender at birth based on sex characteristics and the notion that having a birth sex and gender identity that align is “normal.”[44, 45] This gender/sex binary is one that oppresses trans, non-binary and gender-diverse people in their legitimacy to be understood as “real” by society, showing that these binaries heavily influence societal discussions around gender today.[46] The gender/sex binary can also prevent a proper understanding of biological influences on health by conflating external genitalia at birth with phenotypic, genotypic, and hormonal processes.

The remainder of this glossary presents gender terminology commonly used in English-speaking Western countries today that does not adhere to the gender binary belief system.

CORE TERMS RELATED TO GENDER DIVERSITY

Gender modality is an *overarching category* that refers to one’s experience of gender in relation (i.e., congruence or non-congruence) to their sex assigned at birth.[47] For example, trans women and cis women have the same gender identity (woman) but they do not have the same experience in their gender modality (cisgender and transgender). Definitions of specific gender modalities are provided in a separate section below.

Gender identity is an *overarching category* that refers to the components of gender that correspond to a person's sense of self in relation to their felt and inner sense of gender. Gender identity may or may not correspond to sex assigned at birth. Man, woman or non-binary are gender identities; a list of several gender identities is provided in a separate section below.

Gender expression refers to the components of gender that correspond to a person's gendered image (e.g., roles, behaviours, activities, feelings, attitudes, attributes) that communicates aspects of gender to society and influences how individuals are perceived and treated. Gender expression may be communicated through someone's names, pronouns, or specific gendered language. Although they are often seen as correlated, gender expression is essentially distinct from gender identity. Cis, trans, non-binary and gender-diverse people as well as people from any sexual or romantic orientations may be non-conforming in their gender expression regardless of their gender identity. Furthermore, gender expression is always part of a social context and is not static, but rather can change in different contexts and as a function of gender role profiles.

GENDER MODALITIES

As mentioned above, gender modality refers to a person's experience of gender in relation to their sex assigned at birth. Gender modality includes, but is not restricted to, cisgender and transgender modalities. Cisgender (or cis) is an *adjective* for people whose gender identity corresponds with their sex assigned at birth. This includes "man" and "woman" as gender identities. Transgender (or trans) is an *adjective and umbrella term* for people whose gender identity differs from their sex assigned at birth. This includes "man", "woman", "non-binary" and other gender identities described further down.

As “cisgender”, “cis”, “transgender” and “trans” are adjectives, they are used alongside a noun (e.g., cisgender man, cis man, transgender man, trans man) without the use of a hyphen (e.g., trans-woman, cis-woman), and without making the adjective and noun into one word (e.g., transwoman, ciswoman). The hyphenated and one-word versions of non-cisgender identities are considered derogatory by community stakeholders as it is often used to underline how cisgender men and women have a different gender identity than transgender men and women. The concept of gender modality helps us understand that trans people have the same gender identities as cis people and rather puts the focus on how both had different journeys in constructing their gender identities. The term cisgender is beneficial to inclusion in that it acknowledges that there is a unique journey involved in the construction of everyone’s identities, and not that of only trans people. In turn, it contributes to not otherizing trans, non-binary and gender-diverse people.

Gender-diverse people of other gender modalities may or may not also identify as transgender. Non-binary is an *adjective and umbrella term* for people whose gender identity is not within the gender binary (i.e., man or woman). Hence, non-binary people do not identify themselves as exclusively (or in certain cases, at all) a man or a woman. Non-binary people may identify as both a man and woman, partially somewhere in between, neither and other various ways. “Non-binary” is also used as a standalone gender identity. Gender-diverse or gender-expansive is an *adjective and umbrella term* for people who expand notions of gender expression and identity beyond societal gender norms. Gender-diverse or gender-expansive people may identify as a mix of genders, more binarily as a man or a woman, as agender or genderless. These terms also apply to conceptions of gender outside of the colonial and Western influences.

GENDER IDENTITIES

As mentioned above, “man” and “woman” are gender identities. In this section, we define several other gender identities used in English-speaking Western countries today. Agender is an *adjective* for people who do not identify with any gender. Bigender is an *adjective* for people whose gender identity encompasses two genders or is fluid, but within two genders. Genderqueer is an *adjective* for people who reject the boundaries of the gender binary. Some also reject the idea of static gender. Genderfluid is an *adjective* for people who do not adhere to a static gender, and who may move between genders or experience gender as changing, dynamic, or evolving. Finally, demiboy is an *adjective* for people who identify partially as men, regardless of sex assigned at birth and, similarly, demigirl is an *adjective* for people who identify partially as women, regardless of sex assigned at birth.

NON-WESTERN CONCEPTUALIZATIONS

Many communities and cultures, on all continents but Antarctica, hold a different conceptualization of identity and/or existence than Western culture.[2] Some of these conceptualizations are often described as gender identities or modalities in Western classifications and challenge the gender binary in suggesting that humans embodying more than two genders is natural and uncontroversial, but in actuality are often more complex and go beyond the Western understanding of sex and gender. Indeed, these communities may transcend the notion of gender and should be understood outside of Western taxonomy. Within Western countries, these communities may or may not identify as transgender or non-binary as these labels may contribute to their erasure. For a detailed overview of these communities, see [2].

One term that has received more attention in Western Countries as it is often included in current expansions of the LGBTQ+ acronyms (see Table 1), but is often not well understood, is Two-Spirit. Developed in 1990 by Indigenous LGBTQ+ leaders at the Intertribal Native American/First Nations Gay and Lesbian Conference in Winnipeg, Canada, Two-Spirit is a semantically profound term related, but not restricted to, gender and sexuality and used within many of Turtle Island's (North America's) Indigenous communities. Intertwined with spirituality, this term may describe a stand-alone identity and can include other identities that are specific to one's Nation. Notably, there is a wide variety of gender-diverse terminology used within and across Indigenous Nations and communities, which existed prior to colonization, that is being reclaimed through processes of decolonization and reclamation.[48, 49] The personal and cultural adoption of the term Two-Spirit can be viewed as an act of resistance against a colonial understanding of identity.[50] Two-Spirit encapsulates traditional conceptualizations of existence beyond a Western worldview. Rejecting a binary perspective, and expanding upon the initial LGBTQ+ categorizations, Two-Spirit may be reflective of not only various identities and genders, but also community roles, thereby honouring Indigenous Ways of Being, consistent with an individuals' experiences and values.

Table 1 Common acronyms expanding on LGBTQ+, their meaning and some common uses^a

Acronym	Meaning	Common uses
LGB	Lesbian, Gay, Bisexual	Frequently used in the late 1980s and the 1990s. Now only used when a statement regarding only Lesbian, Gay, and Bisexual people is made.
LGBT+	Lesbian, Gay, Bisexual, Transgender +	Commonly used in the 2000s. Still used today by organisations that want to avoid long acronyms.

LGBTQ+	Lesbian, Gay, Bisexual, Transgender, Queer and/or Questioning +	Commonly used in the 2000s. Still used today by some organisations, activist groups, and the general population.
LGBTI+	Lesbian, Gay, Bisexual, Transgender, Intersex +	Internationally recognized acronym. Recently used by, e.g., Australian and UK Governments.
LGBTQI+	Lesbian, Gay, Bisexual, Transgender, Queer and/or Questioning, Intersex +	Acronym regularly used by the United States Government.
LGBTQ2+	Lesbian, Gay, Bisexual, Transgender, Queer and/or Questioning, Two-Spirit +	Official acronym used by the Government of Canada
LGBTQIA2+	Lesbian, Gay, Bisexual, Transgender, Queer and/or Questioning, Intersex, Asexual and/or Aromantic and/or Agender, Two-Spirit +	Regularly used by community organisations and activist groups as a more inclusive acronym.
2SLGBTQ+	Two-Spirit, Lesbian, Gay, Bisexual, Transgender, Queer and/or Questioning +	Used by some organizations to acknowledge that Two-Spirit people were the first sexually and gender diverse people of Turtle Island
LGBTQQIP2SAA+	Lesbian, Gay, Bisexual, Transgender, Questioning, Queer, Intersex, Pansexual, Two-Spirit, Androgynous, Asexual +	Aims to be more inclusive, but rarely used due to length, complexity, and reduced recognizability.

^aIn all cases, using + at the end of the acronym aims to acknowledge that many sexually and gender diverse people don't identify with the terms included in the acronym. While this table gives an overview of common acronyms, combinations of these acronyms and other acronyms are also used. Within current acronyms, usage is often dependent on personal and group preferences as well as geography and audience.

CONCLUDING COMMENTS

The present glossary introduced how sex and gender differ in terms of their meaning and implications for epidemiology, and defined key terminology related to gender. Several of these terms are *umbrella terms* that are in constant evolution. We note that people may identify with a specific term, an umbrella term, or both. For example, some non-binary people identify as transgender, and some do not and similarly some agender people identify as non-binary, and

some do not. Further, while this glossary covered the current and frequently used terms related to sex and gender, language is constantly evolving, and new terms can emerge, while some may become outdated. For this reason, it is essential to consult with the communities and serve to use the terms they prefer.

Grouping people into populations with similar characteristics is a necessary component of the epidemiologic endeavour, especially for cohort and quantitative studies where distinct, relatively large categories are needed for power to examine groups in moderation, cross-classification, stratification, and intersectional analyses. As such, categorizing humans into groups, for example with sex assigned at birth or gender modality (e.g., comparing cisgender participants and gender-diverse participants), has been and may remain a key component of epidemiological research. Epidemiology as a field needs to recognize the utilitarian purposes of these methods, where categorizations are made to advance the field but do not fully reflect reality, complex bio-socio-cultural entanglements, or any singular existence. We can pursue populational-level knowledge while respecting human diversity by clearly identifying concepts and acknowledging the limitations of our methods. Overall, avoiding the conflation of sex and gender, but also understanding their interactions and subtleties while acknowledging the diversity of gender identities and modalities can make epidemiology not only more inclusive, but also more scientifically accurate regarding the diversity of health experiences. In turn, this can inform public health decision-making by supporting public and community prevention efforts aimed at promoting the health of all populations and reducing health inequities.

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CONTRIBUTORS

CR (she/her) conceptualized the idea. CR and AP (they/them) wrote the initial draft. CR, AP, KLN (she/her), RPJ (he/him), SW (he/him), SLP (she/her), MF (she/her), LER (she/her), and LMTM (she/her) critically revised the paper/edited the draft and agreed on the final version for submission. CR is guarantor for the work. LER and LMTM contributed equally to this paper.

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