

The authorship in nursing literature: an against trend?

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Abstract. *Background and Aim of the work:* Women graduated and engaged in the scientific world are in increasing numbers. The present study aimed to analyze the gender difference in nursing scientific publication and to understand the trend in nursing science is the same or different to that reported in other scientific disciplines. *Methods:* We considered the first name in the authorship of the highest impacted factor journals related of year 2019 in the Web of Science database for the period 2015-2019, as: the International Journal of Nursing Studies (IJNS) and the Nursing Outlook (NO). Considering the proposed economic classification of the "World bank", we assessed the gender of the first authors searched with the relative degree of wealth of their countries thanks to the chi square test. *Results:* From 1st January 2015 to 31st December 2019 a total of 1171 first authors were identified. Of these, 776 (66.27%) belonged to the IJNS and 395 (33.73%) to the NO. The female gender was most representative than the male gender into two journals. In fact, 982 (83.9%) citations belong to female researchers while 189 (16.1%) citations belong to male researchers. However, the same trend is not evaluated in the Italian scenario where the male gender predominates over the female one in scientific production. *Conclusions:* Nursing scientific production shows a counter trend compared to other scientific disciplines, highlighting a predominance of the female sex over the male one. This difference is more pronounced in the more economically developed countries. (www.actabiomedica.it)

Key words: database, female, gender, male, sex distribution

Background

Gender gap refers to the gap between men and women in different scientific areas. This difference impacts in a more or less negative way in various areas such as economic, employment, health and education (1). Women have always had to struggle within the scientific community, in the past, as nowadays, although there has been no ostracism towards women's education for some time now. A striking example is that in the past 100 years only 21 women have won a Nobel Prize in science (2).

Although it is estimated that women graduated and engaged in the scientific world are in increasing numbers and despite, in the most disparate scientific fields, there are numerous initiatives to encourage

women to approach the world of science, informatics and engineering, the data that emerge from studies carried out on scientific literature are not comforting (3-6).

However, in the nursing field, it is known that the trend is significantly different (7). Just think of the first female nurse who left an important trace in history, Florence Nightingale. During the Crimean War of 1853, Nightingale, together with 39 other nurses selected by her, took the situation of the British military hospital in Shkoder in hand, despite the initial distrust of doctors (8).

In Italy, to confirm what has been said so far regarding the inverse trend of the nursing profession there is an important fact: only in 1971, with the Law n.124 of 25 February, the internship began an obliga-

tion abolished and access to nursing schools also for men (9). In 1973, with the application of the Strasbourg Decree, the duration of the course of studies went from 2 to 3 years and with the Presidential Decree 225 of 1974 the list of nurses' duties was drawn up (10).

The foundations of the nursing practice have changed profoundly in recent years, despite the practical application of the laws that characterize the nursing profession is still in progress.

To say who the nurse is today is D.M. 739/1994, or the professional profile of the nurse who identifies the field of activity and responsibility (11). With Law 42/99 (job repeal) the nurse assumes the status of Healthcare Professional who, as such, is directly responsible for his actions (12).

The Profession, therefore, says who the nurse is (DM 739/94), what the nurse knows (Didactic regulations, Law 251/2000, Law 43/2006), what the nurse does and according to what principles (Code of Conduct Nurse; 13). So nursing is generally considered a "women's job", although the number of men employed in this field is increasing. In Italy, in 2017, it is estimated that 77.5% of the nurses employed in the National Health System are female (14), and also 78% of the nurses on duty (almost 300 thousand) and almost 80% of the members are members in the Orders of the nursing professions.

As concern gender gap in the nursing scientific productivity a 2011 study published in the Journal of the Royal Society of Medicine has shown that, in the United Kingdom, there is a considerable bias among nursing authors men and women, although the latter represent most of the category considered (15). Several survey studies have suggested that female faculty members may be less likely to publish academic papers than their male colleagues (16-19).

In this regard, the literature suggests a counter-trend of the authorship of nursing scientific publications compared to those of other disciplines, given that in the latter there is always an increase in the male component compared to the female one (20).

In addition, the literature also reports references on the activity of scientific production related to the state of economic development of the country of origin (21).

Aims

The study aimed to analyze the gender difference in nursing scientific publication and to understand if the trend in nursing science is the same or different to that reported in other scientific disciplines. In particular, our study aimed to answer the following research questions:

1. Is there a statistically significant increase or decrease in the number of female researchers compared to male in nursing scientific publications for the period 2015-2019?
2. Is there a difference between the reference years considered in the study, or is the increase or decrease constant throughout the period?
3. Is there a gender difference in nursing scientific production associated with the economic level of the country of origin?

Methods

Research strategy

To aim the purpose of our research, we considered the impact factor of 2019 in the Web of Science (WoS) database as the reference value, since the values related 2020 are not yet available. The choice of the database was conditioned by the fact that WoS uses the impact factor as the criterion for organizing journals. The criteria search used in WoS were: all journals of all countries in the world dealing with nursing (miscellaneous) in general, so non-specialist nursing journals were included. Then, we considered only the first two highest impacted factor journals for our analyses for the period of the latest five years, as from 1st January 2015 to 31st December 2019.

The second phase of the study was carried out on the websites of the editorial groups that publish the selected journals; in the specific case the publishing group was Elsevier. Research was carried out within the site that covered the five-year period.

For each article of the two selected highest impact factor journals, research was carried out on the first author, aimed at determining his/her gender and the country to which he/she belongs. Editorials, cor-

rigendum and letters to publishers were excluded from this research. The sites of the universities in which they carry out their research and Research Gate database were used to search the nationality and the gender of the first author, and when it was not possible to find such information by these means, the author was contacted via email. Specifically, in introducing our study project we asked the author if he/she could provide us with an indication of the gender as we had not been able to find out by ourselves. Generally, in the order of authors' authorship, the first and the last names are the most important. Specifically, the first name is the one who worked most on the conception, management and implementation of the research study, while the last name is usually a person who has a certain authority in the scientific field. In our research project we deliberately considered only the name of the first author to try to understand if those who are concretely engaged in high-level scientific nursing research are men or women.

Finally, considering the proposed economic classification of the "World bank" (22) we assessed any differences existed in the gender of the first authors searched with the relative degree of wealth of their belonging countries. Specifically, we referred to the world bank web site, where, for the 2020-2021 fiscal years, low-income economies are defined as those with a Gross National Income (GNI) per capita, calculated using the "World Bank Atlas method", of \$1.035 or less in 2019; lower middle-income economies are those with a GNI per capita between \$1.036 and \$4.045; upper middle-income economies are those with a GNI per capita between \$4.046 and \$12.535; high-income economies are those with a GNI per capita of \$12.536 or more.

Data analysis

The tabulated data were stored in a Microsoft Excel database and analyzed with the use of SPSS software, version 20 to determine the sex distributions of the first authors of works for each journal, year and sex. Specifically, *chi square* test was performed to assess sex distribution par years, par journals considered and par author's nationality, respectively. p values less than 0.05 were considered statistically significant.

Moreover, we have divided all the authors' countries of origin into "high income", "middle income" and "low income" by considering the "World Bank list of economy" for the 2020-2021 years (22). Then, also thanks to the *chi square test*, we analyzed the differences existed between the gender of the first author with their countries' economies, to verify if the gender factor varies according to the more or less poor economy of a country or if there may be at the base some cultural trends that may favor the female gender over the male one or vice versa. Furthermore, the difference of the first author's gender with the economic status of the country of origin allows us to understand how much this condition can affect the quantity of scientific production.

Results

By entering the abovementioned search criteria in the WoS database, a total of 146 journals with impact factor were recorded. The range of impact factors goes from 3.783 in the International Journal of Nursing Studies (IJNS) to 0.101 in the Journal of Health Sciences. The first two journals with the highest impact factor value for the year 2019 and therefore included in our research are: the International Journal of Nursing Studies (IJNS) and the Nursing Outlook (NO) journal which had an impact factor value of 3.783 and 2.833, respectively.

From 1st January 2015 to 31st December 2019 a total of 1171 first authors were identified. Of these, 776 (66.27%) first authors belonged to the IJNS journal and 395 (33.73%) to the NO journal, respectively.

The elaboration of the data that follows allowed to answer the three research questions:

1. *Is there a statistically significant increase or decrease in the number of female researchers compared to men in nursing scientific publications in the last five year?*

Considering the gender difference between the names of the first authors reported in the journals considered (Table 1), it is evident that 982 (83.9%) scientific works report as first author the name of a female researcher, of which 633 (54.06%) in the IJNS and 349 (29.80%) in the NO journal; while the number of male researchers reported as first name is

143 (12.21%) in the IJNS and 46 (3.93%) in the NO journal. There is therefore a significant increase in the number of women as first authors compared to men for both journals ($p < 0.001$) and, if we consider the total number of citations according to gender, female sex is significantly more present in the scientific literature nursing compared to men ($p = 0.003$).

2. Is there a difference between the reference years considered in the study, or is the increase or decrease constant throughout the period?

Considering each journal for each year in the period between 2015 and 2019, the data reported further confirm what was said above in all the citations reported. In fact, for each year the number of citations as first author in scientific publications appears to be significantly increasing for female researchers compared to men ($p < 0.001$) (Table 2). It is also curious to note how in the period considered the year 2016 recorded a reduction in scientific production for both journals,

but in any case, the number of female citations is always higher than for men ($p < 0.001$).

3. Is there a gender difference in nursing scientific production associated with the economic level of the country of origin?

Considering the number of citations as first author in the selected journals and in the period considered (Table 3) there is a statistically significant differences ($p < 0.001$) in the number of female authors compared to men both in High Income countries and in the Middle Income countries ($p < 0.001$). On the other hand, the trend recorded for Low Income countries is different, where only 6 scientific works have been produced in a five-year period, in particular 3 works report as first author the name of a woman and 3 that of a man ($p = 1.000$).

It is interesting to read Table 4 which specifically reports the number of works by country of origin of

Table 1. Gender differences for the first author's name by considering the journal (n=1171)

Sex/journal	Total	Female	Male	p value
IJNS	n=776(66.27%)	n=633(54.06%)	n=143(12.21%)	$p < 0.001^{***}$
NO	n=395(33.73%)	n=349(29.80%)	n=46(3.93%)	$p < 0.001^{***}$
Total	n=1171(100%)	n=982(83.9%)	n=189(16.1%)	$p = 0.003^{**}$

*=p value<0.05; **=p value<0.01; ***=p value<0.001

Table 2. Gender differences for the first author's name (n=1171)

Sex/year	Female	Male	p value
2015	n=192 (16.39%)	n=197 (16.82%)	$p < 0.001^{***}$
2016	n=30 (2.56%)	n=45 (3.84%)	$p < 0.001^{***}$
2017	n=200 (17.08%)	n=36 (3.07%)	$p < 0.001^{***}$
2018	n=195 (16.65%)	n=47 (4.01%)	$p < 0.001^{***}$
2019	n=198 (16.80%)	n=31 (2.65%)	$p < 0.001^{***}$
Total	n=982 (83.9%)	n=189 (16.1%)	$p < 0.001^{***}$

*=p value<0.05; **=p value<0.01; ***=p value<0.001

Table 3. Gender differences for the first author's name by considering economies (n=1171)

Sex	Female (82.7%)	Male (17.3%)	p value
High Income	n=907 (77.45%)	n=171 (14.60%)	$p < 0.001^{***}$
Middle Income	n=72 (6.15%)	n=15 (1.28%)	$p < 0.001^{***}$
Low Income	n=3 (0.26%)	n=3 (0.26%)	$p = 1.000$
Total	n=982 (83.86%)	n=189 (16.14%)	$p < 0.001^{***}$

*=p value<0.05; **=p value<0.01; ***=p value<0.001

Table 4. Gender differences for the first author's name by considering the nationality (n=1171)

Nationality	Female first author	Male first author
Austria	n=1 (0.08%)	n=0 (0%)
Australia	n=85 (7.26%)	n=19 (1.62%)
Belgium	n=23 (1.96%)	n=6 (0.51%)
Brazil	n=3 (0.26%)	n=0 (0%)
Canada	n=44 (3.76%)	n=12 (1.02%)
China	n=66 (5.63%)	n=9(0.77%)
Cyprus	n=1(0.08%)	n=1(0.08%)
Croatia	n=1(0.08%)	n=0 (0%)
Denmark	n=13 (1.11%)	n=0 (0%)
Egypt	n=1(0.08%)	n=1(0.08%)
Philippine	n=0 (0%)	n=1 (0.08%)
Finland	n=15 (1.28%)	n=1 (0.08%)
France	n=9 (0.77%)	n=3 (0.26%)
Germany	n=11 (0.94%)	n=9 (0.77%)
Ghana	n=0 (0%)	n=1 (0.08%)
Japan	n=10 (0.85%)	n=1 (0.08%)
Jordan	n=2 (0.17%)	n=0 (0%)
Greece	n=1 (0.08%)	n=1 (0.08%)
India	n=1 (0.08%)	n=0 (0%)
Iran	n=2 (0.17%)	n=2 (0.17%)
Ireland	n=8 (0.68%)	n=1 (0.08%)
Island	n=2 (0.17%)	n=0 (0%)
Israel	n=3 (0.26%)	n=1 (0.08%)
Italy	n=4 (0.34%)	n=7 (0.60%)
Libyan	n=2 (0.17%)	n=0 (0%)
Malaysia	n=2 (0.17%)	n=0 (0%)
New Zealand	n=13 (1.11%)	n=4 (0.34%)
Nord Korea	n=0 (0%)	n=1 (0.08%)
Norway	n=11 (0.94%)	n=3 (0.26%)
Holland	n=53 (4.52%)	n=6 (0.51%)
Oman	n=1(0.08%)	n=0 (0%)
Pakistan	n=1 (0.08%)	n=0 (0%)
Portugal	n=3 (0.26%)	n=1 (0.08%)
Saudi	n=1 (0.08%)	n=1 (0.08%)
Singapore	n=12 (1.02%)	n=3 (0.26%)
Slovenia	n=0 (0%)	n=1 (0.08%)
Spain	n=20 (1.70%)	n=6 (0.51%)
South Africa	n=2 (0.17%)	n=1 (0.08%)
South Korea	n=19 (1.62%)	n=3 (0.26%)
Sweden	n=22 (1.88%)	n=3 (0.26%)
Switzerland	n=1 (0.08%)	n=1 (0.08%)
Taiwan	n=23 (1.96%)	n=2 (0.17%)
Turkey	n=5 (0.43%)	n=1 (0.08%)
United Kingdom	n=97 (8.28%)	n=26 (2.22%)
USA	n=385 (32.88%)	n=47 (4.01%)
Total	n=982 (83.9%)	n=189 (16.1%)

the first author in the five-year period considered, also divided according to the gender of the latter. It can be noted that the predominance of published scientific papers are by nurses from the USA; specifically 385 (32.88%) authors are female and 47 (4.01%) are male. Following are the authors from the UK with 97 (8.28%) citations of female authors and 26 (2.22%) males. Australia also reported a good number of nursing citations with 85 (7.26%) from female authors and 19 (1.62%) from males. China follows with 66 (5.63%) citations of female authors and 9 of males. Canada follows with 44 (3.76%) of female authors and 12 (1.02%) of male authors. The other countries follow with fewer citations. It can be noted that the most economically disadvantaged countries have a very small number of bibliographic citations in the five-year period considered.

Discussion

This study aimed to investigate, in light of the strong representation of women in the nursing profession around the world, the gender gap between the authors, from all over the world, of the two highest impacted factor of nursing journals in WoS database: the International Journal of Nursing Studies and the Nursing Outlook journals.

Our study, in the nursing field demonstrated an against trend in comparison to the STEMM disciplines (Sciences, Technology, Engineering, Mathematics, Medicine), since the female gender was most representative than the male gender into two important nursing journals in the academic literature.

In fact, in the five-year period considered 982 (83.9%) citations belong to female researchers while 189 (16.1%) citations belong to male researchers. If we consider each year of the five-year period, it can be seen that the predominance of female sex in international scientific production in the nursing field is considerably advantageous for females over males, recording a significant increase for each year considered ($p < 0.001$). Moreover, the number of female authors is almost constant over the entire time period considered for both journals. Therefore, female authors are more presented as the first authors than men, under lighting

an against trend to the STEMM disciplines (Sciences, Technology, Engineering, Mathematics, Medicine).

It is interesting to note that in the five-year period considered for both journals in 2016 there was a decrease in scientific publication overall. However, female authors were significantly more cited than male authors ($p < 0.001$). Moreover, our results show that the gender difference is also present considering the economic level of belonging of the first author. In fact, among the High income countries 907 (77.45%) authors are women and 171 (14.60%) are men. This trend is also confirmed among middle income countries, where 72 (6.15%) authors are women and 15 (1.28%) are men. While in low-income countries, apart from the small number of scientific publications recorded, the number of citations between men and women is equal in the five-year period considered ($p = 1.000$). From the data obtained, it can be seen how the economic development of a country influences the weight of its scientific production. Furthermore, it should be considered that among the Middle income countries China is also considered, which alone produced 75 (6.40%) scientific works out of the total recorded of 87 (7.43%). Therefore, it is to be considered how nursing scientific production is mostly held by high income countries and among the emerging reality of China. While the other realities show more attenuated levels of scientific production. It should also be remembered that the data discussed refer to the two most impacted general nursing journals.

At the same time, our results confirmed these data, as in the nursing literature women are more represented than man. This inverse trend of the gender gap in the nursing literature could be sought in history, as the figure of the nurse has always been seen as subordinate to that of the doctor, who was male (23). Hence a male chauvinist conception connected to the profession: nursing seen as a profession subordinated to the medical profession and carried out by nurses, women. To the feminist conception of nursing, then the figures of women of charity were added, enhancing the nursing figure and elevating it from a social class, but in any case, relegating it to the figure of a woman, as it is subordinate to that of the doctor's masculine (24,25).

Furthermore, if we consider only the Italian context, we note how only 13 Italian authors have pub-

lished in these prestigious journals. Interesting is the counter-trend of the gender gap in Italy compared to other countries. In fact, only 2 authors are women, while 11 are men. This aspect could be explained with the young “age” of the nursing research in Italy compared to the other “historical” countries such as the USA and the UK. In practice, nursing research in Italy has recently been introduced and progressed, therefore it has evolved in the meantime with the increase in male nurses. The latter have managed to enter the nursing profession also trying to get into the most prestigious positions, despite the fact that the nursing class still remains a purely female category.

Conclusion

In conclusion we have demonstrated that there is gender gap in authorships in nursing journals in favor to woman and our results are in accordance with the current (26-29).

This trend in nursing scientific production turns out to be in contrast with the other disciplines.

For example, a study published in November 2019 in *The Lancet Global Health* journal highlighted only one in three authors is a woman (30). “Gender differences in academic publishing are influenced by unfair systems that continue to disadvantage women and authors in the field of global health. Women are less likely to get funding” - this is how the researchers of the journal assumed in their research. Also, the same article is lapidary: “there is still a persistent gender gap in academic publishing. Only one in three authors who published in the journal from 2013 to 2018 are women”. Although the number of authors has grown substantially from the 1960s to the present day, and the raw number of publications is becoming more and more uniform in gender, men continue to dominate the positions of the first and last authors. The study authors performed an automated bibliometric analysis by extracting the full name, authors’ rank and country affiliation for the authors of the articles published in *The Lancet Global Health* (excluding corrections and editorials) since its launch, 1st June 2013, as of 1st December 2018. A total of 5878 authors were considered, including only 34.4% women. In general, the percent-

age of female single authors increased slightly each year, from 291 authors in 2013 (31.3% of the total) to 524 in 2018 (36.4% of the total).

However, women were underrepresented in both the first and last position of the author, with 288 first authors (37.5% of the total) and 228 last authors (29.7% of the total) of 768 authors respectively. Finally, among single author articles, less than 30% (73 out of 251) were written by a woman.

These data appear to be in countertrend with data obtained in the present study, since we have found a highly significant increase in the female component compared to the male component in nursing scientific production.

Additionally, the same work disaggregated data by considering by geographical location and showed greater disparities emerged, with the largest gender gap existing among those working in low-income countries, where only 160 out of 629 authors were women (25.4%). Among middle-income countries, the percentage of women rises slightly, passing to 547 women out of 1842 authors (29.7%); while in high-income countries women are 37.5% of the authors, 1438 out of 3833.

For this aspect our data are in agreement with this research since we recorded higher number of published scientific articles in authors belonged to High or Middle income countries. But in the nursing field, however, the number of female citations remains significantly higher than that of men.

Additionally, a study published in *Plos Biology* in 2018 (16) highlighted how the gender gap is particularly evident in areas such as surgery, information technology, and mathematics, going to examine a sample of 36 million authors, from more than 100 different countries, considering about 6000 periodicals that they mainly deal with STEMM disciplines (Sciences, Technology, Engineering, Mathematics, Medicine), in a span of 15 years. Among the areas in which women are most represented are nursing, midwifery and palliative care. The article also reveals how prestigious and well-known journals such as *Nature*, *The Lancet* and the *New England Journal of Medicine* present a low number of female prime authors. Furthermore, women are generally underrepresented both as last authors and as individual authors of a scientific publication.

The same study, from the point of view of the difference between the various nations, highlights how highly developed and high-income countries such as Japan, Germany and Switzerland present a very pronounced gender gap. The data are in accordance with ours in which female first authors are more represented than male author in the two most impacted journals in general nursing. Gender gap is also more pronounced in the High income countries, where publication rates are higher than middle and low-income countries.

So it seems that today the first nursing male authors are still at a disadvantage compared to the female sex. This data is confirmed by some studies present in the literature (24-26).

Certainly, a big limitation to our study is to have considered only two nursing journals and only the first name of each authorship. In the near future it may be interesting to consider a major number of nursing journals to follow the trend of this phenomenon and understand how this trend will continue, also understanding how the growth curve of the number of male authors in nursing literature will increase and if the female gender will preserve this against trend in the scientific world compared with other scientific disciplines. Also it could be interestingly to investigate different areas of nursing in order to understand if this against trend in gender trend is also present in all disciplines of nursing or among them there may be some differences.

Moreover, in the Italian context we saw a prevalence of male authorship that is in the against trend with the entire nursing context, so in future studies it may be interesting to understand how nursing authorship in the scientific literature will be distributed between gender especially with regard to academia and top positions in healthcare facilities. In this regard, it could be very interesting to understand how this gender difference develops in the most prestigious nursing offices to verify or not a countertrend compared to the rest of the world.

Conflict of interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article

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