The 'gender gap' in authorship in nursing literature

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LS conceived the study, undertook data collection and wrote first draft. JH undertook searches, AM completed statistical analysis; all authors contributed with final writing and editing

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Summary

Objectives Gender bias has been found in medical literature, with more men than women as first or senior authors of papers, despite about half of doctors being women. Nursing is about 90% female, so we aimed to determine if similar biases exist in nursing literature.

Design Taking the eight non-specialist nursing journals with the highest impact factors for that profession, we counted the numbers of men and women first authors over 30 years.

Setting We used nursing journals from around the world which attract the highest impact factors for nursing publication.

Participants Eight journals qualified for entry, three from the United Kingdom, four from the United States of America, and one from Australia.

Main outcome measures Using Chi-square and Fisher exact tests, we determined differences between the numbers of men and women across all the journals, between countries (USA, UK and Australia), changes over the 30 years, and changes within journals over time.

Results Despite the small proportion of men in the nursing workforce, up to 30% of first authors were men. UK journals were more likely to have male authors than USA journals, and this increased over time. USA journals had proportions of male first authors consistent with the male proportion of its nursing workforce.

Conclusions In the UK (though not in the USA) gender bias in nursing publishing exists, even though the nursing workforce is strongly feminized. This warrants further research, but is likely to be due to the same reasons for the gender gap in medical publishing; that is, female nurses take time out to have families, and social and family responsibilities prevent them taking opportunities for career progression, whereas men's careers often are not affected in such ways.

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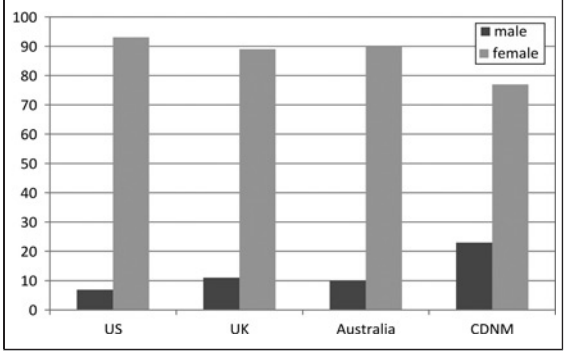
In 2006 a strong gender bias against women was identified in the USA by the lower proportion of women as first and senior authors of original research in the medical literature, although this proportion increased over the four decades of the study.[1] A subsequent study in the UK reported similar findings.[2] In both studies, a strong gender imbalance was found, despite the increasing proportion of women in leadership roles within medicine in these countries. In the North American study, which included the six top ranking medical journals over 35 years, the proportion of female first or senior authors increased from 5.9% to 29.3%, and from 3.7% to 19.3%, respectively. The UK study of six journals showed that over the same three decades, female authorship increased from 10.5% to 36.5% (first authors) and from 12.3% to 16.5% (senior authors). In both countries, women are still in a minority as authors of original research when compared with male colleagues. These findings are surprising given the proportion of women in medicine, with 50% of American and 60% of British medical students being female.[1] The two studies[1,2] suggested that opportunities for career progression in medicine favour men, and that women often put careers on hold to have families, or for other reasons. Consequently, women are less often first or senior authors than their male counterparts.

There are two studies of gender bias in North American journals which examined the gender of research subjects, but not authors.[3,4] In fact there is no literature of gender bias in the authorship of nursing research. In the USA in 2000, 6.9% of the nursing workforce was male,[5] while in the UK, 1997 figures show that 10% of the nursing workforce was male, and 11% by 2008.[6] In Australia, the proportion of men in the nursing workforce grew slightly, from 8% in 1995[7] to 10% in 2007.[8,9] While nursing is almost all female, there is some evidence[10–12] of a male predominance in senior positions, although actual recent worldwide figures are not available. In the absence of recent measurement to determine this 'well-known' fact, we reviewed the website of the Council of Deans of Nursing and Midwifery of Australia and New Zealand.[13] Of the 43 Council members, 10 (23%) were men, which is well above the 10%[8,9] proportion of men in the Australian nursing workforce

Figure 1
Percentage of male and female nurses, 2008–2009, by country[5–9] (including Council of Deans of Nursing and Midwifery of Australia & New Zealand, 2010[13])



(Figure 1). We hypothesized that the over-representation of men in senior positions in the nursing workforce would be reflected in a similar gender bias in authorship.

Previous studies of medical publishing[1,2] have investigated the proportion of women who publish in the male-dominated medical profession. However, nursing is strongly female-dominated, consequently we chose to examine the proportion of men who are first authors in the nursing literature, and changes over time as more men have taken up nursing as a profession. The aim of this study was to examine gender bias in the top eight generalist nursing journals (those which have the highest impact factors for the discipline, excluding journals for particular areas of specialty). In addition we investigated this gender bias between countries, between journals, over time, and with reference to trends in the nursing workforce.

Methods

Using the Web of Science, we identified the top 20 nursing journals by impact factor. Specialist journals were excluded, and eight generalist journals remained: three from the UK (*International Journal of Nursing Studies* [*IJNS*], *Journal of Advanced Nursing* [*JAN*] and *Journal of Clinical Nursing* [*JCN*]); four from the USA (*Nursing Research* [*NR*], *Research in Nursing and Health*

[*RINH*], *Nursing Science Quarterly* [*NSQ*] and *Advances in Nursing Science* [*ANS*]); and a single journal (*Nursing Inquiry* [*NI*]) from Australia. We examined the years 1980, 1990, 2000 and 2009. Table 1 lists the journals, their impact factors (as reported on 21 December 2009), country of origin and rank. Two journals, *JCN* and *NI*, were not published in 1980.

We considered the use of first or last author as the indicator, but because there is no consistent style relating to order of authorship in nursing publications, we decided to use the first author. Though this may not have always picked up the senior author, because of the inconsistency of this convention, we had to make a decision and so decided to use first author only. One investigator (LS) examined each paper in each issue of each journal and manually counted male and female first authors. If it was not possible to determine the person's gender, a Google or Bing search of Facebook, and/or baby names websites was used. If this failed, institution websites were examined for the person's name; sometimes the site included a photograph, or a description of the person's work in which personal pronouns were used that indicated the person's gender. If this was unsuccessful, the journal editors were approached. For many of the Asian names, an Asian person was contacted to see if she could tell us whether the name was that of a man or woman. In only two cases were we not able to determine the person's gender (and these occurred in early editions, where the papers included common surnames with only the initial given). We conferred over confusing names. We included editorials and commentaries as primary sources of work, but excluded letters, book reviews, and responses to commentaries.

Statistical analysis

Initially, we used percentages of male and female first authors of the total publications, for each year, for each journal, and then by country. A Chi-square test of independence[14] was used to compare the number of men who were first authors in the eight journals between individual journals across years, for within country comparisons and between country comparisons. The one Australian journal was not included in the between country analysis, as it had started later than the other journals, and its numbers were too small for meaningful analysis. For several journals, small numbers precluded the use of the chi-square test, and Fisher's exact test was used.[14] To test for the trend over time, we used Cochran–Armitage trend test. All analyses were undertaken using Stata version 11.0 (Stata Inc., Texas).

Results

Table 1 gives a description of the eight included and the average number of papers published in each issue of the years examined. Two journals did not exist in 1980; *JCN*, which began in 1992, and *NI*, which was first published in 1994. For each of these journals, those beginning years were included as 1990. Two British journals, *IJNS* and *JCN*, had male editors, and both only in the final year examined. All other journals had female editors. The number of issues per year ranged from one in 1994 for *NI*, to 24 in 2009 for *JCN*. The UK journals published more papers than the USA publications, with the lowest mean number of papers per issue in the American *ANS* – 7.5 in 2000 (*RINH* had four in 1980, but only two issues out of four were available for analysis), while the mean for *JAN* from the UK for 2000 was 29.6.

Table 2 compares male and female first authors by journal for the years 1980, 1990, 2000 and 2009 and shows that while publications by men ranged from 3–46%, there was an overall significant difference between publications by men and by women in only *JAN* ($P < 0.001$), as well as a trend over the years ($P < 0.001$). A trend for changes across the years was shown in *JCN* ($P < 0.001$) also, though there was no significant difference overall for this journal.

Overall, the number of papers by men in the UK totalled 455 out of 1760 (26%) while in the USA the number was 61 out of 770 (8%). Table 3 compares male and female authorship within countries (USA, UK, Australia) for the years 1980, 1990, 2000 and 2009. Within the UK journals (*JCN* did not start until 1992 so are included as 1990), there was a significant difference between male and female authors ($P < 0.001$). When only 1990, 2000, 2009 were examined (including *JCN*'s

Table 1
The journals over each individual year examined, number of editions per year, mean number of papers per issue, and gender of editors

Journal	*Years*	*Editor M/F*	*Issues (n)*	*Number of papers per issue (mean)*	*Total included papers*
International Journal of Nursing Studies	1980		4	7	14
	1990		4	8.5	30
	2000		6	9	53
	2009	M	12	15	183
Journal of Advanced Nursing	1980		6	9	54
	1990		12	16	192
	2000		12	29.6	356
	2009	F	12	21.25	255
Nursing Research	1980	F	6	15.7	76
	1990	F	6	13.7	80
	2000	F	6	8.3	50
	2009	F	6	9.5	57
Research in Nursing and Health	1980	F	3	4	12
	1990	F	6	9.2	51
	2000	F	6	9	54
	2009	F	6	10	60
Journal of Clinical Nursing	1992	F	6	13.8	64
	2000	F	6	16.2	99
	2009	M	12	18.2	422
Nursing Science Quarterly	1990	F	4	9.75	29
	2000	F	4	17.5	70
	2009	F	4	17.25	69
Nursing Inquiry	2000	F	4	8.5	34
	2009	F	4	9.75	40
Advances in Nursing Science	1980	F	4	8.75	35
	1990	F	5	7.8	37
	2000	F	4	7.5	36
	2009	F	4	10.25	41

1992 papers as 1990), the difference remained ($P < 0.001$), while trends for both brackets of years (1980–2009 and 1990–2009) also showed significant differences ($P < 0.001$). For the USA and Australian journals, no significant differences were found between the years for male and female first authors.

Table 4 shows that significant differences were found in the between country comparisons of the number of men publishing in the UK and USA journals (the Australian journal was not included because of its late beginning and small numbers). Examinations for (a) 1980, 1990, 2000 and 2009 and (b) for 1990, 2000 and 2009, and both analyses yielded significant differences ($P < 0.001$). The UK journals have significantly more male first authors than the American journals. The one Australian journal (*NI*) examined, showed 13 papers out of 82 (16%) had male first authors, however, because it was not established until 1994 only a small number of papers was reviewed. Furthermore, when the data were analysed across the three countries, the significant difference was retained ($P < 0.0001$). Over time, there was no significant change in any country in the number of male authors.

Discussion

This is the first study of gender bias in the female dominated nursing profession and shows that, in the USA, the proportion of males who are first authors is in line with the male population of the nursing workforce, whereas in the UK, the proportion of men who publish is disproportionately higher than the men whose careers are in nursing. This may signify a gender bias there. As with medicine, career progression for nurses, particularly those in academia, depends upon research publications and scholarly endeavour. The Research Assessment Exercise in the UK[15] and the Excellence in Research for Australia Initiative[16] quantify research activity. Impact factors of journals and citation reports of various kinds are becoming standardized across academic disciplines to assess an individual's research productivity. As found in feminist studies,[17] gender bias in authorship could affect research output and consequent career progression of women in professions.[18,19] We examined gender bias in nursing with its very low proportion of men.

Approximately 10% of the nursing workforce is male (USA 6.9%, UK 10–11%, Australia 8–10%[6–9]); however, it is well-known (though actual figures

Table 2
Comparison between male and female first authors, per journal, 1980, 1990, 2000, 2009

	1980			*1990*			*2000*			*2009*			*P*	
Journal	*TOT*	*M*	*F*	*TOT*	*M*	*F*	*TOT*	*M*	*F*	*TOT*	*M*	*F*	*P overall*	*P trend*
International Journal of Nursing Studies	28	10 (35.7)	18 (64.3)	34	9 (26.5)	25 (73.5)	53	14 (26.9)	38 (73.1)*	183	65 (35.5)	118 (64.5)*	NS	NS
Journal of Advanced Nursing	54	25 (46.3)	29 (53.7)	192	63 (32.8)	129 (61.2)	356	97 (27.2)	259 (72.8)	255	50 (19.6)	255 (80.4)	<0.001	<0.001
Journal of Clinical Nursing†				83	21 (25.3)	62 (74.7)	99	16 (16.2)	83 (83.8)	422	85 (20.1)	337 (79.9)	NS	<0.001
Nursing Research	76	9 (11.8)	67 (88.2)	80	5 (6.2)	75 (93.8)	50	3 (6)	47 (94)	57	3 (5.3)	54 (94.7)	NS	NS
Research in Nursing & Health	12	3 (25)	9 (75)	51	2 (3.9)	49 (96.1)	54	3 (5.6)	51 (94.4)	60	2 (3.3)	58 (96.7)	NS	NS
Nursing Science Quarterly				38	5 (12.8)	33 (87.2)	39	5 (14.3)	34 (85.7)	69	7 (10.1)	62 (89.9)	NS	NS
Advances in Nursing Science	35	2 (5.7)	33 (94.3)	39	3 (7.7)	36 (92.3)	30	2 (6.7)	28 (93.3)	42	2 (4.8)	40 (95.2)	NS	NS
Nursing Inquiry‡				8§	2 (25)	6 (75)	34	5 (14.7)	29 (85.3)	40	6 (15)	34 (85)	NS	NS

*Unable to determine gender for first author
†First published 1992
‡First published 1994
§Only two editions available for analysis
P value for overall association was estimated using Chi-square test. Fisher's exact test was used where cell frequencies were <5
P value for trend over time (TOT) was estimated using the Cochran-Armitage test

Table 3
Within countries comparison of male and female first authors, UK, USA, Australia, 1980, 1990, 2000, 2009

		Year						
Country	*1980*	*1990*	*2000*	*2009*	*P value for overall association*	*P value for trend*	*P value for 1990, 2000, 2009*	*P value for trend (1990, 2000, 2009)*
UK								
Male	35	93	127	200	<0.001	<0.001	<0.001	<0.001
Female	47	237	380	660				
USA								
Male	14	15	18	14	0.794	0.784	0.317	0.292
Female	109	194	186	214				
Australia								
Male		2	5	6			0.453	0.452
Female		6	29	34				

P value for overall association was estimated using Chi-square test. Fisher's exact test was used where cell frequencies were <5
P value for trend over time was estimated using the Cochran-Armitage test

are difficult to identify) that a large proportion of senior positions are held by men.[10–12] This observation is true for nursing both in academic and clinical practice. The percentage of male first authors in the USA is consistent with the percentage of males in the nursing workforce; however, in the UK, the percentage of men publishing in the top journals is over double the proportion of males in the nursing workforce. We also examined the gender of the editor to determine if this factor was influential; however, only two journals (*IJNS* and *JCN*) had male editors (in 2009 only), so this explanation is unlikely. We examined changes over time in relation to the arrival of the male editors in each of these journals, but there was no evidence that a change had occurred over the years examined.

Without some further in-depth exploration of gender bias in nursing journals and the culture of the nursing profession (and academic nursing in particular), it is difficult to know how to interpret our results. Our study identifies a clear gender bias in the UK, given the relatively large number of male first authors in the top journals; however, gender bias was not observed in the USA, despite a similar proportion of males in the nursing workforce. In the UK, the rise of men to the top nursing positions, disproportionate to the number of men in the nursing workforce, is parallel to the male dominance which is observed in the medical

Table 4
Between countries comparison of male first authors, UK, USA, 1980, 1990, 2000, 2009 (Australia not included because of small numbers)

		Year						
Country	*1980*	*1990*	*2000*	*2009*	*P value for overall association*	*P value for trend*	*P value for 1990, 2000, 2009*	*P value for trend (1990, 2000, 2009)*
UK	35	93	127	200	0.081	0.027	<0.001	<0.001
US	14	15	18	14				
Australia		2	5	6			0.6*	

*Fisher's exact test

profession and the gender bias in medical publishing.[1,2] Jagsi *et al.*[1] suggested that the gender bias in medical authorship (which disadvantaged women) was caused by the restricted number of women in positions to take on senior authorship. This is because of the well-described barriers to women's career progression caused by the constraints of traditional sex roles and sexism.[17,18] The argument about traditional sex roles of women also applies to nursing and may explain why a disproportionate number of men rise to the top of the academic ladder and consequently lead research groups and publish. However, this does not explain the lower proportion of men who publish in the American nursing journals.

It was beyond the scope of this study to examine the country of origin of the authors or cultural differences between countries which affect nursing that may have influenced the ability of authors to publish. We used first author only because, in nursing, convention often dictates that the lead investigator is listed first. Because we used the eight non-specialist nursing journals from the 20 nursing journals with the highest impact factors, we included only one journal from a country other than the UK and the USA (Australia), and thereby limited any ability to generalize these findings. While nurses publish in non-nursing journals, we have not examined these. We have no way of examining the numbers of male and female authors rejected in these journals, though that may provide extra insight. The journals studied may not be representative and comparison with those that are not top impact factor journals would be of interest, though it was not part of this study.

Another limitation of this study surrounds the assessment of female and male names, that is, the process used for determining the gender of the first author. While one person (LS) was mainly responsible for this, if any uncertainty arose after exhaustive efforts to determine a name's gender were not successful, a deal of consultation was undertaken with the other investigators, with editors of the journals who were asked to examine records, and with colleagues from the countries from which the names came. While we are confident we covered this effectively, it may be that we erred at times. However, we are certain that this occurrence was rare enough not to have skewed the results.

Conclusion

We have demonstrated that there is gender bias in authorship in nursing journals in the UK similar to that observed in medicine. The proportion of men publishing in the UK far outweighs the proportion of men in the nursing workforce. However, in the USA a similar proportion of men and women publish. While we included only first authors, it would require a more detailed study to tease out the status of each of these in the list of authors, and was beyond the scope of this study.

The gender bias we found is similar to that found in medical publishing, and possibly has the same origin – the inhibiting factors such as traditional sex roles that prevent women from taking leadership roles, in this case, doing the writing that leads to promotion in academia. Our study found this to be the case in the UK, but not in the USA. Such findings are strange in the heavily female dominated profession of nursing, and probably have their bases in the same culture and mores which see disproportionate (when compared with the number in the nursing workforce) numbers of men in senior nursing positions. Further research is needed to determine why there is such a difference between the USA and the UK, as are studies of nurses who publish in other countries, and in multidisciplinary journals. Perhaps in nursing, as in medicine, females do not suffer from as strong a desire to publish for career advancement as their male colleagues (a conclusion that may get us into hot water with feminist theorists, but we would welcome discussion on this issue). This leads us into a very fruitful field for further research.

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