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'Gender shouldn't matter because we are all scientists here': A narration of the panel discussion at the 2nd International Women in Science Without Borders conference

The obligation for working mothers is a very precise one: the feeling that one ought to work as if one did not have children, while raising one's children as if one did not have a job.¹

The disparities that exist between men and women, and more so working mothers, in the participation of science, technology, engineering, mathematics, medicine and innovation (STEMMI) are a global concern.² In the past, efforts to address gender inequalities in STEMMI progressed at a slower pace because of the fragmented nature of gender equality advocacy efforts. In explicitly defining gender equality as a goal for sustainable development (SDG 5), there is renewed vigour in the pursuit of solutions to address discrimination on the basis of gender.³ Challenges that constrain women's full participation in political, economic and public life are being identified, and as a result policies and strategies, including those concerning women in STEMMI in developing countries like South Africa, are being reviewed to ensure that the gender gap is reduced.^{4,5}

It is against this backdrop that a discourse on gender biases in science was deemed necessary for the 2nd International Women in Science Without Borders (WiSWB) conference that was held in Johannesburg (South Africa) on 21–23 March 2018. Here we reflect the thoughts and discussions around the softer issues faced by women in the sciences which emerged from a panel discussion at the conference. The conference consisted of technical sessions which attracted peer-reviewed papers from various scientific disciplines, as well as dedicated sessions and a keynote address by Minister Naledi Pandor. Although the conference had as its primary focus the showcasing of technical research, there was a need identified in the organising phase to also discuss some of the challenges facing female scientists within the ecosystem of scientific research, as well as to obtain insights from senior male and female scientists and leaders on strategies for overcoming some of those challenges. This article reflects primarily the opinions and statements made by the various panellists. Formally, a panel discussion was facilitated in which three questions were presented to the panellists who were encouraged to share their experiences, opinions and advice with the delegates. Although there are many more challenges faced by women in the sciences, for the panel discussion the focus was on three specific issues that were deemed internationally applicable to all fields and scientists alike: (1) gender wage gap; (2) cultural perceptions and encouraging young girls to become scientists; and (3) the need for women in sciences. While specific questions were aimed at specific panellists, it was expected, and encouraged, that other panellists add to the discussion. There was also a request to the audience to defer questions until after the panel discussion was concluded because, as is almost always the case, time was limited. However, the audience was encouraged to continue the conversations amongst themselves, and with the panel members if necessary, and to use the rest of the conference as an extension of the platform aimed at providing support for female scientists. It was also clarified that 'science' is used as a blanket term to include all forms of sciences and there is no distinction between what is defined as hard and soft science. We summarise the discussion related to each of the three questions and follow by some concluding remarks.

Gender wage gap

In all fields of science, it was evident that it is a generally accepted fact that women are paid less than their male counterparts for the same work or task and comparable qualification. Theories were advanced in the discussion as to why gender wage gap persists. One theory is that women are expected to take more leave, and therefore work less than men, attributed to familial responsibilities. This theory results in the notion that women are less productive in the workplace, and hence creates the impression that paying women less is justified. Statistical discrimination theory was mentioned and translates to the interplay between cultural stereotypes and gendered preferences or outcomes such as the willingness of employers, especially in STEMMI occupations, to pay a premium for men who are viewed favourably in terms of agency, intelligence and analytical competence compared to women.⁶

Economists confirm that the gender wage gap is a universal problem that still exists in both the developing and developed world. In mainstream economics, the International Monetary Fund studies, conducted in the labour market, have shown that there is no difference in the productivity between male and female workers. Despite some economists arguing that there is no gender discrimination in the market (as discrimination could be inefficient, it may not be tolerated in a perfectly competitive market), practical evidence shows that it exists. According to Getachew et al.⁷, there exists an inequality of opportunities (parental gender bias) at home, and sharing parental responsibility creates 'inequalities' within households. Getachew et al.⁷ argue that such parental gender bias is a result of non-pecuniary cost associated with parental investment in children. In this research, gender bias is treated as the difference in the parents' psychic cost. This is a reflection on their optimism or pessimism towards their investment in their children's education, which leads to different human capital accumulation, and therefore to differing social mobility thresholds for daughters and sons.

In a study of a cohort of mathematically gifted individuals as adults (being in the top 1% of mathematical reasoning ability at age 13 years), Lubinski et al.⁸ found that the incomes of the men were significantly higher than those of the women even though the differences in university educational attainment were not significant. Further, being married was more of an advantage for men than for women, as married men had higher incomes than married women

and unmarried men. While both genders had achieved exceptionally well in their chosen fields, their values were different, with men, as a group, valuing full-time high impact work as compared to women, as a group, valuing flexibility at work and balancing work with other aspects of life.

A similar notion regarding gender wage gap is evident from the Uber algorithm (referred to as the Gig economy⁹) which assigns customers to everybody in the Uber driver database equally without gender preference. However, there is evidence that there is a difference between the incomes of the female drivers and their male counterparts. It has since been discovered that the algorithm has identified that female drivers are more reluctant to take risks, such as taking late-night passengers to a dangerous destination, and, as a result of this choice, they were earning a lower income. In this case, equal opportunities exist, but not everybody is able, or willing, to seize opportunities for various reasons. In scientific research careers, a similar phenomenon occurs in which the career growth of women is constrained by decisions that limit mobility, such as the choice to have a family, which often coincides with the period after graduate studies when both men and women are expected to establish themselves by travelling to conferences and taking up postdoctoral positions.¹⁰

A further explanation for the wage gap was offered in the discussion: female scientists do not have competitive negotiation skills. There exists a perception, described in this panel session, that women are not as adept at asking for pay increases because they believe that their managers will recognise and reward their achievements if they 'just work hard enough'. A general observation was that their male counterparts tend to be more assertive. There is a perception that it is easier for men to vocalise the value they add to a company, and hence generally find it easier to talk about their own accomplishments and behave as better self-marketers. It was agreed that female scientists need to develop the skill and confidence to be able to negotiate for pay increases. Learning from other female scientists and mentors can help with understanding experiences.

An additional experience many female scientists have encountered is that of the 'imposter syndrome'. Imposter syndrome is a psychological pattern in which individuals doubt their accomplishments and have a persistent, often internalised, fear of being exposed as a 'fraud'.¹¹ Imposter syndrome occurs more frequently among women than men. Despite evidence to the contrary, a woman may develop the belief that she is not competent, or not considered competent. It was suggested that this may have become linked to performance evaluation in recent years and be related to the assertion that women are consistently undervalued by both women and men.¹² One of the best ways to combat this phenomenon is to know that other women experience it. Making sure that young female scientists have objective, validated confidence in their achievements is important, and alerting them to the existence of imposter syndrome, and other obstacles, can be very useful. Attributing success to one's own intelligence can be helped by consciously building one's own expertise and knowledge. One way of mitigating this is through mentorship programmes. Mentors can assist in reiterating the intrinsic value of the research being done and the real contribution it is adding to the field. The support that women need can often be found by working with other women in the same field. It was also noted that it is common for most women to put undue pressure on themselves to 'perform' in a perceived way.

Traditionally, men have engaged with the sciences across the entire socio-economic landscape. It must be recognised that in many countries, cultures and institutions, men are active advocates for the advancement of women. However, in many cases men still tend to act as gatekeepers, and, in some instances, are reluctant to accept contributions from female researchers. There is an urgent need for this situation to change. The balance in the gatekeeper positions will change when women are better represented in the senior levels of the sciences, and are seen and known as experts in their fields.

Two additional factors were discussed. In some cultures, it is possible that men are intimidated by women who are high achievers.¹² The second factor is the known perception that when a field becomes dominated by female researchers or scientists, the field becomes less prestigious for men.

According to Thébaud and Charles⁶, deep-rooted gender stereotypes have interactional effects at both the individual and broader societal levels. At the societal and cultural levels this takes the form of overt and subtle biases, held by both men and women, that men and women should fit neatly into the popular notion that 'men are from Mars and women are from Venus' in terms of behaviour and career choices.¹³ At the individual level, gender stereotyping shapes how women perceive themselves in terms of aptitude in studying mathematics and science at an early age and later on in their confidence to pursue, persist and thrive in STEMMI careers. Female researchers and scientists are encouraged to persevere, to stand out, and to make progress. At the same time, strategies and policy actions are required to ensure that girls and boys are exposed to the same STEMMI opportunities at school and that gender biases are eradicated. At institutional and organisational levels, policies and practices need to be reassessed from a gender perspective.¹⁴ Increased financial investment in female participation in STEMMI is a step in the right direction, but concrete steps to create inclusive organisational and societal environments are needed to maximise returns on investments.^{4,5}

Cultural perceptions and encouraging young girls to become scientists

The idea that young girls are discouraged from pursuing careers in the hard sciences, as well as the cultural perceptions about why it is better for women to marry and have children, still exist, and although times are changing, the process is slow. Families do invest in a daughter's education, but there is still a perception, often by extended family, that daughters' achievements are less worthy than sons' achievements. Young girls still grow up with an expectation that they should get married and have a family.

An example was described from traditional Zulu culture. Male children continue to be more highly valued than female children. Sons are expected to become providers in the homestead whereas daughters are viewed less favourably by their families because they are expected to marry into another family, where they will assume the role of caretaker of their future homes and in-laws. Therefore, characteristics such as the courage to pursue a high-impact career, independence and leadership are often not expected from daughters.¹⁵ Family members, especially elder men, can sometimes be heard saying to female relatives who display such characteristics that they 'have manly courage' and it would have benefitted the family if they had been born male. Cultural gender stereotypes have been used to deny female children an education in many parts of the world. Ironically, regions which are strongholds of cultural gender stereotyping outperform egalitarian countries in terms of the proportion of women obtaining higher degrees in STEMMI fields and persevering in STEMMI careers.¹⁵

Another member of the panel shared her personal experience on the topic of culture. As a daughter in a single-parent household, her experience was that her mother was more than willing to invest in her education, but also had the strong expectation that she would also marry and be responsible for a household. Her experience is in line with the view expressed by Getachew et al.⁷ that parents should reconsider their perceptions of psychic cost, in this case, their expectation that daughters should marry. This is a critical point of the human capital development of children in terms of parental gender bias. Although gender equality has come far, from these discussions it was clear that there is still a long way to go in terms of societal expectations.

The interactional processes that serve to stymie the full participation of women in STEMMI are often compounded for African women. Often, the twin subtle biases of race and gender are not openly discussed. However, it is a professional experience of African women that anything less than excellence is not enough to be placed on a par with one's peers as 'you are assumed to be incompetent until you can prove otherwise'^{6,10}.

The need for women in the sciences

Women want the choice to work in the sciences, or, as it was expressed by a panel member, 'People want choices!'. In a recent study of the demand and supply of skills in South Africa⁴, the authors could not elaborate on



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