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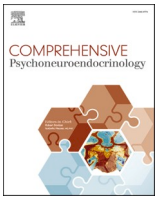

Sex and gender measurement for scientific rigor and data harmonization across studies

In this issue, Peters et al. [1] advocate for the precise definition of study populations in reproductive psychiatric science as well as for gender inclusive and sensitive practices throughout the scientific process. The adoption of inclusive and gender-representative practices and language is something we and others have advocated for across fields related to "women's health", including in obstetrics & gynecology [2], epidemiology [3,4], breastfeeding medicine [5], and midwifery [6]. In line with these calls to action, Peters et al. [1] provide rationale and guidelines for researchers in reproductive psychiatric science to improve their scientific practices when studying reproductive factors and experiences stemming from having a vagina, uterus, ovaries, and/or developed breast tissue. Following these guidelines can make research (1) more rigorous and reproducible by clearly defining and reporting study populations, (2) more ethical by minimizing potential harms from research, (3) more inclusive by avoiding the reinforcement of cisnormativity, the gender binary, and gender-based discrimination, and (4) more impactful by improving evidence-based clinical practice for all individuals.

In this commentary, we focus and expand on one quote from Peters et al. [1] (p. 3): "*Not having the power to test effects of gender identity on the study outcomes, while a limitation that prevents direct gender comparisons, is not an acceptable reason to restrict inclusion criteria to only a subset of the relevant population.*" This is a very important point that, in our opinion, meets inclusivity, gender representativeness, and scientific objectives.

Centering study materials (e.g., recruitment ads, interviews, questionnaires) around (assumed cisgender) "*women*" when it does not accurately represent the study population reinforces cisnormativity and furthers the erasure of gender diversity. This can alienate and stigmatize trans, non-binary, and gender diverse people, potentially leading the research to cause psychological and physical harm through the exclusion of these groups from health services. Study materials centering around "*women*" can also reinforce stereotypical thinking about the sex binary and the female body. This harm extends to cisgender women as well when participants are faced with research materials that suggest female biological functions as "expected" of them when they are not present for all bodies - for example, the impact of the gendered wording of a study on menstruation or pregnancy for cisgender women with reproductive issues. As highlighted by Peters et al. [1], these possibilities go against researchers' ethical mandate to minimize potential harm for participants.

The thoughtful inclusion of gender diversity in designing a study meets scientific objectives beyond ethics. Peters et al. [1] highlight that all study processes should consider gender representativeness, including demographic forms measuring gender identity. Peters et al. [1] also provide a form that can be used for reproductive research for measurement of gender identity (for other options and more detailed identity measurement, see Ref. [7]). As mentioned by Peters et al. [1], this allows proper reporting of sample demographics. In turn, this facilitates proper interpretation of the findings and their generalizability. Beyond demographics, as noted in Peters et al.'s [1] quote above, it is often expected during data collection that a study in reproductive science does not have enough trans, non-binary, and gender diverse participants to test detailed effects of gender identity on study outcomes. However, we add that such arguments often ignore that data is frequently used beyond main study questions and that modern statistical techniques allow for combining samples.

Secondary data analyses examining new research questions with existing data are a common practice in health research, which could grow in popularity through current increases in data sharing and open data [8,9]. In using previously collected data to answer new research questions, modern techniques such as integrative data analysis can be used to pool raw data from two or more studies [10,11]. Analyses are then conducted on the combined data and inferences are made between- and within-studies. If the original items were not identical, data harmonization is used to combine categories, items, or responses [12,13]. However, insufficient overlap between the items of different studies can lead to data harmonization being unfeasible.

By globally integrating gender identity in standard demographic sections of their interviews and questionnaires, reproductive science could create a network of studies with more thorough and accurate data on gender identity, as well as its intersections with other identities. It will then be possible to use this data along with modern analytical techniques to answer new psychiatric and health questions related to gender identity with adequate statistical power. Studies specifically designed with and for the lesbian, gay, bisexual, transgender, queer, intersex, asexual, and two-spirit (LGBTQIA2+) community will remain essential to support health across the gender spectrum [14]. With more complete demographic questionnaires across studies, we can maximize the usefulness of the data we collect as a field as well as our ability to answer questions efficiently to improve clinical practice and policy.

The appropriate definition of study populations, proper study design, and thorough sociodemographic measurement is essential to consider not only for "women's health" fields such as reproductive psychiatry, but also for "men's health" fields as well as health research globally as it has been shown that even fields that are not traditionally gender-specific still use and reinforce the gender binary [15,16]. Overall, following the guidelines from Peters et al. [1] and others (e.g. Refs. [3,17,18]) for gender-inclusive and representative research practices as well as proper sex and gender measurement is an essential step to improving the quality of reproductive psychiatry and health research, and in turn improving clinical practice and mental health.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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