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OPINION PIECE

The relevance of gender for excellent research and innovation: an opinion

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Opinion

Research excellence describes a standard of superior performance for which all researchers are expected to strive. Although a contested norm, its import is that the research conducted will be of high quality, produce reliable results, contribute to the quantum of knowledge, and benefit both science and society. Increasingly, it is accepted that delivering excellent research involves consideration of the sex and/or gender dimension in research teams and through all stages of the research process.

In their booklet *What is the Gender Dimension in Research?*, Trinne Korsvik and Linda Rustad explain that the gender dimension in research "means that gender is part of the research design and systematically controlled for throughout the research process without necessarily being the main focus of analysis" (2018, p.12). They then go on to present relevant case studies from research fields such as: health and well-being; food, agriculture and fisheries; energy; transport; environment and climate; and safe societies.

The international *Gendered Innovations* project, led by Londa Schiebinger of Stanford University, had the goal to "provide scientists and engineers with practical methods of sex and gender analysis". The project identified the benefits of "integrating sex and/or gender analysis into research and innovation" as follows:

> [it] adds value to research in terms of excellence, creativity and business opportunities; helps researchers and innovators question gender norms and stereotypes, and rethink standards and reference models; leads to an in-depth understanding of diverse gender needs, behaviours and attitudes; addresses the diverse needs of citizens of the European Union and thereby enhances the societal relevance of the knowledge, technologies and innovations produced; contributes to the production of goods and services better suited to new markets (H2020 Expert Group, 2020, p. 6).

The exclusion of sex and/or gender leads to lower standard research, and indeed costs lives and money, according to *Gendered Innovations*. This point is also made by the League of European Research Universities (LERU):

> [in medical research] 44% of publications on diseases prevalent in women did not report the sex of the subjects or specimens studied. Similar results are known from basic neuroscience, endocrinology. The result of this pervasive bias both in preclinical and clinical science is that medicine and health care as they are practiced today are less evidence-based for women than for men. Eight out of ten drugs that were withdrawn from the market in the US between 1997 and 2000 were found to have worse side-effects in women than in men (LERU, 2015, p. 7).

It is critically important, then, to consider the sex and gender aspects throughout the whole of the research cycle, before ruling them out as non-significant. This includes considering their interactions with other identities-race, class, and others.

An article in *Nature* discussed the "potential for sex and gender analysis to foster scientific discovery, improve experimental efficiency and enable social equality" (Tannenbaum et al., 2019, p. 137). It described how five scientists showed that incorporating sex and gender could improve experiments, reduce bias and create opportunities for discovery and innovation. Their examples highlight that including sex and gender led to advanced understanding in diverse fields – from male and female shellfish responding differently to climate change, to gendered social robots, and to artificial intelligence computer vision improvements prompted by evidence that facial recognition systems misclassify the sex of darker-skinned women more often than lighter-skinned men.

Knowing why we should integrate the gender dimension in research is one step. Knowing how we can do this is the next step. For researchers who are not steeped already in gender research, it can be a struggle to tease out what gender in their context can mean, and how one would go about operationalising it. Fortunately, there are a growing number of guides at the disposal of the research community.

The European Union has funded multiple projects supporting the integration of gender equality in universities and research organisations and promoting the inclusion of the gender

dimension in research[1]. These projects provide the research community with tools and helpful checklists to address these issues as researchers strive to deliver excellent research. *Gendered Innovations*, for example, provides detailed worked examples from all fields on how gender can be integrated into scientific research. Korsvik and Rustad (2018, p. 57-58) include a checklist of questions to address in the course of working through a research project.

Tannenbaum et al. (2019, p. 141-142) provide two helpful process diagrams that can be employed by researchers when seeking to determine the relevance of sex and/or gender in research. One process diagram is relevant to organisms and non-human animals. It prompts researchers to think about the inclusion of sex in experiments, including sex as a variable in data analysis, determination of the source of any observable sex-related difference and reporting of sex-related findings and the underlying causal mechanism. They also make the point that even when there is no sex finding after going through this process, this null finding should be reported.

When the study involves humans, the process tree follows a similar logic, with some nuance added. Gender, for example, is substituted for 'sex', following the logic that the gender of a person is socially constructed, and that for some persons their sex attributed at birth is not aligned with their gender identity. Thus a study could include more genders than the binary male-female genders. The researcher's attention is drawn to the consideration of data collection methods that allow for the appropriate capture and consideration of gender data. In the analysis phase, identified gender overlaps and differences need explanation. Some major explanatory categories are provided as aids to interpretation of the results – gender norms, gender relations, gender identity, and participant interactions in various configurations. The outcomes of this gendered analysis provide options for mitigation of gender bias in this, and subsequent, research along with reporting of gendered findings including the underlying causal mechanisms involved. As with non-human research, the null finding for gender impact on the research should be reported, as this indicates that the research process took gender into consideration.

Although over 130 sub-fields have been identified in which sex and/or gender is relevant to research, there are some few disciplines for which this aspect is not relevant – such as in

[1] A live listing of EU-funded projects on gender and research/innovation can be found at http://www.genderportal.eu/projects

theoretical mathematics. In this case, the relevance is related to the gendered composition of the research team: who is doing the research, who is getting the credit, whether collaboration opportunities are equally available to the women and men on the research team, and if the team is gender-balanced across all stages of the career path. These are important considerations to maximise performance and contribute to an egalitarian research environment.

Increasingly, excellent research incorporates considerations of sex and/or gender and holds the opportunity for gendered innovations. Excellence is a fundamental norm for research, and all other activities, in universities. As researchers are increasingly looked to for answers to the challenges facing our world, responsible research and innovation will integrate the gender dimension, and will demonstrate having done so. This structured attention to sex/gender, as part of the exploration and/or the team undertaking the research will make the work relevant for science and of benefit to society.

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