**Author gender bias in paediatric journals and FOAM**

Round, A., Barton, J., Kuri, A., Tran, T., Round, J. and Knight, K.

**NAME OF AUTHORS AND AFFILIATIONS -** Round, A., Barton, J., Kuri, A., Tran, T., Round, J. and Knight, K.

Antonia Round – University of Leicester, Medical School, George Davies Centre, Lancaster Rd, Leicester LE1 7HA.

Jack Barton - St George’s, University of London, London, United Kingdom, SW17 ORE.

Ashvin Kuri - Barts and The London School of Medicine and Dentistry, Garrod Building, Turner St, Whitechapel, London, E1 2AD.

Tien Tran - St George’s, University of London, London, United Kingdom, SW17 ORE.

Jonathan Round - St George’s, University of London, London, United Kingdom, SW17 ORE.

Katie Knight - North Middlesex Hospital, Sterling Way, London, N18 1QX.

**CORRESOPNDING AUTHOR DETAILS –** Antonia Round, University of Leicester, Medical School, George Davies Centre, Lancaster Rd, Leicester LE1 7HA. 07398216854. acr28@student.le.ac.uk.

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Women are disproportionately underrepresented within medical academia1. This gender bias has wide-reaching consequences, negatively impacting employment, promotion, grant success, and pay. Paediatric academia is an important area to investigate publication gender bias as women account for the greatest proportion of the clinical workforce.

Free Open Access Meducation (FOAM) is a novel and expanding method of communicating best practice and research findings. FOAM refers to blogs, podcasts, educational websites, smartphone apps, social media and other freely available resources used for medical education. Given its accessibility for potential authors, removal of the need for funding bodies and independence from large institutions, FOAM may be less subject to gender bias than traditional publishing methods. We as a group of medical students who frequently use FOAM, collaborated with two paediatricians who develop FOAM resources, in order to assess and discuss the extent of gender bias in paediatric FOAM.

To our knowledge, there is no previously published work investigating gender bias within FOAM. We identified that the novel nature of FOAM provides a unique opportunity to assess, recognise, and tackle potential gender bias before FOAM becomes more institutionalised, and susceptible to ingrained negative social norms. To this end, we conducted a study collecting data on author gender within paediatric peer-reviewed and FOAM sources.

Throughout this article, ‘women’ refers to those self-identifying as women. This may include cisgender, transgender, or other gender identities. Gender identification was first approached by accessing the author’s institutional webpage. If this was unclear, gender was identified from the author’s name with guidance from ‘www.babynames.com’, as used in previous studies2. Any queries regarding the author gender could be raised for discussion with the wider group of researchers. Articles where an author's gender could not be established were excluded.

Paediatric FOAM sources were selected based on their ranking in the ALiEM Social Media Index3. The top-ranking sites included were: Don’t Forget the Bubbles, PEMBlog, Pediatric EM Morsels, Pediatric EM, and PaediatricFOAM.

Paediatric peer-reviewed journals were selected based on the highest impact factor using Web of Science journal citation reports tool4. The inclusion criteria for peer-reviewed publications were publication in English, accessible via the UK Access Management Federation and study type was either randomised controlled trial, systematic review, meta-analysis, or observational study. The selected journals were JAMA Pediatrics, Journal of Child Psychology and Psychiatry and Applied Disciplines, Pediatrics, Pediatric Allergy and Immunology, and Journal of Adolescent Health.

We analysed 806 peer-reviewed journal articles with 5637 authors and 260 FOAM articles with 277 authors published in 2019. We found that women represented 56% of total authors within paediatric peer-reviewed publications, but only 33% within FOAM. There was relative homogeneity within the five paediatric journals (52%, 53%, 54%, 55% and 68% respectively) however wide variation between the five FOAM resources (59% DFTB, 10% PEMBlog, 0% Pediatric EM Morsels, 56% Pediatric EM, 50% Paediatric FOAM).

Whilst the slight predominance of women as authors within paediatric peer-reviewed publications was expected as similar progress has been observed elsewhere5, the overall predominance of men as authors in paediatric FOAM was unexpected. We had thought that FOAM may less subject to factors limiting gender equality in publishing elsewhere. Grant funding is not needed, and the time required to develop material is often less than generating peer-reviewed output and can be arranged more flexibly. In place of editorial boards are individual FOAM site curators or founders, which may make publication more accessible with less potential for structural bias.

In light of these findings, we reassessed the potential causes for gender bias observed within paediatric FOAM. Rather than formally structured editorial boards, FOAM sites typically have looser structures with founding members that write, commission and edit submissions. Whilst this may seem more accessible for potential authors, the disadvantage of this structure is that FOAM sites may be vulnerable to a form of the Founder effect – perpetuating the conscious and unconscious intentions of the instigator.

Furthermore, FOAM is almost exclusively unfunded and non-institutional. Those seeking to write FOAM articles will need to do this outside of their contracted work, which will penalise authors with less time or less financial stability. FOAM is more difficult to cite and less well recognised for job applications.

Solutions must be considered to mitigate this gender bias whilst FOAM is still a new and growing structure. FOAM community awareness of this issue and conscious planning will be key. FOAM publishing of yearly author gender reports could be helpful to this end. Other top-down approaches, such as that promoted by Athena Swan, could be helpful; with encouragement of women holding editorial board positions, mentor support for potential authors, and curation of topics.

This is an important and emerging issue of equality within medical education. It is hoped that our observation and discussion will promote recognition of gender equality within FOAM and the work needed to achieve this for FOAM creators.

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**Supplementary Tables**

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|  | Peer-Reviewed Journal Publications | Free Open Access Meducation (FOAM) articles |
| Total number of articles | 806 | 260 |
| Total women as authors (%) | 3181/5637 (56.43) | 90/277 (32.50) |
| Total men as authors (%) | 2456/5637 (43.57) | 187/277 (67.50) |
| Women as first authors (%) | 507/806 (62.90) | 83/260 (31.92) |
| Men as first authors (%) | 299/806 (37.10) | 177/260 (68.07) |
| Women as last authors (%) | 389/806 (48.26) | N/A |
| Men as last authors (%) | 417/806 (51.74) | N/A |

**Table 1**. Authorship of paediatric peer-reviewed journal publications and FOAM articles by gender.