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Do women publish fewer journal articles than men? Sex differences in publication productivity in the social sciences

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This paper examines whether women and men publish journal articles at a level comparable with their representation within the social sciences. The paper also explores sex differences in patterns of single authorship and co-authorship. To do so, demographic data of the UK social sciences is compared with a sample of UK-authored journal articles. The findings of the study show that, overall, female academics contribute to a lower proportion of journal articles than the proportion of academic staff that they constitute. However, within certain disciplines (social policy and psychology) women publish articles at a level comparable with the proportion of the discipline that they constitute. These findings, it is argued, can be helpfully understood as both cause and consequence of the gendered academy.

Keywords: gender; publication productivity; higher education; social science

Introduction

Publishing research is an integral part of academia. Within the United Kingdom, the processes that regulate research within universities serve to encourage and reward publication productivity (scholarly output). The productivity of individual scholars affects their academic status and success (Fox 2005; Knights and Richards 2003; Research Information Network and JISC 2009; Tien 2007; Ward 2001). Evidence from the material and life sciences suggests that publication productivity varies by sex (Fox 2005; Mauleon and Bordons 2006; Xie and Shauman 1998). Little is known, however, about the scholarly output of male and female social scientists. This article aims to fill this gap by examining sex differences in publication productivity across these disciplines. The article considers the implications of this analysis for understanding academia as a gendered institution. With UK universities currently preparing for a research regulation exercise, this discussion presents a

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timely analysis of publication productivity, women's position within the academy and the gendered nature of higher education. The next section examines the theoretical and empirical background to these debates. This is followed by the aims and methodology of the study. The findings of the empirical analysis are reported, and then the implications of these for the gendered academy are discussed.

Background

Women in the academy

Nearly 30 years ago, Dale Spender (1981) highlighted the invisibility of women in the academy. Spender argued that women were excluded from the formal production of knowledge. Since then, women have made significant progress in higher education, both as academic staff and students. Within UK universities, the proportion of female academic staff is rising and the number of female professors has reached record levels (Lipsett 2008). Women and feminists are populating a range of posts, providing spaces for more progressive practices across academia (David 2007).

And yet, despite this recent progress, there is continuing evidence that sex discrimination and inequality pervades the academy (Knights and Richards 2003; Wolf-Wendel 2003). Studies highlight that women have different experiences to men at every stage of the academic career, suffer discrimination and remain under-represented in certain parts of higher education (van Anders 2004; Bagihole 1993; Finch 2003; Glazer-Raymo 1999; Krefting 2003; Neugebauer 2006). Across academia, women report discrimination in the processes of selection and recruitment, research funding and pay (Bagihole 1993; Steinpreis, Anders, and Ritzke 1999; Wenneras and Wold 1997; Bornman, Mutz, and Daniel 2007; see also Marsh and Bornmann 2009; Ward 2001). Studies report that inequality in the academy also extends to research activity (original research that contributes to the development of knowledge), the publication process, and publication productivity (Aitchison 2001; Association of University Teachers 2004; Boschini and Sjogren 2007; Curtis 2004; Dickersin et al. 1998; Fisher et al. 1998; Knights and Richards 2003; Krefting 2003; McDowell and Smith 1992; McDowell, Singell, and Stater 2006; Smith 2008). It is this aspect of higher education that is examined in this article.

Sex and publication productivity

Publishing research is central to academia. Within the UK, quality assurance procedures and the distribution of funding are informed by the production of, and value attributed to, academic publications. Yet, there is growing evidence, primarily from the material and life sciences, of sex inequality within the publication and peer review processes (Wenneras and Wold 1997) and of women's lower level of publication productivity compared with men

(Fox 2005; Mauleon and Bordons 2006; Xie and Shauman 1998). Moreover, there is evidence that women's research activity is not sufficiently recognised by their universities. Women's involvement in The UK Research Assessment Exercise (RAE) is one such example. Within this process, universities select academics and their publications to be entered into the RAE. The quality of the research is then assessed by experts and research users in order to inform future decisions about funding. As a mode of accountability within higher education, the RAE has been subject to wide ranging criticism including, for example, reducing scholarship to an income-generating activity and increasing the hierarchy and differentiation between universities (Lucas 2006; Morley 2004). From a feminist perspective, there is concern that the RAE disadvantages women in a number of concrete ways (Harley 2003; Knights and Richards 2003; Smith 2008). Male academics, for example, were almost 40% more likely than their female colleagues to be entered into the RAE in 2008 (Association of University Teachers 2004; Corbyn 2009; Higher Education Funding Council for England 2009).

By examining sex differences in research and publication processes, this body of research usefully highlights sex inequalities within the academy. However, the value of examining differences between men and women is limited. Such approaches (labelled 'sex differences' approaches) have been criticised for overstating differences between men and women and failing to give adequate attention to variation within sex categories (Acker and Armenti 2004). Therefore, analysis of the academy has benefited from using 'gender' as an analytical tool. The concept of gender has enabled authors to recognise that the actions and experiences of woman/manhood in the academy are socially constructed, and so intertwined with other social identities such as sexuality, ethnicity and social class (Leathwood and Read 2009; Knights and Richards 2003; Ropers-Huilman 2003). This research has revealed that discourses of masculinity and femininity shape higher education, and so exposing the gendered nature of many academic processes including the construction of knowledge and disciplinary boundaries (Leathwood and Read 2009), quality assurance procedures (Smith 2008), conceptions of merit and achievement (Krefting 2003), management practices (Mavin and Bryans 2002) and research selectivity (Harley 2003).

Gender and publication productivity

When analysed through a gendered lens, women's lower level of publication productivity (compared with their male colleagues) can be understood as an artefact of the gendered nature of academia. The importance attributed to publication productivity within higher education, and mechanisms such as the RAE, have been criticised for preserving masculine practices within the academy (Harley 2003; Leathwood and Read 2009; Wenneras and Wold 1997). Feminists claim that 'knowledge', its definition, creation and dissemination,

has been constructed and framed in masculine terms (Knights and Richards 2003; Harley 2003). The academic reward system, based on research and publications, is therefore prejudiced towards the activities typically exhibited by men (Bagihole 1993). Masculine norms and practices privilege men's approach to research (in terms of content and method) and these create gender-specific definitions of scientific quality that penalise women (Benschop and Brouns 2003; Dunn and Waller 2000; Knights and Richards 2003; Mavin and Bryans 2002).

The existing literature also suggests that gendered roles within the university influence women and men's ability to publish research. Studies suggest that women adopt feminine roles that include higher teaching, administration and pastoral care loads than their male colleagues (Bagihole 1993; Higher Education Funding Council for England 2009; Knights and Richards 2003; Smith 2008). This means that less emphasis (and time) is allocated to research activities and publication productivity. Other factors that characterise women's position within the academy may also be detrimental to their research activity. Women are often working at lower professional ranks than their male counterparts, and specialise less. Publication productivity tends to increase with professional grade (Mauleon and Bordons 2006; Xie and Shauman 1998) and degree of specialisation (Leahey 2007).

Aside from the gendered nature of higher education, studies suggest that wider gender roles and family responsibilities interact with women's ability to write and publish research. There is divergent evidence about the impact of women's caring responsibilities on their work and scientific output (Ellemers et al. 2004). A lack of time and the difficulties associated with balancing home and work life are understood to have a negative impact on female academics (Acker and Armenti 2004; Probert 2005). Yet, evidence from the material and life sciences suggest that the relationship between gender, family characteristics and publication productivity are complex, with evidence that women with caring responsibilities are more productive than those without (Fox 2005). Recent research found that family responsibilities have an initial positive effect on productivity whilst an overall negative impact over time (Hunter and Leahey 2010).

These studies suggest that gender differences in publication productivity present an interesting angle through which to examine women's role within the academy and the gendered nature of such institutions. In the United Kingdom, a new quality assurance procedure has replaced the RAE. The Research Excellence Framework is due to be completed by 2014 and preparations are currently underway in UK universities. Therefore, it is a pertinent time to consider women and men's publication productivity in the social sciences. Whilst such analysis is taking place within the material and life sciences, only few studies have examined publication productivity in the social sciences, primarily in economics (Fish and Gibbons 1989; Maske, Durden, and Gaynor 2003; McDowell, Singell, and Stater 2006).

This article also examines sex differences in patterns of single authorship and co-authorship of journal articles. Single authorship is a common feature of humanities and social science research. Collaboration in research and co-authorship tends to result in considerably more publications than a single-author approach (Nederhof 2006; Stack 2002). Therefore, co-authorship can influence publication productivity. There is limited research that examines sex differences and patterns of multiple and single authorship of published articles. The evidence so far reports divergent findings. Some studies suggest that levels of co-authorship are similar for men and women (Maske, Durden, and Gaynor 2003; McDowell, Singell, and Stater 2006), whilst others suggest that women produce significantly more single-authored articles than men (Boschini and Sjogren 2007; McDowell and Smith 1992). When co-authorship does occur within the social sciences, authors tend to collaborate with academics of the same sex (McDowell and Smith 1992; Boschini and Sjogren 2007). Boschini and Sjogren (2007) found that as the proportion of female academics in economics increases, so too does women's propensity to co-author with other women. Men's propensity to write articles with women, however, does not. Male academics appear more likely to author articles with other men (Fisher et al. 1998).

Aims

This article examines women and men's publication productivity in the social sciences. It aims to consider whether women publish a lower proportion of journal articles than would be expected on the basis of their representation in the social sciences. In order to do so, the analysis addresses the following research questions:

1. Do women and men publish journal articles at levels comparable with their representation in the social sciences?
2. Are there sex differences in single authorship and co-authorship of social science journal articles?

Methods

An audit of social science journals was carried out to identify the number (and proportion) of journal articles written by men and women. These data were compared with the number (and proportion) of women and men working with academia.

This article focuses on sex differences in publication productivity because, as explored above, the level of women and men's research output is arguably influenced by wider gendered structures within the academy and society more widely (Harley 2003). Whilst sex differences in productivity are not inherently significant, they become meaningful when analysed through a gendered lens. Such analysis can recognise that men are also

implicated in the gendered nature of higher education and that male actors who do not aspire to the dominant masculine discourses of competition and success are likely to be disadvantaged. Moreover, this analysis can appreciate that particular women are better equipped than others (through their role in academia and beyond) to conform to such discourses. Analysis of women's experiences and positions in academy, in all their diversity, is therefore still important (Finch 2003; Acker and Armenti 2004).

Publication productivity is measured in terms of the number of journal articles published. Periodicals have been selected because they have been found to be the single most important publication medium for most disciplines in social science (Nederhof 2006). However, it is important to recognise that other mediums are used to disseminate social science research including chapters in edited volumes, policy reports and monographs. Evidence suggests that the use of these mediums varies across the social sciences (Nederhof 2006). With limited research about men and women's publication practices, little is known about sex differences in the use of journals or other publication mediums. In focusing on journal articles, this article therefore considers a single, albeit significant, aspect of publication productivity. This is intended to provide a starting point for exploring sex and publication practices across and within disciplines.

The findings reported here are based on comparing two sets of data: a random selection of social science articles authored by UK-based academics (published 2005); and demographic data of UK social science academics (2003/04). This time period was selected because it was in the middle of the RAE cycle. The details of the methods for sampling, data collection and analysis are reported below.

Random selection of social science articles authored by UK-based academics

A sample of 202 articles was selected from a large dataset of social science journals. The final sample included articles that were written by one or more UK-based scholars. As outlined in Figure 1, a number of steps were taken to select this sample. First, a list of social science journals was identified. This included 140 journals taken from across 16 different disciplines. These disciplines were based on the groupings of the Economic and Social Research Council (ESRC) in 2005 (the ESRC is the United Kingdom's leading agency for funding and training in social science). These groupings were constructed as part of the guidance notes for postgraduate studentships (for a full list of the 16 categories, see ESRC 2005, 5). Lists of journals under each of the 16 disciplines were identified using three different University of London library catalogues together with Internet resources (such as Social Science Information Gateway). The resulting sample included over 1000 social science periodicals. Whilst the ESRC categories excluded non-tradi-

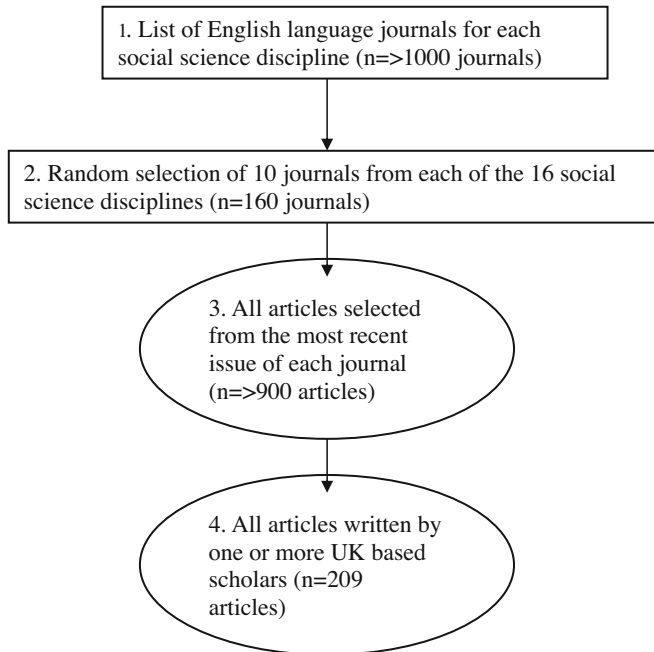


Figure 1. Identification of articles written by UK-based authors.

tional disciplines such as ‘gender studies’ or ‘women’s studies’, the use of the library catalogues meant that journals published within these fields were identified in the sample because they were also often housed under the main disciplinary categories. The journal *Gender, Work and Society*, for example, was included under the ‘management’ discipline. Second, 10 journals were randomly selected for each of the 16 disciplines to provide 160 periodicals. This dataset could include both refereed and non-refereed journals. By virtue of being catalogued in an academic library, it was likely that a high proportion of the journals were refereed. This information, however, was not collected about the journals. Third, for each of the 160 journals, the volume and issue published in summer 2005 was identified. All articles from this issue (excluding editorials, book reviews, letters, and news items) were selected. This provided over 900 published reports for the sampling frame. Fourth, all reports were checked to identify articles that were written by at least one author who was based in the United Kingdom. This was determined according to the authors’ affiliation (whether this was a UK-based university or research centre), which was commonly stated in the journal article. Where this information was not available in the article, Internet searches were conducted. This resulted in 209 journal articles.

Data were collected from the sample to identify the sex of every listed author for each journal article. This was challenging since the sex of the author was typically deduced from the first name, which was not always

listed on the article itself (see Mauleon and Bordons 2006). Therefore, notes or biographical details in the journal article were used to infer the sex, or Internet searches were conducted (see Dickersin et al. 1998). Based at UK universities, the majority of authors had a presence on the Internet, which included details of a full name or photograph. However, it was not possible to determine the sex of the authors of seven articles (3% of the total sample) and so these were not included in the analysis. This resulted in a total sample of 202 journal articles.

For each article, the number of authors was recorded and the proportion of female and male authors was calculated. An article written by three men and one woman, for example, translated into 75% male contributed and 25% female contributed. Where articles were authored by one sex (e.g. one woman), this was recorded as 100% female. This conversion was necessary to provide a common metric that would, firstly, capture the distribution of authorship across the sexes and, secondly, provide a suitable metric to compare with the proportion of women and men that made up the social sciences. The data from the 202 articles were collated and the percentage of male-authored and female-authored articles (including both single authored and co-authored articles) was calculated for the whole of the social sciences, and the composite disciplines.

Demographic data of UK social science academics (2003/04 academic year)

The ESRC demographic review of the UK social sciences (Mills et al. 2005) was used to provide data on the proportion of female and male scholars in the United Kingdom. This report provides data on the number of academic staff employed in the social sciences for the 2003/04 academic year. This source was selected because it provided the necessary data at a period of time that was broadly comparable with the random sample of articles (due to the expected time lag between submission and publication of articles, authors employed in 2003/04 were likely to have their research published in 2005 or after). The data included academic staff of different grades (ranging from researchers to lecturers) and on different employment contracts (permanent or fixed term). The demographic review provided data for the proportion of women and men in social science as a whole and within particular disciplines.

To address Research Question 1, the proportion of female authors found in the sample of articles was compared with the proportion of female academics in the United Kingdom as reported in the ESRC demographic review. This is similar to a cross-sectional design, comparing two sets of data at specific points in time. As such, this approach is useful for examining patterns of association (Bryman 2004) and so undertaking exploratory analysis and generating hypotheses for future research. Yet, analysis of publication productivity at a particular period means that it is not possible to measure change or trends over time.

Comparisons were made for the social sciences as a whole and for particular disciplines: political science, economics, social policy and psychology. These disciplines are pertinent for analysis as, traditionally, these are gendered subject areas. Political science and economics have represented particularly masculine areas of the social sciences (considered 'harder' components of the social sciences, and with high proportions of male academics and students). Social policy and psychology are traditionally feminine fields (considered 'softer' disciplines, and with high levels of women as scholars and students) (see Knights and Richards 2003). Whilst providing an in-depth analysis of particular disciplines, this approach does not interrogate inter/cross-disciplinary publishing (e.g. academics in social policy publishing in sociology journals). Comparisons were tested for statistical significance using a *Z* test. This test was chosen because it is appropriate for comparing a sample proportion to a population proportion (where the sample size is greater than 30), with a 5% level of significance (Diamond and Jefferies 2001).

To address Research Question 2, sex differences in the levels of single authorship and co-authorship were compared. The total sample of UK-authored articles was differentiated according to whether they were single authored or co-authored. Analysis of single-authored articles involved comparing the proportion of female and male articles with the sex composition of the social sciences as a whole and for individual disciplines. The co-authored articles were analysed to identify the proportions of single-sex and mixed-sex collaborations.

Findings

Do women and men publish journal articles at levels comparable with their representation in the social sciences?

Of the random sample of articles, 202 were written by UK-based authors with data available on the sex of the author. The 202 papers came from 72 different journals, both international and UK based, and covered the 16 disciplines of social science.

Analysed by the sex of the authors, the sample included 68% written by men (equivalent to 137 articles) and 32% (equivalent to 65 articles) written by women. Comparing these data with the proportion of men and women in the social sciences can help us to identify whether the proportion of female publications reflects their representation in the social sciences more generally. According to the ESRC demographic review, 60% of social scientists were men and 40% women. The proportion of female-authored articles in the sample is therefore lower than the proportion of women social scientists (at the 5% level of significance) (see Table 1).

The sample of social science journal articles was made up of 16 different disciplines. Four of these disciplines (political science, economics, psychology and social policy) were analysed individually.

Table 1. Proportion and number of articles written by women and men compared with the proportion of women and men in the social sciences.

	% articles (number)	% social scientists
Women	32 (65)	40
Men	68 (137)	60
Total	100 (202)	100

In the discipline of political science, a total of 29 articles from six different journals had UK-based authors. Ninety-two per cent of this sample was written by male authors and 8% by women. We would expect that male authors would write the majority of published articles in political science as data from the ESRC demographic review highlight that a high proportion (76%) of political scientists are men (see Table 2). However, the proportion of male-authored articles is much higher than we would anticipate and therefore the percentage of female-authored articles is much lower. Whilst women make up 24% of political scientists in the United Kingdom, they only contributed 8% of the articles sampled here. Therefore, the proportion of published articles is significantly lower (at 5% level of significance) than we would expect of the wider population of female political scientists.

In the sample of economics journals, only nine articles were written by UK-based authors. These articles came from four different journals. Sex differences in the authorship of the nine articles and the make-up of the discipline are outlined in Table 3. As a minority in the discipline, female economists would be expected to publish less than their male counterparts. The data here reveal that women wrote a lower proportion of the sample (13%) than we would expect from a population constituting 22% of UK economists. However, this finding is not statistically significant (at 5% level

Table 2. Proportion and number of articles written by women and men compared with the proportion of women and men in political science.

	% articles (number)	% political scientists
Women	8 (2.3)	24
Men	92 (26.7)	76
Total	100 (29)	100

Table 3. Proportion and number of articles written by women and men compared with the proportion of women and men in economics.

	% contributed articles (number)	% economists
Women	13 (1.2)	22
Men	87 (7.8)	78
Total	100 (9)	100

of significance). This means that there is not sufficient evidence to conclude that the proportion of articles published by women in economics is less than the proportion of female economists more widely.

Within psychology, 23 articles (taken from seven different journals) were written by UK-based authors. Forty-three per cent of these articles were written by women. The ESRC review reveals that women constitute a similar proportion of academics in the field (43%) (see Table 4.). This finding provides statistically significant evidence (at 5% level of significance) that the proportion of articles published by women in psychology is comparable with the proportion of female psychologists in the United Kingdom.

Of the sample of articles written by UK-based authors, 19 came from social policy journals. The level to which women contributed to the sample of articles is high. As Table 5. illustrates, the proportion of female contributed articles is 53%. Similar to the discipline of psychology, social policy has a high proportion of female academics (46%). These findings represent statistically significant evidence (at 5%) that the proportion of articles published by women in social policy is comparable with the proportion of female social policy academics in the United Kingdom. This is the case despite the finding that women wrote a higher proportion of the sampled articles than they constitute in the discipline of social policy.

In summary, analysis across the disciplines shows that women published fewer articles than their male colleagues in three out of the four disciplines. However, in two of the disciplines (psychology and social policy), the proportion of articles published by women was comparable with the level of female academics represented in these disciplines. In one discipline (political science), the proportion of female contributed articles was significantly lower than would be expected of the wider population of women in that discipline.

Table 4. Proportion and number of articles written by women and men compared with the proportion of women and men in psychology.

	% contributed articles (number)	% psychologists
Women	43 (10)	43
Men	57 (13)	57
Total	100 (23)	100

Table 5. Proportion and number of articles written by women and men compared with the proportion of women and men in social policy.

	% contributed articles (number)	% social policy academics
Women	53 (10)	46
Men	47 (9)	54
Total	100 (19)	100

Are there sex differences in single authorship and co-authorship of social science journal articles?

The majority of articles in the sample of 202 articles were written by single authors: 57% (115) were written by one author and 43% (87) were written by two or more authors. Within the sample of published articles, there were observable sex differences in patterns of single authorship and co-authorship.

Single authorship

There were 115 single-authored articles, with 77 (66%) written by men and 38 (33%) written by women (see Table 6). Compared with their representation in the social sciences more broadly, men wrote a higher than expected proportion of the single-authored articles: 60% of male social scientists wrote 66% of the single-authored articles.

It is only possible to report tentative findings from individual disciplines, due to the small sample of single-authored articles within each subject area. There were similar numbers of single-authored articles written by men and women in the disciplines of social policy (five articles by men, four articles by women) and psychology (four articles by men, five articles by women). In contrast, within the discipline of political science, men wrote the vast majority of single-authored articles (24 articles by men, two articles by women). In economics, there was only one single-authored article and this was written by a man.

Co-authorship

Of the 202 sampled articles, 87 (43%) were written by two or more authors. Co-authored articles included single-sex and mixed-sex collaborations. Single-sex collaboration was more common than mixed-sex collaboration: 58% (50) of the co-authored articles were written by single-sex teams compared with 42% (37) mixed-sex teams.

The 50 articles written by single-sex collaborations represented 25% of the total number of all articles sampled ($n=202$). The vast majority of articles written by single-sex collaborations were authored by men: 78% (39) of the articles authored by single-sex teams were co-written by male collaborations (see Table 7).

Of the whole sample (202), 18% (37) were written by mixed-sex teams. The composition of these teams by sex of author is illustrated in Table 8.

Table 6. Proportion and number of single-author articles written by women and men compared with the proportion of women and men in the social sciences.

	% single-author articles (number)	% social scientists
Women	33 (38)	40
Men	66 (77)	60
Total	100 (115)	100

The majority (62%) of mixed-sex collaborations included equal proportions of male and female writers. Very few (6%) of the collaborations included a team with more women than men. One-third (32%) of co-authored articles was written by teams with more men than women.

Discussion and conclusions

This article has examined sex differences in publication productivity in the social sciences. As there is limited quantitative analysis of women and men's scholarly output in the social sciences (for example, Maske, Durfen, and Gaynor 2003; McDowell, Singell, and Stater 2006), this study usefully fills a gap in our knowledge about sex and publication productivity. This article also analysed sex differences in single authorship and co-authorship of journal articles, making a contribution to a small but divergent body of literature (for example, Boschini and Sjogren 2007). Across the social sciences, women did not publish journal articles at a level comparable with their representation within academia. This means that women publish less than their male counterparts (and men publish comparatively more). This finding concurs with studies in the material and life sciences (Fox 2005; Mauleon and Bordons 2006; Xie and Shauman 1998).

By examining sex differences in publication productivity, this analysis begins to increase our understanding of men and women's publication practices in the social sciences. Yet, as mentioned above, it is only by interrogating these findings through a gendered lens that it becomes possible to understand the significance of such differences. The existing literature on gender and publication productivity helps us to reflect on some of the implications.

Table 7. The number and proportion of single-sex, co-authored articles written by women and men.

	% single-sex, co-authored articles (number)
Women	22 (11)
Men	78 (39)
Total	100 (50)

Table 8. Composition of the mixed-sex, co-authored articles.

Total number of mixed-sex co-authored articles	% of articles co-authored by an equal proportion of women and men (number)	% of articles co-authored by teams with more women than men (number)	% of articles co-authored by teams with more men than women (number)
37	62% (23)	6% (2)	32% (12)

The conclusion that, overall, women publish less than their male counterparts may be considered problematic in the context of a university system that attributes great value to publication productivity. This finding may be seen to provide further evidence of the masculine nature of the academy, which encompasses gendered constructions of 'knowledge' and scientific quality that disadvantage women and their research (for example, Knights and Richards 2003). Moreover, women's lower level of publication productivity may indicate that female academics adopt roles that are less orientated towards research than their male colleagues (for example, Bagihole 1993). Wider gendered roles in society may also play a part in academics' ability to publish research (for example, Ellemers et al. 2004). Alternatively, the finding that women publish less than men may signal that female academics are seeking new opportunities to undertake research and dissemination activities that challenge dominant discourses about publication. Rather than complying with existing demands to produce peer-reviewed publications in journals, women may be establishing new and different channels for disseminating their research (Leathwood and Read 2009). Further, the finding that women wrote a lower proportion of single-authored articles than men may be an indication that women are challenging the individual and competitive framing of research and publication, and favouring collaborative practices. Indeed, this article found that single-sex collaborations were the most common form of co-authored articles within the social sciences. Further research is needed to interrogate these suppositions. This could helpfully examine the publication practices of women and men, including the use of a range of mediums (e.g. policy reports, monographs, novel methods) and cross-disciplinary publication.

This article also examined sex differences within individual disciplines of the social sciences. This provides a further angle through which to consider the gendered nature of academia. In two of the four disciplines, analysis found that female academics published articles at a level comparable with their representation within those disciplines. This finding was reported for those disciplines that had similar proportions of male and female academics and are traditionally considered to be more feminine (social policy and psychology). The proportion of articles published by women was significantly lower than expected for the discipline of political science, traditionally deemed to be a masculine subject and with low levels of female academics. This finding suggests that there are discipline/departmental-specific factors that influence scholarly output. Possible explanations, and implications for the gendered academy, are considered below.

First, the publication of female-authored articles at levels comparable with women's representation in particular disciplines may suggest that masculine discourses within the university are suspended and/or liable to subversion (Leathwood and Read 2009). The disciplines of social policy and psychology may be more 'feminised' and provide a shelter from the masculine norms and practices that exist elsewhere. These fields of study may provide a space to

challenge 'traditional' constructions of knowledge and gender-specific definitions of scientific 'quality' (Benschop and Brouns 2003). Thus, women's research may be more widely accepted, valued and published. Second, the roles adopted by women and men in the disciplines of social policy and psychology may ensure that teaching and administration roles are more equally distributed across women and men. Third, the finding that publication productivity is more equal in disciplines with relatively high proportions of female academics (such as social policy and psychology) may mean that the number of women within a discipline may be important. A 'critical mass' of women may facilitate women's career progression, including their publication productivity (Beutel and Nelson 2006). Whilst there are valid concerns about the use of the theory of critical mass for understanding women's behaviour (see, for example, Childs and Krook 2006), it seems that women's presence can be a catalyst for higher female publication productivity. Critical mass theory is understood by many scholars as linking increased numbers of women with female coalitions. If this was the case, we might expect that there were a greater number of female co-authored articles within those disciplines with higher levels of women. Indicative findings from this research do suggest that more articles authored by all female teams were conducted in the disciplines of social policy (three articles) and psychology (two articles) compared with political science (zero articles) and economics (one article). The total number of all female-authored articles, however, was small ($n = 11$) and so further research would be required to examine this conjecture.

There may be alternative explanations for why women's publication productivity varies according to discipline. It is argued here that these findings, and the wider sex differences in publication productivity reported in this article, can be best understood as both cause and consequence of the gendered academy. Whilst further research is needed to better understand publication practices within the social sciences, these findings offer a new angle through which to reflect on the gendered academy, women's role in higher education and their contribution to the formal production and dissemination of knowledge.

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