

Gender disparities in pediatric critical care research

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Background

Women researchers, in many areas of science, continue to secure less grant funding, author fewer publications, and do fewer podium presentations than male researchers. Gender disparity limits the talent pool of researchers, female role models in research, and the areas of research focus.^{1,2}

Women constitute approximately 40% of pediatric critical care physicians in the US and Canada, and the majority of nurses but the gender demographics of pediatric critical care clinical researchers are unknown.

Objectives

- To determine the proportion of female researchers in pediatric critical care randomized controlled trials (RCTs).
- To compare the publications and impact of female and male researchers.

Methods

Included researchers: We included authors of published RCTs in pediatric critical care.

Data sources: We used PICUtrials.net to identify RCTs. This database uses comprehensive search strategies of multiple databases to identify published RCTs in pediatric critical care, most recently updated in 2018. In included published RCTs administering any intervention to children in a pediatric ICU. It excludes trials conducted in neonatal ICUs and individual patient crossover trials. Pairs of reviewers independently screened studies for eligibility, assessed risk of bias, and abstracted data.

We extracted author names, affiliations and professions from the RCT publications and use Web of Science to identify the number of times each publication was cited.

Determining researcher gender: We assigned a gender to each name by comparing the names to historical databases (United States Social Security Administration 1932-2012 and UK 2001 and 2011 census data), using the 'gender' package (Version 0.5.2) for R. For researchers not found through those methods, we manually searched online for their preferred gender pronouns. Names that could not be classified and study groups were excluded from analysis.

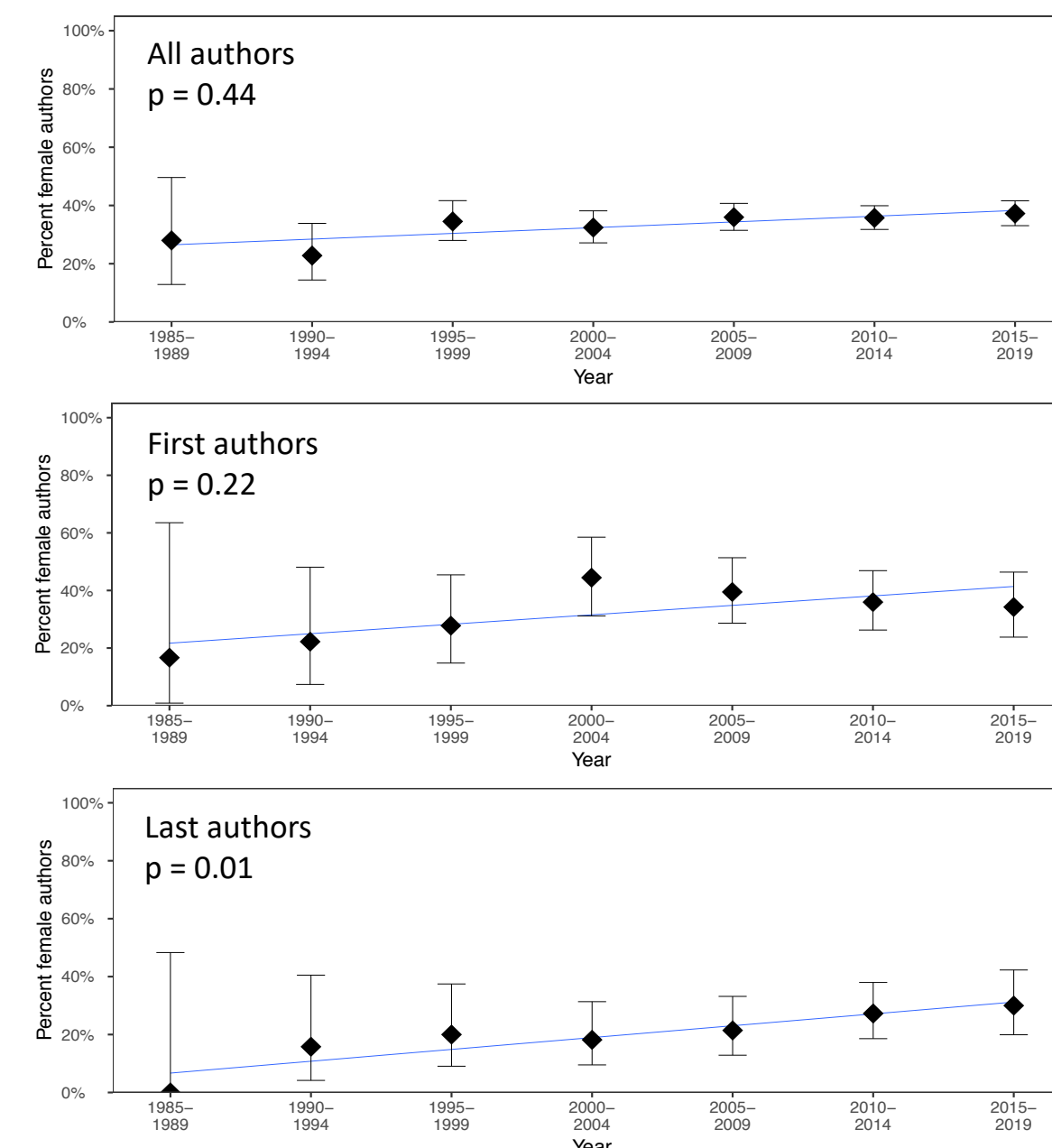
Results

We included 378 RCTs, 1875 individual researchers, and were able to classify the gender of 1509 (80%) of them.

Female authorship by author type

Type	Total authorships	Categorized authorships	Female n (%)
Any	2083	1953 (94%)	680 (35%)
First	405	371 (92%)	122 (36%)
Last	396	362 (91%)	76 (23%)

Female authorship over time

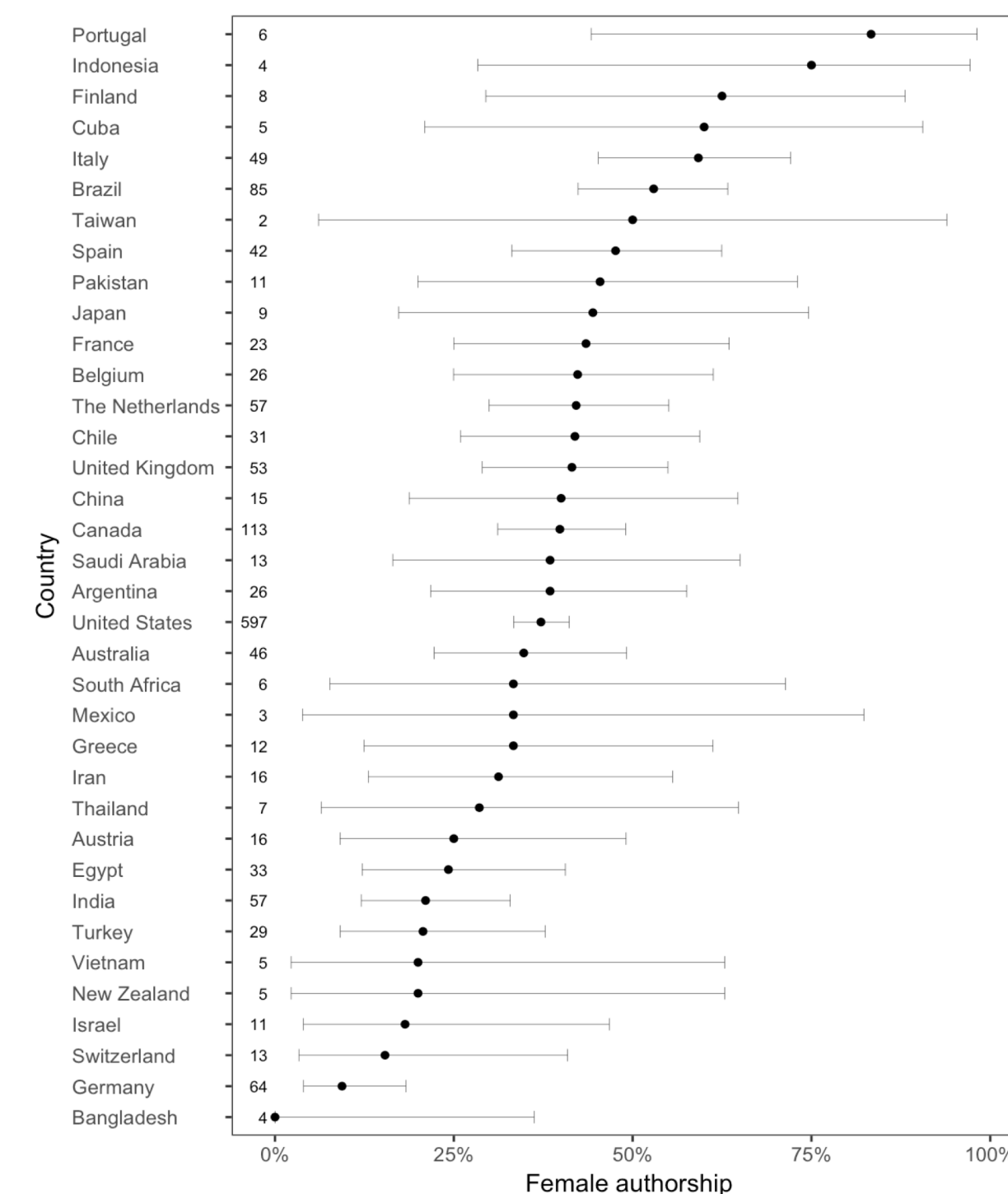


Each diamond represents the percent female authorship for each five year period and its 95% confidence interval. The average trend of female authorships is represented by the blue line.

Trial and publication characteristics

Characteristic	Female first or last author (n = 160)	Both male first and last authors (n = 163)	p-value
Low risk of bias	89 (56%)	90 (56%)	0.90
Multicentered	30 (19%)	38 (23%)	0.20
Children randomized	55 (33, 102)	50 (30, 107)	0.11
Total citations	21 (8, 48)	29 (11, 58)	0.003
Citations per year	2.4 (1.2, 4.9)	3.0 (1.1, 5.1)	0.79
Journal impact factor	3.7 (2.3, 6.6)	4.5 (3.0, 7.7)	0.99

Female authorship by country



Each dot represents the percent female authorship for a country and its 95% confidence interval. The total number of female authorships is presented along the vertical axis.

Female authorship by profession

Profession	Authorship type		
	All	First	Last
All professions	732/2092 (35%)	164/478 (34%)	112/504 (22%)
Physicians	344/1368 (25%)	120/429 (28%)	80/454 (18%)
Nurses	114/118 (97%)	38/38 (100%)	22/22 (100%)
Non-clinicians	85/181 (47%)	0/0 (0%)	9/19 (47%)
Other clinicians	40/61 (66%)	6/9 (67%)	0/4 (0%)
Unclear	149/364 (41%)	0/2 (0%)	1/5 (20%)

Conclusions

Although increasing over time, women still represent a minority of published pediatric critical care researchers. While fewer in number, the trials that female researchers publish are similar in characteristics and impact as male researchers. There is heterogeneity in female authorship patterns among countries and professions that should be acknowledged when considering future steps.

Further work should identify barriers to gender diversity in pediatric critical care research and potential solutions. It should also include appropriate methods to measure the impact of such changes in a timely manner.

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