

# Addressing sex and gender inequities in scientific research and publishing

*Significant sex/gender imbalances in research participation and scientific publishing have left gaps in knowledge that potentially undermine evidence-based clinical practice. To address these inequities, the European Association of Science Editors' (EASE) Gender Policy Committee (GPC) has prepared Sex and Gender Equity in Research (SAGER) guidelines for scientific reporting and means to achieve gender parity in editorial management. These provide a useful basis for authors and journals to revise their policies and practices.*

Sex and gender are related significantly to health and disease on a global level [1]. Sex refers to the biological attributes (e.g. chromosomes, reproductive organs) that typically distinguish females from males, whereas gender is a social construction reflected in the differential self-identities, behaviors and roles associated culturally with biological sex [2]. Despite the importance of sex/gender for wellbeing, there are significant imbalances in research participation resulting in gaps in knowledge that potentially undermine evidence-based clinical practice [3].

The purposes of this editorial are to: (1) raise awareness regarding sex/gender imbalances in scientific research and publishing; and (2) encourage the endorsement of remedies to address these inequities. Toward these ends, this paper draws from the work of the European Association of Science Editors' (EASE) Gender Policy Committee (GPC), which has reviewed sex/gender inequities comprehensively in scientific investigation and communication, and formulated a common standard for policies on research reporting and editorial management [3,4].

## SEX/GENDER AND SCIENTIFIC RESEARCH

Although the importance of sex/gender is acknowledged in many areas, disparities in research participation in other relevant domains are well documented [3]. The reasons for these imbalances are many, and probably include unconscious biases (e.g. [5,6]). Regardless of the causes, women are under-represented in studies of non-sex-specific cancers, cardiovascular disease, HIV and other conditions. Further, when women are included, data analyses often do not take sex/gender into consideration [7], and the findings of studies that have not examined sex/gender differences are frequently overgeneralized [4]. Although discussed most often in relation to women, gender imbalances in research participation may also have implications for men's

health. Further, there is the common misconception that sex differences are unimportant for non-human organisms that can be categorized by sex [3].

Apart from participation in research, a gender gap remains in the conduct of scientific inquiry. Although there have been recent improvements, women scientists continue to be under-represented in academic positions and less well paid than their male counterparts; disparities in grant funding have also been documented [8].

## SEX/GENDER AND SCIENTIFIC PUBLISHING

Not surprisingly, sex/gender issues in the conduct of scientific studies are mirrored in the scholarly journals that publish that research. This situation was made evident in an oft-cited 2012 editorial in *Nature*, which stated that only 14% of its peer-reviewers were women [9]. This is not an exception; women are generally under-represented at all levels of the editorial hierarchies of scientific journals [3]. Although the composition of its editorial staff is changing, a 2014 review of *Addiction's* work-force revealed that 83% of high-level editorial positions were occupied by men. Only 29% and 28% of Senior Editors and Assistant Editors, respectively, were women, although a higher proportion, 45%, served as peer-reviewers. To address this imbalance, *Addiction* has enacted a policy of exclusively inviting women to serve in editorial positions, unless there are specific reasons to do otherwise, until gender parity is achieved.

## REDRESSING THE SEX/GENDER INEQUITIES

Historically, journal policies have evolved to meet new challenges. Examples include the adoption of Consolidated Standards of Reporting Clinical Trials (CONSORT), the Animal Research: Reporting of *In Vivo* Experiments (ARRIVE) guidelines for animal studies, and policies regarding ethical issues. Although compliance and enforcement remain challenges, issues have been addressed most effectively through the implementation of relevant policy standards [3].

Based on a review of existing policies, the EASE GPC developed the Sex and Gender Equity in Research (SAGER) guideline, a comprehensive procedure for reporting sex and gender information in study design, data analyses, results and interpretation of findings [3,4].

## Recommended sex/gender policies for research reporting

### Terminology

Exercise care in the terminology used to describe research methods and explain results in order to avoid confusing sex and gender.

### Title and abstract

If only one sex is included in the study, the title as well as the abstract should specify the sex of the animals or any cells, tissues and other material derived from these, and the sex/gender of human participants.

### Introduction

Where appropriate, it should be reported if sex and/or gender differences are expected.

### Methods

How sex and gender were taken into account in the design of the study should be stated clearly, including reporting of representation of males and females. The reasons for the exclusion of males or females should be justified.

### Results

Data should be presented routinely disaggregated by sex. Where appropriate, meaningful sex/gender based analyses should be reported regardless of positive or negative outcome. The reasons for lack of any gender analysis should be justified.

### Discussion

The implications of sex/gender analyses should be discussed, and it should be indicated whether lack of such analyses could have affected the results.

The last two of these recommendations set a direction of travel, but the issue of disaggregating findings with variables that show no evidence of acting as moderators has not been considered good practice, so these may be recommendations that require further consideration.

It has been proposed that the recommended changes in reporting in the SAGER guideline should be accompanied by alterations in the gender composition of journal editorial boards.

## WHY SEX/GENDER? WHY NOW?

Why should sex/gender take precedence over other categorizations (e.g. race/ethnicity, age)? Gender bias potentially touches half the global population and, therefore, is an obvious remediation target. The known biological differences between females and males are more fundamental than those associated with other socio-demographic variables; sex/gender effects are

ubiquitous in research and have significant implications for clinical practice [3]. Further, a focus on sex/gender does not preclude analyses based on other categorizations and could provide a model for other affected groups.

Given recent improvements in addressing inequities, why focus on sex/gender issues now? The EASE GPC maintains that advances have been a direct result of changes in official policies, such as the US National Institutes of Health 1993 mandate, that funding recipients document the proportions of women participating in clinical studies. History suggests that, although increased awareness is often an important first step, significant changes are achieved through enforced alterations of policies and procedures.

## CONCLUSION

The remedies to current sex/gender bias advanced by the EASE GPC will be effective only if adopted by a broad cross-section of the scientific community [3]. Scientific journals are encouraged to incorporate the SAGER recommendations into their policies and practices. Additionally, the gender composition of editorial boards should be monitored and steps taken to try to achieve equitable distributions of women and men.

### Declaration of interests

None. The author has no connection with the tobacco, alcohol, pharmaceutical or gaming industries or any body funded substantially by one of these organizations. The author has no financial conflict of interest arising from involvement with organizations that seek to provide help with or promote recovery from addiction.

### Clinical trial registration details

Not applicable.

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