Under-representation of women is alive and well in sport and exercise medicine: what it looks like and what we can do about it

Nash Anderson,1 Diana Gai Robinson,2,3 Evert Verhagen,4 Kristina Fagher,5 Pascal Edouard,6,7 Daniel Rojas-Valverde,8 Osman Hassan Ahmed,9,10,11 Moa Jederström,12 Laila Usacka,1,13 Justine Benoit-Piau,1,14 Candy Giselle Foelix,1,15 Carole Akinyi Okoth,16,17,18,19,20 Nefeli Tsiouti,21,22 Trine Moholdt,23,24 Larissa Pinheiro,25,26,27 Sharief Hendricks,28,29 Blair Hamilton,29 Rina Magnani,29,30 Marelise Badenhorst,31,32 Daniel L Belavy,31

INTRODUCTION
Despite constituting approximately 50% of the population, women specifically are under-represented in sport and exercise medicine (SEM) and they often experience a negative bias. Our authorship group has recognised this issue based on evidence from recent studies, personal experiences and the experiences of the wider SEM community. We understand that this is a complex issue. Through this editorial, we aim to briefly highlight the issue of insufficient representation of women in SEM, discuss some of the impacts of this inadequate inclusion and other negative aspects experienced and suggest steps that we can all take to address female under-representation to improve the field of SEM.

FEMALE UNDER-REPRESENTATION IN SEM
Sex and gender bias in SEM settings are evident in multiple ways. Systematic reviews demonstrated that female athletes are under-represented in sports and exercise research.12 International Olympic Committee consensus statements identified the need for increased representation and inclusion of authors from different genders, ethnicities, skill sets and levels of experience.5 Female first and last authorship on scientific publications is less than 25%,4,5 they hold less than 25% of leadership roles in editorial boards and research teams.12 This includes designing experimental studies with female-specific physiological considerations and creating evidence-based exercise-related guidelines tailored for sportswomen.13 There is also a need for separate analyses to account for different causal mechanisms for injuries or health issues in men and women. Sex-specific exercise training recommendations can help improve adherence and physiological responses in clinical populations.14 However, women remain under-enrolled in both recreational and performance sports research, mirroring the under-representation of women across health and disease states.15

HOW DOES IT AFFECT THE FIELD, AND WHAT OTHER ADVERSE CONSEQUENCES DO WOMEN IN SEM FACE?
Under-representation of female participants, clinicians and researchers in SEM can have detrimental effects for the field and women within it.

Knowledge gaps
Although female athletes constitute approximately 50% of the population, there are distinct knowledge gaps in areas such as sport performance, cardiovascular health, musculoskeletal health, postpartum physiology and lactation research.11 It is crucial to foster diversity in both participant cohorts and research teams.12 This includes designing experimental studies with female-specific physiological considerations and creating evidence-based exercise-related guidelines tailored for sportswomen.13 There is also a need for separate analyses to account for different causal mechanisms for injuries or health issues in men and women. Sex-specific exercise training recommendations can help improve adherence and physiological responses in clinical populations.14 However, women remain under-enrolled in both recreational and performance sports research, mirroring the under-representation of women across health and disease states.15
Addressing this issue is vital to support performance and safe sport for women.

**Workplace challenges**
Harassment at the workplace can lead to unhealthy work environments, mental health challenges and poor job satisfaction for female practitioners. This may contribute to women leaving their positions early or seeking work in other areas. Moreover, the workload and work culture may differ for female and male clinicians and researchers. Higher suicide mortality rates are observed among female physicians compared with male physicians. Work stressors have been identified as a risk factor for suicide among female physicians. Female sportmedicine physicians experience disrespect and have their judgement questioned more often than male sport medicine physicians. They have also reported experiencing sexual harassment.

**Reduced sports participation**
Encouraging sports participation and actively striving to keep all children and adolescents, irrespective of their sex or gender, engaged in sports is crucial for promoting health throughout life. Sports dropout is a major

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| Build a culture of awareness, excellence and inclusivity | Embrace diverse views and diverse people, leading to better research and outcomes. Addressing gender bias through open discussions. Educate faculties on the impact of gender bias. Open and candid discussions about gender bias can help shift the focus to evaluating the quality of work conducted in science and medicine, rather than focusing on the practitioner’s gender. This may create solutions to address bias rather than perpetuating it through silence. Improve gender representation and work–life balance in academia Ensure equal representation of male and female research participants. Provide secure, long-term employment opportunities for early-career academics, and ensure that they have access to equal parental leave, support for dual-career relationships, part-time work options, and affordable, high-quality childcare. Additionally, consider organising family-friendly conferences that can accommodate attendees with caregiving responsibilities. Diversify the applicant pool through initiatives such as training search committees. Support and promote professional growth through mentoring, networking and development opportunities, particularly for women faculty. Promote a healthy work–life balance by discouraging a culture of 24/7 work and encouraging employees to prioritise their well-being. Foster a problem-solving environment in which colleagues can support each other and work as a team, increasing motivation, efficiency and health. Promote female inclusion in sports medicine Provide diversity and inclusion training for athletes, coaches and other staff. Provide career coaching, mentorship and opportunities for growth as practitioners and in leadership positions. Hold leaders accountable for driving business practices and clinics that improve diversity. Encourage diversity and inclusion in leadership positions within sports medicine organisations and address gender bias in hiring and promotion practices. Implement intentional allyship strategies to address speaker gender inequity. Conduct further research through an intersectional lens to examine factors leading to over-representation of white men in SEM. Enhance female inclusion in research, publications, and conferences Consider diversity at all stages of research and publication, including among author groups and peer reviewers. Reflect on the reasons behind the gender disparity in acceptance rates of scientific work, and explore the possibility of implementing gender-blind review processes. Ensure diversity at sport and exercise medicine conferences, increasing the representation of women and gender diverse people as speakers and attendees. Recognise the benefits of greater diversity Acknowledge that greater diversity benefits both clinicians and patients, bringing different qualities, skills and experience to the table. Female providers are preferred by female athletes for sexual health problems and by both male and female athletes for psychosocial health issues. Female physicians have lower mortality rates for their patients. Enhance the use of enabling technology Promote the empowerment of women through information and communications technology. Distribute work equally Ensure that work is distributed equally across genders. Do not overload women. Implement anonymous reporting platforms and expert commentary to address bias in SEM settings Initiatives like #SpeakUpOrtho provide a platform for anonymously sharing experiences of microaggressions, bullying, harassment, discrimination and retaliation. Expert commentary can help prevent the perpetuation of these behaviours. SEM, sport and exercise medicine.
concern among specifically female adolescents. Role models may play a role in ameliorating this.\textsuperscript{20, 21}

ADDRESSING FEMALE UNDER-REPRESENTATION

At peak sport medicine bodies, academic researchers and training institutions, there are a number of ways we can address female under-representation and its consequences. In table 1, we describe the following strategies: (a) build a culture of awareness, excellence and inclusivity, (b) promote female inclusion in sport medicine, (c) enhance female inclusion in research, publications and conferences, (d) recognise the benefits of greater diversity, (e) enhance the use of enabling technology, (f) distribute work equally, (g) implement anonymous reporting platforms and expert commentary to address bias in SEM settings. By incorporating these strategies, we can work towards creating a more diverse and inclusive environment in the field of sport medicine that benefits everyone involved.

Portugal is an example of a country that has achieved parity between men and women in research, with women representing 50\% of published researchers.\textsuperscript{22} Women are highly represented among first authors, indicating greater equality and representation for early-career researchers. Unlike other comparable nations, women researchers in Portugal are likely to continue publishing over time and remain engaged in research.

It is important that we acknowledge the under-representation and work to break the cycle of gender bias through role models. The lack of female role models in SEM can perpetuate the cycle of gender bias. Breaking this cycle is essential to ensure that future generations do not perceive gender bias as normal and continue to pass it down to new practitioners joining the field. In the future, gender equity should be normal.

CONCLUSION

Like many disciplines, there is an evident under-representation of women and potential negative bias in SEM, research and occupations at all levels. There are great benefits to achieving gender equity in SEM. We believe that we can ensure that the brightest minds from all backgrounds can contribute to the advancement of science and enhance not only the sports medicine community but also society at large by acknowledging and addressing this under-representation.

RECOMMENDED RESOURCES

- Follow the hashtag #WomenInSTEM
- See BJSOM blog August 2022 https://blogs.bmj.com/bjsom/2022/08/22/gender-bias-in-sports-medicine/

Author affiliations

1Tuggeranong Chiropractic Centre, Fadden, Australian Capital Territory, Australia
2Sydney Sportsmed Specialists, Sydney, New South Wales, Australia
3School of Medicine, Notre Dame University, Sydney, New South Wales, Australia
4Amsterdam Collaboration on Health & Safety in Sports, Department of Public and Occupational Health, Amsterdam Movement Sciences, Amsterdam UMC, University Medical Centers – Vrije Universiteit Amsterdam, Amsterdam, The Netherlands
5Rehabilitation Medicine Research Group, Department of Health Sciences, Lund University, Lund, Sweden
6Department of Clinical and Exercise Physiology, Sports Medicine Unit, University Hospital of Saint-Etienne, Faculty of Medicine, Saint-Etienne, France
7Université Jean Monnet Saint-Etienne, Lyon 1, Université Savoie Mont-Blanc, Inter-university Laboratory of Human Movement Biology (EA 7424), Saint-Etienne, France
8Sport Injury Clinic (Rehab&Readapt), Human Movement Sciences and Quality of Life School (CIEMHCAVI), National University of Costa Rica, Heredia, Costa Rica
9Physiotherapy Department, University Hospitals Dorset NHS Foundation Trust, Poole, UK
10The Football Association, Burton-Upon-Trent, UK
11School of Sport, Health and Exercise Science, University of Portsmouth, Portsmouth, UK
12Athletics Research Center (ARC), Department of Health, Medicine and Caring Sciences (HMV), Linköping University, Linköping, Sweden
13Faculty of Medicine, University of Latvia, Riga, Latvia
14School of Rehabilitation, Faculty of Health Medicine and Science, Université de Sherbrooke, Sherbrooke, Quebec, Canada
15Child of this Culture Foundation, Orlando, Florida, USA
16National Spinal Injury Referral Hospital, Nairobi, Kenya
17Ministry of Health, Nairobi, Kenya
18Medical Commission, Nairobi, Kenya
19National Olympic Committee of Kenya, Nairobi, Kenya
20Kenya Hockey Union, Nairobi, Kenya
21Project Breakalig, Nicosia, Cyprus
22School of Medicine, European University Cyprus, Engomi, Cyprus
23Department of Circulation and Medical Imaging, Norwegian University of Science and Technology, Trondheim, Norway
24Women’s Clinic, St. Olavs Hospital, Trondheim, Norway
25Department of Physical Therapy, School of Physical Education, Physical Therapy and Occupational Therapy, Rehabilitation Sciences Graduate Program, Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, Brazil
26Department of Human Biology, Division of Exercise Science and Sports Medicine, Lifestyle and Sport (HPALS) Research Centre, Faculty of Health Sciences, University of Cape Town, Rondebosch, South Africa
27Institute for Sport, Physical Activity and Leisure, Leeds Beckett University Carnegie School of Sport, Leeds, UK
28Centre for Stress and Age Related Disease, University of Brighton, Brighton, UK
29School of Physical Education and Physical Activity, State University of Goiás, Goiânia, GO, Brazil
30Sports Performance Research Institute New Zealand (SPRINZ), Auckland University of Technology, Auckland, New Zealand
31Hochschule für Gesundheit, Germany; Department of Applied Health Sciences, University of Technology, Bochum, Germany
32School of Rehabilitation, Faculty of Health Medicine and Science, Université de Poitiers, Poitiers, France
33Equipe de Recherche en Sciences de la Médecine et du Sport (ESMS), Centre National des Sports, Paris, France
34Department of Physical Therapy, School of Health, University of Minho, Braga, Portugal
35Child of this Culture Foundation, Orlando, Florida, USA
36University of Technology, Bochum, Germany
37Not applicable.
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Twitter Nash Anderson @Sportmednews, Diana G Robinson @dianarobdoc, Evert Verhagen @eververhagen, Kristina Fagher @KristinaFagher, Pascal Edouard @PascalEdouard42, Moa Jederström @MJederstrom, Laila Uscacka @kailialiaiap, Candy Giselle Foeik @candyfoeik, Carole Akinyi Okoth @Carole0683, Nefeli Tsiodra @ProjektBreakalig, Brijlismash, Trine Molefeldt @trinemolefeldt, Sharief Hendricks @Sharief_H, Blair Hamilton @BlairH_PhilD, Rina Magnani @rinoka_ and Daniel L Belavy @belavyprof

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