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European Psychiatry

journal homepage: <http://www.eurpsy-journal.com>



Original article

## Gender-gaps and glass ceilings: A survey of gender-specific publication trends in Psychiatry between 1994 and 2014

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### ARTICLE INFO

#### Article history:

Received 9 March 2017

Accepted 23 March 2017

Available online xxx

#### Keywords:

Academic psychiatry

Psychiatry in Europe

### ABSTRACT

**Background:** Within academic psychiatry, women are underrepresented in the higher academic ranks. However, basic determinants of women's lack of academic advancement such as publication activity are poorly understood. The present study examines women's publication activity in high-impact psychiatry journals over two decades and reports developments in the numbers of male and female authorship over time and across cultural areas.

**Methods:** We conducted a retrospective bibliometric review of all articles published in 2004 and 2014 in three high-ranking general psychiatry journals. Statistical comparisons were made between the two years and with results from a baseline assessment in 1994.

**Results:** The overall percentage of female authors increased from 24.6% in 1994 to 33.2% in 2004 to 38.9% in 2014. Though increases in female authorship were statistically significant for both decades, there was less difference between 2004 and 2014, indicating a possible ceiling effect. Rates of female first authors increased between 1994 and 2014, though to a lesser degree between 2004 and 2014. Numbers of female corresponding authors plateaued between 2004 and 2014. Within Europe, Scandinavia displayed the most balanced gender-wise first author ratios. Western European and Central European countries increased their rates of female first authors substantially between 2004 and 2014.

**Conclusions:** Despite gains in some areas, our study reveals considerable deficits in the diversity of the current academic psychiatric landscape. Ongoing efforts and interventions to enhance the participation of underrepresented groups on institutional, political and editorial levels are necessary to diversify psychiatric research.

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## 1. Introduction

Diversity research shows that diverse working environments contribute substantially to innovation and productivity, both in academic and commercial settings [1,2]. Thus, numerous policies on national and institutional levels were implemented to unleash untapped potentials by enhancing participation of underrepresented groups such as women [3]. Despite the considerable advancements the academic landscape has made in the last decade, medical academia remains male-dominated, especially in leading positions [4]. Even though women make up 50% or more of medical students in most Western countries [3], only 39% of faculty [5] and less than 15% of department chairs are female in the US

[6]. In psychiatry, numbers of women involved in clinical, scientific or educational activities have traditionally been higher than in other areas of medicine. This trend, however, has not been proportionally reflected in women psychiatrists' research output, especially in domains crucial to academic advancement such as first and corresponding authorship of original papers [7].

Though the problem of gender discrimination is evident on many levels of psychiatric research, interventions and solution-oriented studies into this topic are constrained by a lack of reference data on current developments.

The present paper aims to close this information gap and updates on women's publication activity in high-impact psychiatry journals over time and with respect to cultural/territorial variations. We hypothesised that:

- the gender gap has been narrowing since the last available report in 1994;

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- and significant differences in the proportion of female authorship can be observed depending on geographic/cultural area.

## 2. Methods

We performed a retrospective bibliometric review of all articles published in 2004 and 2014 in three of the most prestigious general psychiatry journals, i.e. *Jama Psychiatry (JP)*, *The American Journal of Psychiatry (AJP)* and *The British Journal of Psychiatry (BJP)*. These journals were chosen based on their long-standing consistency in high impact factor rank as well as for reasons of comparability to a previous study by our group reporting gender and authorship in 1994 and 2007 in the same three journals. We chose to investigate the years 2004 and 2014 in order to provide comparisons across 10-year intervals since 1994. We provide comparative comparisons with results from 1994 where possible and place an additional focus on the geographical area of authors' affiliation in the years 2004 and 2014. We included all articles published in the above journals except:

- editors' introductory notes;
- book reviews;
- American Psychiatric Association issues and presidential addresses;
- regular columns;
- and corrections in our analysis.

The applied coding scheme was developed and used for the first assessment on authorship by our research group in the context of this ongoing project and adapted for the present assessment. First, publications from two months in each journal were rated simultaneously by two authors (S.S. and B.S.), followed by discussion and consensus on adaptations of the coding scheme. This process was repeated twice until the new coding scheme satisfactorily fit the data. Thereafter, two authors (S.S. and B.S.) independently recoded all articles of 2014. Where discrepancies between the ratings occurred, these were discussed and resolved until full concordance between the raters was achieved. All articles from 2004 were recoded according to the new final coding scheme by one author (S.S.).

### 2.1. Coding scheme

We distinguished between (a) original research and (b) non-research articles. Original research articles were categorized according to the research methods used: cohort studies, case-control studies, cross-sectional studies, clinical trials, meta-analyses/systematic reviews and "other". The non-research articles included the subcategories: reviews, case reports, commentaries or discussions, editorials and letters.

Gender of all listed authors for the included publications was identified from the first and middle name provided in the article. Where first/middle names were not stated, we consulted further publications by the same group and performed Google searches for the first names. Where names were not clearly indicative of gender, the social network for scientists *ResearchGate* or personal or institutional homepages were checked for photographs and CVs indicating gender. The country of affiliation of the first author was recorded as stated in the bylines of the respective articles. When information on the corresponding author was not stated or an article was published by only a single author, the first author served both as first and corresponding author in our coding scheme. Data on the gender composition of the editorial boards was obtained from the journals' homepages and by email request.

### 2.2. Data analysis

Countries of affiliation were grouped according to geographic region and cultural area based on their classification in the Human Relation Area Files database (eHRAF) [8], a widely used indexing tool for cultural studies. First, descriptive analyses were performed separately for all three years and results displayed as full numbers, percentages and means with standard deviation. Second, differences between journal, years, affiliation of the first author and gender were investigated using Chi<sup>2</sup> tests. Alpha levels < 0,05 were considered statistically significant. For all statistical analyses SPSS, Version 22 [9] was used.

## 3. Results

In 1994, a total of 950 articles were published across the three journals. Of these, 473 (49.8%) were original research articles and 477 (50.2%) were non-research articles. In 2004, the total number of publications dropped to 800 (original research: 502, 62.8%; non-original research: 298, 37.2%). In 2014, the number of published articles was 642 articles (original research: 318, 49.5%; non original research: 324, 50.5%).

### 3.1. Gender of authors

In 1994, overall 3417 authors were listed. Of these, 2456 (71.9%) were male and 801 (23.4%) were female. For 160 authors (4.7%) the gender could not be identified. In 2004, the listed 3782 authors included 2379 (62.9%) authors of male, 1180 (31.2%) of female and 224 (5.9%) of unidentified gender. In 2014, 1957 out of 3418 authors (57.3%) were male, 1246 (36.4%) were female and 215 (6.3%) were of unidentified gender. This reflects a statistically significant increase in overall female authors between 1994 and 2004 ( $P=0.000$ ) as well as between 2004 and 2014 ( $P=0.000$ ).

Rates of female first authorships also increased between the years from 17.1% in 1994 to 30.2% in 2004 to 33.9% in 2014. While the change between 1994 and 2004 was statistically significant ( $P=0.000$ ), the increase between 2004 and 2014 failed to reach statistically significant levels ( $P=0.133$ ).

The percentage of female corresponding authors increased significantly between 1994 and 2004 (1994: 17.9%; 2004: 29.2%;  $P=0.001$ ), but showed no statistically significant difference between 2004 and 2014. Results are illustrated in Fig. 1.

In 1994, rates of female first authors were comparable for all three journals (JP: 16.5%, AJP: 17.8%, BJP: 15.2%). In 2004 and 2014, however, rates of female first authors were considerably higher in JP than in the other two journals under investigation (2004: JP 45.5%, AJP 29.5%, BJP 23.8%, 2014: JP 39.3%, AJP 31%, BJP: 31.9%) A similar picture emerged for the rates of female corresponding authors. While in 1994 the rates of female corresponding authors across the three journals were comparable (JP: 18.4%, AJP: 13.9%, BJP: 16.2%), pronounced journal-wise differences in female corresponding authorship were visible in 2004 (JP: 48.2%, AJP: 28.4%, BJP: 20%) and 2014 (JP: 35.9%, AJP: 26.5%, BJP: 20%).

### 3.2. Author gender in non-research articles

In all three years, non-research articles were significantly more frequently first authored by men than by women ( $P=0.000$ ). A detailed display of gender distribution amongst first and corresponding authors in non-research articles is provided in Table 1.

Significant differences over time in non-research articles were observed in letters, where female corresponding authorships dropped between 1994 and 2004. Between 2004 and 2014, however, rates of both female first and corresponding authors

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