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DOI:
10.1111/emre.12106

Document Version
Peer reviewed version

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Citation for published version (APA):
Barnes, S., Sang, K. J. C., & Baruch, Y. (2017). Homophily in Human Resource Management Publishing. *European Management Review*. Advance online publication. https://doi.org/10.1111/emre.12106

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Homophily in Human Resource Management Publishing

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This is an earlier version of the following paper:

Barnes, S., Sang, K., & Baruch, Y. (2016). Homophily in Human Resource Management Publishing, *European Management Review*, http://onlinelibrary.wiley.com/doi/10.1111/emre.12106/abstract

Homophily in Human Resource Management Publishing

Abstract:

Existing theory suggests that social networks form a major factor in individual and team performance, including in academic collaborative research. However, there is currently a lack of a theoretical framework to explain the social network related factors that influence publication processes and decisions. We address this gap by adopting a theory-building perspective, analyzing a large data set on the impact of social networks. Using a case of one leading journal (*Human Resource Management*), we collected data on 10 years of publication, exploring 327 papers, written by 667 authors, which represent 839 ties. Examining individual demographic and institutional characteristics, we developed and tested a set of hypotheses, providing a framework for shaping and guiding future academic research collaborations. Our findings suggest that as albeit the intention, diverse collaboration is still at a low level. This contribution adds to the literature on understanding the factors influencing the type of collaborations that lead to publications in leading journals.

Keywords: gender, ethnicity, social network analysis, HRM, co-authorship.

Introduction

There have been recent calls for academic theorising to move beyond Western paradigms, particularly as a response to the increase in research-active academics from non-Western universities (Singh and Meng, 2013). Indeed, concerns have been expressed over the influence country of origin has on the knowledge created through research (Usuneir, 2006), with recent calls for management research to move beyond the English language hegemony (Ozbilgin, 2014). Similarly, the role of gender in knowledge creation through social networks has often been neglected in the literature (Durbin, 2011; Benscop, 2009; Sozen, Varoglu, Yeloglu, and Basim, 2016). In light of this, in this paper we consider homophily in academic publishing, deemed to be the tangible outcomes of academic social networks which are dominated by White academics from elite Western Universities. Academic scholarship involves the creation and dissemination of knowledge. For management research, this knowledge must be both academically and practically relevant (Vicari, 2013). The main tool to evaluate the worthiness and contribution of new knowledge is its publication. Thus 'Publish or perish' is a basic truism in academia (Adler and Harzing, 2009; Baruch and Hall, 2004; Breschi et al., 2008; Bedeian, Taylor, and Miller, 2010) across different cultures (Braine, 2005; Leung, 2007) and disciplines (Adler and Harzing, 2009). A number of factors influence the prospect of publication, one of which is collaboration within a team of co-authors, where social networks play crucial role in bringing people together and enabling them to collaborate (Uzzi et al., 2007). Research collaboration that takes place within emerging networks have started to gain academic attention (Acedo, Barroso, Casanueva, and Galán, 2006). Such analyses proved useful in other academic fields (e.g. Racherla and Hu, 2010). Certain worries exist that academic publishing is largely controlled by Anglo-American corporate capital (Paasi, 2005) or the

divide between North America and the rest of the world (Baruch, 2001; Harzing and Metz, 2012).

To explore the publishing phenomenon this paper presents a case study of publishing patterns within a leading journal in management studies: Human Resource Management (HRM). HRM was selected due to its centrality and status as the top target journal within the specific field of HRM (and the only HRM journal on the prestigious Financial Times list). In order to examine the diversity (or lack of it) in publishing networks, a Social Network Analysis (SNA) was conducted on publications in HRM between 2000 and 2009. The paper begins by setting out the theoretical framework for the current study: homophily. This is then used, in conjunction with the extant literature on academic publishing, to develop specific hypotheses. We then describe in detail the method adopted to analyse the networks present in the journal, specifically, SNA. The findings of the analysis are presented, with implications for academic publishing and theorising considered.

Homophily and social networks

The processes by which workplace social networks remain homogeneous has received considerable academic attention. Social networks represent one of the structural barriers to women's full participation in academic life, as it "reproduces and constitutes power in action in everyday organizational life" (Benschop, 2009, pp. 222-223). Specifically, workplaces, including academia, perpetuate inequalities through the persistent dominance of white men. Homophily, whereby greater contact is seen between similar individuals, is argued to be a basic underlying principle of organisations (McPherson et al., 2001). This preference is in part due to uncertainty around working with unfamiliar individuals (Gilbert et al., 1999). The consequences of homophily has largely been studied in relation to gender (in)equalities in workplaces. For example homophily is seen to be key to gendered

networking practices including amongst others, mentoring, selection and promotions (Benschop and Brouns, 2003). Women report concerns that they are not welcome in men's networks and that they may have family commitments that make travel to develop and maintain networks difficult (Bird, 2011). Aspiring networking involves engaging with those in positions of power – doing so gets a person noticed and is beneficial for careers. This is seen as gender appropriate behaviour for men, but not for women (Benschop, 2009). The increasing use of online technologies may facilitate women's opportunities for networking and reduce their marginalisation from important social networks (Menzies and Newson, 2008). Homophily has also been successfully used to understand the persistence of racial inequalities in the workplace. Seebruck and Savage (2014) reveal that while homophily may not in itself advantage white employees, it does disadvantage ethnic minority employees. However, homophily may be advantageous for marginalised people when they enter social networks, including those from ethnic minority backgrounds (Mollica et al., 2003)

Homophily is relevant also in the context of networking. Formal and informal networks are essential to career progression within the creative industries (McLeod et al., 2009). Gibson and Klocker (2004) drew important parallels between academia and the creative industries, arguing that in both there are creative clusters which dominate the discourse within the sector. Specifically, these clusters are based within Western and Northern geographies. Within academia such clustering has been used to partially explain women's exclusion from social networks which are important to career progression (Kakabadse, Figueira, Nicolopoulou, Hong Yang, Kakabadse, and Özbilgin, 2015; Vasquez-Cupeiro and Elston, 2006). The determinants of academic career progression, such as the prestige of the university where an academic gained his or her PhD, are complex and inter-related. Publishing is necessary, not only for success in academia, but for professional survival (Frey, 2002). Academics who have access to the key networks within their discipline tend to

be more productive in terms of publications (Diamantopoulos, 1996). The following section considers the extant literature on academic publishing.

Gender and ethnicity in publishing

Women represent a small proportion of the editorial boards of management journals. Metz and Harzing (2009) found that most journal editorial boards have less than 20% female, while 40% have fewer than 10% (Kimery et al., 2004). Membership on the editorial boards of leading journals was a key predictor of publication in such journals (Valle and Schultz, 2011). There is possibly a reciprocal bi-directional relationship, because one criterion for appointment to the board may be early publication in the journal (yet other criteria like reviewing for the journal may instrumental too). Therefore, if women are not represented on the editorial boards they lack one of the key resources which can lead to publications. Thus, women are less likely to find a position in research-intensive institutions because these institutions tend to hire those publishing in top journals. Kimery et al. (2004) found very low representation of women in accounting journals, and call for similar work to check if the under-representation of women authors cuts across disciplines. Homophily would suggest that academics exhibit a preference for publishing with those who are 'like them', i.e. male academics will not only dominate the networks in academic publishing, but the will also be more likely to network with (and therefore publish with) male academics. Based on this discussion, we propose the following hypotheses:

H1a. Men exhibit homophily via their co-authorship.

H1b. The publication network is dominated by male authors.

Within career theory (Arthur et al., 1989), the need for career capital is critical for progress (Baruch and Hall, 2004; Inkson and Arthur, 2001). Publishing is essential for academic

success and promotion (Adler and Harzing, 2009). 'Knowing-whom' is indeed important and being part of a network is no less critical than other factors (Casciaro and Lobo, 2008) and collaboration in writing is involved with social interactions (Guarido Filho, Machado-da-Silva, and Rossoni, 2010). A range of characteristics have been examined, including ethnicity, gender and type of higher education institution. In all ethnicities men outnumbered women. Regarding the exclusion of ethnic minority professionals from social networks, we hypothesise:

H2a. Whites exhibit homophily via their co-authorship.

H2b. The publication network is dominated by those who are White.

Men are more likely to be found in research-intensive institutions (Beatty and Leigh, 2010). Within the Business discipline, men outnumber women in all ethnic groups, non-white women being particularly under-represented. The most research productive are Asian American men followed by White Men. Both work the longest weeks, but spent the least time on teaching. Full-time male faculty produce three papers for every one paper that a female full-time faculty member produces (Goulden, Mason, and Frasch, 2011). Such outcomes generate a tendency to repeat similar activity to replicate success, as can be anticipated in any eco-system, including academic eco-systems (Baruch, 2013). In terms of dominance, we hypothesise:

H3a. White men exhibit homophily via their co-authorship.

H3b. The publication network is dominated by white men

Western bias in academic publishing

The hegemony of academic publishing has been referred to as the 'Anglo-American Academic Empire' (Minca, 2000: 285). Minca further argues that this 'empire' controls the rules for academic debate, the primary route for which is journal publication. Even for those of Anglo-Saxon origin, there is a bias towards US hegemony. Certain worries exist that academic publishing is largely controlled by Anglo-American corporate capital (Paasi, 2005) or regarding the divide between North America and the rest of the world (Baruch, 2001; Harzing and Metz, 2012).

Editorial boards are largely based in the USA and Canada, although membership from Europe, Australia and New Zealand is increasing (Harzing and Metz, 2012). However, membership from non-Western countries, including those from Africa and South America, stands at approximately 1%. If Minca (2000) is correct that Western editors and reviewers are more sympathetic to submissions which adhere to Western paradigms, then it suggests consequences for the diversity of voices and perspectives which will be published. Canagarajah (1996) reinforces this concern: "because these mostly bilingual/bicultural scholars are influenced by the indigenous communicative conventions, their writing will display peculiarities that are usually treated by Western scholars as ample evidence of their discursive/academic incompetence" (p. 436). Analysing geographical location ensures that ethnicity can be examined distinctly from geographical location.

Englander and Lopez-Bonilla (2011) examined the responses of reviewers to journal submissions by non-native English speakers. They found that reviewers focussed on concerns with written English, with some not reviewing papers. Reviewers felt that the authors had not met the norms and standards of the academic discipline (science). This raises a concern that authors unfamiliar with academic conventions may be excluded from

the academic community. Indeed, a number of reviewers in the Englander and Lopez-Bonilla (2011) study suggested that the authors in the manuscripts analysed should develop links with native English speakers. Networking within the academic community can have a number of benefits, for example, assisting those from non-Western countries to adhere to the dominant paradigm within their discipline. Of course, this would not challenge the existing hegemony, rather it would reproduce it and perhaps further sideline differing perspectives. However, if non-Western or non-native English speakers are excluded from co-authoring teams, this may further contribute to the persistent domination of white and/or Western scholars. Further, using the lens of homophily, we suggest that academics from North-America are likely to exhibit a preference for networking with other North American academics. The following hypotheses are proposed:

H4a. Authors from North America exhibit homophily in their co-authorship.

H4b. The publication network is dominated by authors from universities from North America.

Social networks are essential to academic career development because they are closely tied to publication in high quality journals. Gibson and Klocker (2004) have argued that academics operate within particular 'scenes'. These 'scenes' validate what is considered academic knowledge, and facilitate knowledge production through publications, conferences, networks and friendships: "for northern hemisphere academics the lines of access to the more powerful, influential journals and publishers are shorter and much less difficult to negotiate than for geographers elsewhere" (Gibson and Klocker, 2004, p.426). Membership of professional bodies and attendance at academic conferences was a strong predictor of publication performance and therefore career progression for marketing

academics (Diamantopoulos, 1996). Women represented only 20% of the study sample, and were less prolific than their male counterparts.

H5a. Authors from Western universities exhibit homophily via their co-authorship.

H5b. The publication network is dominated by authors from universities in Western countries.

Publication and institutional status

The prestige of current academic institution seems to be a predictor of faculty research productivity (publications) (Long et al., 2009). Beattie and Goodacre (2004) in a study of British Accounting academics demonstrated that those in older institutions produced three times as many publications as those in new universities. One quarter of the publications were co-authored with academics from non-Accounting/Finance academics both from the UK and overseas. Therefore, we can see that collaborating beyond national and disciplinary boundaries is important for research publication. We thus hypothesised:

H6a. Authors from prestige universities exhibit homophily via their co-authorship.

H6b. The publication network is dominated by authors from prestige universities.

Through the examination of these hypotheses, we aim to undertake an inter-organizational analysis of the social networks within academia. The following section outlines the innovative method used, namely Social Network Analysis, a useful technique for exploring academic networks (Pilbeam and Denyer, 2009).

Methodology

As outlined earlier, business and management schools remain under-examined in the academic literature on gender and careers (Sang et al., 2013), while the make-up of such schools is broadly reflective of academia in general (Parsons and Priola, 2012). This paper takes publications to be a key output of social networks between academics. As such, we have focussed on publications in a leading general management journal, Human Resource Management. We take Human Resource Management as a case study due to its position as a leading journal in the area of management and the pre-eminent journal in the discipline of human resource management, including a place on the Financial Times list of the leading 40 business journals in 2009 (45 journals since 2011: see Financial Times, 2014). It currently holds a rank of 4* on the Association of Business Schools list of journals (Harvey, Kelly, Morris, and Rowlinson, 2010). The journal editorial board is comparatively diverse in terms of gender and geo-location, though mostly from Western countries, predominantly the United States. An examination of the editorial board in November 2011 showed a degree of diversity with a number of women in the editorial team (46/98 members; 46.9%), and some members with affiliations beyond North America (17/98 members; 17.3%). However, membership was largely limited to affiliations from Western countries (97/98 members; 99.0%) and the majority of the team are affiliated to institutions in the United States (79 persons; 80.6%). By focussing on one journal, we are able to analyse in detail the gendered publication patterns in this leading journal within a discipline, which reflects the average gender balance in higher education. The paper uses social network analysis – an approach successfully used in previous research to map research collaborations (Uzzi et al., 2007).

Data collection

The study focused on all papers published in Human Resource Management in the first decade of the 21st Century (2000 to 2009). Data collection consisted of three main phases: (1) capturing the basic bibliographical data and formatting it; (2) designing a database and importing the bibliographical data; and (3) entering additional author characteristics, and exporting the data for use in a social network analysis package. Note that our data set is not a 'sample' as is typical in survey-based research; rather, as is typical in social network analysis, we focus on *all* publication relationships with the ten-year period.

Capturing the publication data

Basic publication details about each of the papers were extracted from each volume and issue of the journal using the bibliographical software, Zotero. In total, there are 327 papers, 667 authors and 839 ties in the study period.

A relational database design was created which included additional fields and tables linking to a central table that contained core details and standard identity codes of authors for specific publications. Linking to this table were tables that contained further details of the specific publication (code, title, year and author counts), and author (code, surname, forename), among others, linked from the standard identity codes. Specific fields and tables were created in the database that related to the author characteristics that would be examined in the social network analysis, including institution (and thereby country and region), institutional prestige, gender and ethnicity.

Further data was entered directly into the Access database. The data was entered and checked by two researchers. Data on gender and ethnicity were collected by visiting the personal Web sites of specific individuals and by conducting additional searches based on

the author and publication details in Google. Data on ethnicity was captured via an extension of the IC (identity code) system used by the UK police in radio communications (Home Office Research and Statistics Directorate, 1997). This included the following ethnicities: Arab/North African; African, Caribbean or Black; Hispanic; Indian, Pakistani, Bangladeshi or Other (South) Asian; Chinese, Japanese, Korean or Other South-East Asian; White; Other Ethnic Group; Mixed or Multiple Ethnic Groups; or Unknown. In addition, data on the type of department that the author worked in and their last known institution (in addition to the publication institution) was also collected.

Data on Prestige were collected from two sources: via the Financial Times Global MBA research rankings and via the Academic Ranking of World Universities developed by Shanghai Jiao Tong University. The Financial Times prestige ratings were based on data from the nine years where a top-100 classification was used for the Global MBA (2002-2010). Given the lag between data collection and publication this was taken to approximately coincide with the data from 2001 to 2009. FT prestige was calculated by first calculating the average research rank in all years that a business school appears in the lists. Each institution's rank was then converted into a prestige score from 1 to 900 calculated as (101 – AR) x RY, where AR is the average ranking and RY is the number of years in which a rank appears. The top score was Harvard Business School, with a score of 898. The university prestige scores used the available ARWU data from 2003-2009. These were calculated in a similar way, but since some rankings are ranges for a number of universities (e.g. 451-500), these were first converted to the mid-point of the range (e.g. 475.5). Subsequently, average rankings were calculated for each year in which a university appears. Prestige scores were then calculated for each year based on the maximum (highest) ranking minus the university ranking. Scores for each year were then added to create an overall score. The highest score was Harvard University with 3190 (the maximum possible score).

Descriptive data on the authors is shown in Table 1. The sample is dominated by men (59.5%) and those with institutions mentioned in the publication in North America or Europe (72.4% and 15.7% respectively). The predominant ethnicity is White (73.3%), with a sizeable number of authors who are Chinese, Japanese, Korean or Other South-East Asian (9.7%). Almost half of authors were White men (45.9%) and four-fifths were academics (80.5%), most from business, management or marketing departments (65.5%).

The final data set was exported to Microsoft Excel, where it was formatted for use in the UCINet social network analysis package.

Insert Table 1 about Here

Data Analysis

The data was analyzed in UCINet 6 and graphically represented in the Netdraw 2 software package. The overall network had a density (the number of ties as a proportion of the maximum number of ties) of 2.0% and an average number of ties of 1.307. The main (largest) component of the network consisted of 84 authors, with a network density of 3.2% and an average of 2.667 ties. The next largest components had 17, 13, 10 and 10 actors. The network is undirected (co-authors each have a relationship with each other) but valued (according to the number of co-authored papers in the study period). Figure 1 provides a graphical depiction of the network of co-authorship with isolates (single-authors) and pendants (one co-author) removed for clarity.

Insert Figure 1 about Here

Social network metrics used in the study

A number of metrics and social network analytical techniques are employed in this study to test the hypotheses. These employ various calculations to determine the 'centrality', or importance within the network, of a particular node or set of nodes (please see the Appendix for an explanation).

The metrics range from the simple calculation of links with other authors (known as Freeman's (1979) degree centrality), and the number of authors reached in two or three links (i.e. two- or three-step reach), to more complex measures. For example, closeness centrality assesses the distance (or farness) from all other actors within the network (Sabidussi, 1966). Eigenvector centrality represents a recursive degree centrality metric, with co-author scores weighted and added according to how many links they have (Bonacich, 1972; 1987). Betweenness centrality values the extent to which other actors require an actor to reach others via the shortest path (Freeman, 1979). Flow betweenness extends this concept to valued networks (in this case valued ties relate to the number of co-authored papers) and to all paths between actors (not only the shortest). Thus, it values the level of flow in a network provided by an actor (Freeman et al., 1991). Finally, perhaps the most complex measure is structural holes (Burt, 1992). This measures the contribution of actors in providing non-redundant primary contacts, i.e. links to actors and clusters who would otherwise not be connected, rather than indirect connections and duplicate flows.

Analytical techniques used in the study

A number of techniques were used to test the hypotheses in the study. These included UCINet's join-count and relational contingency-table (RCT) analysis functions to test hypotheses about homophily (Hanneman & Riddle, 2005): if actors are similar in some way then they are more likely to connect together within that group than with other groups. The join-count function uses a binary network and a partition that classifies actors into two groups. Using the same logic as the Pearson χ^2 test of independence, the procedure blocks the data into four groups (group 1 to group 1, 1 to 2, 2 to 1, and 2 to 2) and calculates values based on the expectation of no association between an attribute, e.g. gender, and the likelihood of co-authorship. These expected frequencies are compared to the observed frequencies and the inferential significance is determined by calculating a large number of random networks with the same density and partitions to assess the likelihood that the results could be from a random trial where there is no association.

The RCT analysis function enables the inclusion of more groups to provide a better test. Frequencies of relational observations are cross-classified in an *n* rows by *n* columns contingency table, where *n* is the number of groups, e.g. regions of the world, and each cell records the number of incidences of co-authorships. Expected values are calculated in a similar way to the join-count procedure by calculating random trials for a network with similar characteristics. The significance of the differences in proportions is determined using Pearson's χ^2 statistic.

While the above procedures are useful for categorical attributes, different techniques are needed to examine the influence of continuous variables on autocorrelation behaviour, such as the clustering behaviour of authors from prestige universities. The two techniques used have their roots in geography: Moran's I Index (Moran, 1950) and Geary's C Index (Geary, 1954) (see Appendix). These measure the extent to which similarity between authors (in terms of prestige) is related to proximity, by comparing observations with the results of random trials. Notably, while

the Moran statistic compares pairs of relationships to the overall average, the Geary statistic is more focussed on local differences between pairs of authors.

This study also involved testing hypotheses at the node level. For example, does the fact that an author is a white male influence their position in the network, particularly in terms of centrality measures? In this case we use the simple two-sample node-level t-test available in the UCINet software package and outlined in Hanneman and Riddle (2005). Here the categorical variable is the independent variable and the centrality metric is the dependent variable. The test involves a large number of random trials (typically 10,000) to create the permutation-based sampling distribution of the difference between means. In the trials, the scores for the independent variable are randomly assigned to the categorical variable and the standard deviation of the distribution is used as the estimated standard error for the t-test.

Results

In this section, we detail the results of hypothesis testing using the analytical techniques and metrics discussed in the last section. Let us examine each of the hypotheses in turn, to investigate homophily amongst the authoring teams.

H1(a). Men exhibit homophily via their co-authorship.

We examine whether co-authorship patterns exhibit autocorrelation by gender using join-count analysis. The network demonstrated a noticeable autocorrelation amongst authors according to gender (Table 2). Interestingly, this autocorrelation was strongest among women, with an expected number of ties of 137, but 182 being observed, a difference of 45, which is significant at the 0.1% level. This was also prevalent for men, although to a lesser degree, with 328 actual ties, 31 more ties than expected (p=.047). Subsequently, the number

of co-authorships between men and women was 76 less than expected, with only 329 observed ties, a significant finding at $p<.001$. A further RCT analysis also confirmed significant autocorrelation by gender ($\chi^2=32.126$, $p<.001$). Thus, we find strong support for H1(a).

Insert Table 2 about Here

H1(b). The publication network is dominated by male authors.

A t-test on gender for various measures of centrality did not find that gender had a significant effect on degree centrality, eigenvector centrality, closeness centrality, reach centrality, two-step reach, three-step reach and structural holes. We did however find a significant effect of gender on Betweenness Centrality ($M_{female}=7.101$, $M_{male}=29.196$), with men having significantly higher values ($p=.012$), and on Flow Betweenness ($M_{female}=16.799$, $M_{male}=51.003$; $p=.021$), again with a significant dominant effect of men. To further examine this, we identified the top-10 authors in terms of centrality metrics and these are shown in Table 3. While four female authors appeared in the top-10 list for degree centrality and three for structural holes, none appeared for betweenness centrality or flow betweenness. This tends to suggest that men exhibited intermediary or gatekeeper-like characteristics within the network, such that connection activity tended to flow through men more than through women. Thus, overall, we find only partial support for H1(b).

Insert Table 3 about Here

H2(a). White authors exhibit homophily via their co-authorship.

An RCT analysis was conducted to determine if there was autocorrelation via ethnicity (see Table 4). The result showed a strong autocorrelation (χ^2=371.236, p<.001). This is noticeable for the largest ethnic groups of White (521 ties, 451 expected) and Chinese, Japanese, Korean or Other South-East Asian (41 ties, 8 expected). Other ethnic groups are relatively small (21 actors or less), but those who are Hispanic, Indian, Pakistani, Bangladeshi or Other (South) Asian, and African, Caribbean or Black also demonstrate observed/expected ratios in excess of one. Thus, we find strong support for H2(a).

Insert Table 4 about Here

H2(b). The publication network is dominated by those who are White.

To examine H2(a), we recoded the data into those who were White (73.3% of nodes) and all Others. Based on this data we conducted t-tests to assess whether White nodes were dominant in the network via the centrality measures. Table 5 shows the results. As we can see, for all but two measures, closeness centrality and eigenvector centrality, Whites have significantly higher scores, with five measures being significant at the 1 percent level or higher. Overall, there is support for H2(b).

Insert Table 5 about Here

H3(a). White men exhibit homophily via their co-authorship.

The data also showed an autocorrelation amongst the co-authorship behaviour of white men (see Table 6). The expected number of ties amongst white men is 176, whilst the actual number is 236, a difference of 60 ties. This result is significant at $p<.001$. Similarly, the relationships between white men and the 'other' group was significantly less than predicted at $p<.001$. Subsequently, the number of co-authorships between white men and non-white men was 94 less than expected, with only 323 observed ties, a significant finding at $p<.001$. Overall, there is strong support for H3(a).

Insert Table 6 about Here

H3(b). The publication network is dominated by white men.

The data were dichotomized into White Men and Others to determine the position of white men in the network. White men consisted of 45.9% of the nodes in the network. We were interested in applying a variety of measures to determine the degree of centrality of white men within the network. In particular, we used a t-test to examine whether white men had a more central role in the network. The results are shown in Table 7. For four of the eight measures, betweenness centrality ($p=.001$), two-step reach ($p=.013$), three-step reach

(p=.010) and flow betweenness (p=.001), white men were clearly, and significantly, dominant. However, this was not the case for the other measures: degree centrality (p=.155), closeness centrality (p=.687), eigenvector centrality (p=.919) and structural holes (p=.075). One of the most powerful effects is demonstrated in Figure 2, which shows the main component of the network with white men shown in blue and nodes sized for betweenness centrality. Thus, we find partial support for H3(b).

Insert Table 7 and Figure 2 about Here

H4(a). Authors from North America exhibit homophily via their co-authorship.

A relational contingency table analysis was conducted to determine if there was autocorrelation via region of the author. The expectation is that there would be an autocorrelation due to geographical proximity and the related collaborative benefits (see Table 8). The result showed an extremely strong autocorrelation (χ^2=1392.938, p<.001). This is noticeable for all regions where there is sufficient data, including North America (553 ties, 440 expected), Europe (77 ties, 21 expected), Asia (33 ties, 4 expected) and Australasia (32 ties, 2 expected). There is some evidence of collaboration (e.g. between Europe and the Middle East and Australasia and the Middle East), but the number of ties is small. Overall we find strong support for H4(a).

Insert Table 8 about Here

H4(b). The publication network is dominated by universities from North America.

To examine this hypothesis we dichotomized the data into nodes from North America and nodes from elsewhere. A variety of measures of centrality were examined via a t-test for the nodes in the network. Seven of the measures are unsupportive of the hypothesis. Only Eigenvector Centrality supports the hypothesis ($M_{North\ America}$=-0.003, M_{Other}=-0.010; p=.021), and this is based on data in which only nine nodes have measures that are not zero. Thus, we do not find convincing support for H4(b).

H5(a). Authors from Western universities exhibit homophily via their co-authorship.

The data also showed an autocorrelation amongst the co-authorship behaviour of Western authors (see Table 9). The expected number of ties amongst Western authors is 721, whilst the actual number is 753, a difference of 33 ties. This result is significant at p=.006. Similarly, the relationships between Western authors and non-Western authors was less than half that expected, with only 50 observed ties, a significant finding at p<.001. This reinforces the dominance of Western authors in the network due to clustering behaviour. Overall, there is strong support for H5(a).

Insert Table 9 about Here

H5(b). The publication network is dominated by authors from universities in Western countries.

As a development of H4(b), we further dichotomized the data into nodes from Western (North America, Europe and Australasia) and non-Western-Authors. Again, centrality was examined via a t-test for the nodes in these groups. Only two measures are supportive: betweenness centrality ($M_{Western}$ = 21.858, $M_{Non\text{-}Western}$ = 0.000; p=.001) and structural holes ($M_{Western}$ = 1.345, $M_{Non\text{-}Western}$ = 1.031; p=.002). These measures are indicative of authors that hold important roles as gatekeepers and as a source of direct ties. The results for structural holes in the main component is illustrated in Figure 3, in which red nodes indicate Western authors. Thus, we find only partial support for H5(b).

Insert Figure 3 about Here

H6(a). Authors from prestige universities exhibit homophily via their co-authorship.

We examined this hypothesis using the Moran and Geary Indices and the Prestige and FT Prestige variables. These tested the notion that publication patterns between nodes were determined by the prestige of the publication partner. Turning firstly to prestige based on the ARWU data, we find a significant pattern of co-authorship based on prestige. The Geary statistic is 0.746 (standard error=0.044; note that a Geary statistic of 1.0 represents perfect independence), which is highly significant (p<.001). Similarly, the Moran statistic of 0.405 (where -0.002 indicates perfect independence; standard error=0.036) is also highly significant (p<.001). However, when testing the relationship using the FT prestige data we find that the Moran statistic of 0.262 (standard error=0.034) is highly significant (p<.001),

but that the Geary statistic of 0.954 (standard error=0.084) is not (p=.286). This latter finding may be due to the "local" nature of the Geary statistic compared to the "global" nature of the Moran metric, as well as the smaller number of valued institutions in the FT prestige data. It is worth noting that for the ARWU rankings, one of the six ranking criteria are publications in Science and Nature. Due to the topic matter of these publications, they are unlikely to influence indirectly our results. For the FT rankings, one of the 21 criteria used relates to papers published in FT-list journals, one of which is the HRM journal. However, since this is such a small component and our study compares specific journal publication data with aggregate prestige data on whole institutions, we think that the tautological effects will be negligible. Overall, there appears to be strong support for H6(a) using the broader prestige measure but only partial support using the narrower measure.

H6(b). The publication network is dominated by prestige universities.

In order to assess whether the prestige of the author's institution influenced their role within the network, we ran simple linear regression in UCINet between the ARWU and FT Prestige measures and seven centrality metrics. The correlation and significance of each of these is shown in Tables 10 and 11. The results show a strong relationship between prestige and centrality for both measures of prestige and for all but the eigenvector centrality metric, which, as mentioned above, is only non-zero for nine nodes. Thus, we find support for H6(b).

Insert Tables 10 & 11 about Here

Discussion and conclusions

The data presented here shows that homophily is evident in authoring teams of a leading HRM journal. This is particularly problematic given the increase in non-Western academics and calls for Western theoretical paradigms to be fundamentally revisited (Singh and Meng, 2013; Usuneir, 2006). If such social networks are maintained, Singh and Meng's call may be difficult to enact, particularly with calls to increase the relevance of management research (Vicari, 2013) beyond the English language hegemony (Ozbilgin, 2014). We must ask ourselves to what extent is the knowledge produced in journals universal, and to what extent is it culturally bound in Western paradigms.

Via homophily, the data presented here shows that the networks within HRM are dominated by those who publish with academics who are (at least biographically) like them. The networks identified using SNA demonstrate that white men tend to publish with other white men. Similarly, women and persons with the same ethnical background also tend to publish together. While the data presented here does not allow an analysis of the dynamics of the networks that have resulted in successful publication in this leading journal, they do enable us to identify that white men are publishing with white men. If homophily of the dominant group within academia (white men) persists then there are implications for the progression of those who are not based in leading Western universities, those who are not white and those who are not male. As such, the composition of coauthoring teams has implications for the exclusion of marginalized academics, and subsequent career opportunities and barriers

(Baruch and Vardi, 2016). Basically, our results suggest that diversity is hard to achieve in terms of co-authorship, under such circumstances and habitudes.

While the empirical work here points to patterns of homophily in academic publishing, there are limitations to the work. Frey (2002) points out that little is known about the behaviour of referees. Further work would benefit from understanding how referees and editors make their decisions. It would also be useful to know which papers are more likely to be accepted and which are rejected (i.e. to know the demographics of the authors). Such an analysis would help to us to understand whether academics from underrepresented groups need to be encouraged to submit to the journal.

We have focussed on one tangible output of networks within academia – publications. While SNA has enabled a robust and detailed analysis of the key actors in these networks, it does not allow for an analysis of how these networks are formed or their dynamics. It is not possible to determine why these groups of academics are choosing to publish together. Future research would benefit from adopting a qualitative approach, which allows for the dynamics of these working relationships to be examined. This may include interviewing key actors in the network to understand who they work with and why. The data presented here does now allow for an analysis of possible confounding variables such as tenure or 'ability'. However, data from other academic disciplines suggests that seniority does not result in greater research output in leading journals (Mishra and Smith, 2012). Future work must consider how academics form, maintain and reproduce these important networks. Doing so will allow for a greater understanding of how key actors in networks select network members and how this influences diversity within the field. Such approaches would benefit from a qualitative approach, for example, interviewing key people in the networks to understand how they themselves entered the field and how they select coauthors. A

qualitative approach would also allow for an understanding how the ordering of authors is determined, including the selection of the corresponding author. The data is also limited to one 10-year period of publication and it would be interesting to focus on a longer period of several decades to see if the pattern of publishing authors has become more diverse over time. The prestige measures also have limitations, as noted in the results section. Furthermore, the data is limited to one journal, albeit a leading journal in the field. However, the data presented here is supported by that in other social science fields, which points to similar patterns.

It is important to note that women and ethnic minority academics are under-represented within academia more generally. It is therefore perhaps not surprising that the networks within male dominated disciplines such as business studies exhibit networks that are dominated by white men. Data from broader social science suggests that academic women's publishing does not reflect their representation within the academy (Bird, 2011). The current study does not allow for an analysis of why this is, although there is a suggestion that it reflects gendered working patterns within the academy (HEFCE, 2009). As Durbin (2011) has argued, homophily in social networks and the subsequent exclusion of women may result from the gendered division of labour, which supports men's opportunities to engage in informal networking activities.

It is recommended that a number of actions should be undertaken to rectify the aforementioned situation. One key element in enacting change is leadership and support within academic institutions – universities, journals and academic associations. Workshops for improving academic writing skills and clearly explaining the advantages of co-authorship can contribute towards generating new networks that will be more diverse. Thought leaders in publishing can also offer further support for inclusion activities. Other

options are available for under-represented groups to increase involvement and avoid marginalisation, including ensuring that those within these groups volunteer and nominate colleagues for boards and other scholarly activities.

This paper has provided new insight into a prevalent phenomenon in academia using a large, unique and difficult to obtain data set. An analysis of the publishing patterns within a leading management journal revealed significant clusters of authors. In particular, HRM networks are dominated by white men, by Western authors, and by scholars from prestigious institutions, which may have implications for the global claims of international journals.

REFERENCES

Acedo, F. J., Barroso, C., Casanueva, C., and Galán, J.L. 2006. 'Co-authorship in management and organizational studies: An empirical and network analysis', *Journal of Management Studies*, 43: 957-83.

Adler, N. J. and Harzing, A. 2009. 'When knowledge wins: Transcending the sense and nonsense of academic rankings.' *Academy of Management Learning & Education*, 8: 72-95

Arthur, M.B., Hall, D.T., and Lawrence, B.S. 1989. *Handbook of career theory.* Cambridge: Cambridge University Press.

Baruch, Y. 2001. 'Global or North American top management journals.' *Journal of Cross-cultural Management*, 1: 109-126.

Baruch, Y. 2013. 'Careers in Academe: The Academic Labour Market as an Eco-System.' *Career Development International*, 18(2): 196-210.

Baruch, Y. and Hall D.T. 2004. 'The academic career: A model for future careers in other sectors?' *Journal of Vocational Behavior*, 64: 241-262.

Baruch, Y. and Vardi, Y. 2016. 'A fresh look at the dark side of contemporary careers: Toward a realistic discourse.' *British Journal of Management,* 27: 355-372.

Beattie, V., and Goodacre, A. 2004. Publishing patterns within the UK accounting and finance academic community. *The British Accounting Review,* 36: 7-44.

Beatty, J. E., and Leigh, J. S. 2010. 'Taking stock of management education: A comparison of three management education journals.' *Journal of Management Education*, 34(3): 367-392.

Bedeian, A.G., Taylor, S.G. and Miller, A.N. 2010. 'Management science on the credibility bubble: Cardinal sins and various misdemeanors', *Academy of Management Learning & Education,* 9: 715-725.

Benschop, Y., and Brouns, M. 2003. 'Crumbling ivory towers: academic organizing and its gender effects.' *Gender, Work & Organization*, 10(2): 194-212.

Benschop, Y. 2009. 'The micro-politics of gender in networking.' *Gender, Work and Organization.* 16(2): 217-237.

Bird, S. R. 2011. 'Unsettling Universities' Incongruous, Gendered Bureaucratic Structures: A Case-study Approach.' *Gender, Work & Organization*, 18: 202-230.

Broadbridge, A. and Hearn, J. 2008. 'Gender and Management: New Direction in Research and Continuing Patterns in Practice'. *British Journal of Management*, 19: 38-49

Bonacich, P. 1972. 'Factoring and weighting approaches to clique identification.' *Journal of Mathematical Sociology*, 2: 113-120.

Bonacich, P. 1987. 'Power and centrality: a family of measures.' *American Journal of Sociology* 92: 1170-1182.

Braine, G. 2005. 'The challenge of academic publishing: a Hong Kong perspective.' *TESOL Quarterly*, 39: 707-716.

Breschi, S., Lissoni, F., & Montobbio, F. (2008). University patenting and scientific productivity: a quantitative study of Italian academic inventors. *European Management Review*, *5*(2), 91-109.

Burt, R.S. 1992. *Structural Holes: The Structure of Competition*. Cambridge, MA: Harvard University Press.

Canagarajah, A.S. 1996. 'Nondiscursive' Requirements in Academic Publishing, Material Resources of Periphery Scholars, and the Politics of Knowledge Production.' *Written Communication*, 13: 435-472.

Casciaro, T., and Lobo, M.S. 2008. 'When competence is irrelevant: The role of interpersonal affect in task-related ties.' *Administrative Science Quarterly*, 53: 655-684.

Diamantopolous, A. 1996. 'A model of the publication performance of marketing academics.' *International Journal of Research in Marketing*. 13: 163-180.

Dressel, P., Hartfield, B. W., and Gooley, R. L. 1994. 'Dynamics of Homosocial Reproduction in Academic Institutions.' *The American Journal of Gender and the Law*, 2: 37-62.

Durbin, S. 2011. Creating knowledge through networks: a gender perspective. *Gender, Work & Organization*, 18(1): 90-112.

Englander, K and Lopez-Bonilla, G., 2011. Acknowledging or denying membership: Reviewers' responses to non-anglophone scientists manuscripts. *Discourse Studies*, 13: 395-416.

Financial Times 2014. Business education: About the FT Business School Rankings, http://rankings.ft.com/businessschoolrankings/, Accessed: April 15: 2014.

Freeman, L.C. 1979. Centrality in social networks: Conceptual clarification. *Social Networks*, 1: 215-239.

Freeman, L.C., Borgatti, S.P., and White, D.R. 1991. 'Centrality in valued graphs: A measure of betweenness based on network flow.' *Social Networks*, 13: 141–154.

Frey, B.S. 2002. Publishing as Prostitution? Choosing Between One's Own Ideas and Academic Failure, *IEW - Working Papers iewwp117*, Institute for Empirical Research in Economics - University of Zurich.
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=316699

Geary, R.C. 1954. 'The continguity ratio and statistical mapping.' *The Incorporated Statistician*, 5(3): 115–145.

Gibson, C. and Klocker, N. 2004. Academic publishing as 'creative' industry, and recent discourses of 'creative economies': some critical reflections. *Area* 4: 423-434.

Gilbert, J.A., Stead, B.A. and Ivancevich, J.M. 1999. 'Diversity management: a new organizational paradigm.' *Journal of Business Ethics*, 21: 61-76.

Goulden, M., Mason, M. A., and Frasch, K. (2011). Keeping women in the science pipeline. *The ANNALS of the American Academy of Political and Social Science*, *638*(1), 141-162.

Guarido Filho, E. R., Machado-da-Silva, C. L., and Rossoni, L. 2010. 'The social and intellectual dimensions in the construction of scientific knowledge: the institutional theory in organization studies in Brazil.' *BAR-Brazilian Administration Review*, 7: 136-154.

Hakim, C. 2000. *Work-Lifestyle Choices in the 21st Century: Preference Theory* Oxford: OUP.

Hanneman, R. A., and Riddle, M. 2005. *Introduction to Social Network Methods.* Riverside, CA: University of California Riverside.

Harvey, C. Kelly, A. Morris, H., and Rowlinson, M. 2010. *Academic Journal Quality Guid, Version 4*. The Association of Business Schools, London.

Harzing, A-W., and Metz, I., 2012. 'Practicing what we preach: the geographic diversity of editorial boards.' *Management International Review* (DOI 10.1007/s11575-011-0124-x)

HEFCE 2009. Selection of staff for inclusion in RAE2008
http://www.hefce.ac.uk/data/year/2009/selectionofstaffforinclusioninrae2008/ Accessed 14th April, 2014.

Home Office Research and Statistics Directorate 1997. *Ethnic Monitoring in Police Forces: A Beginning*. London: Home Office.

Huff Sigismund, A. 2009. *Designing Research for Publication,* London: SAGE.

Inkson, K., and Arthur, M. B. 2001. 'How to be a successful career capitalist.' *Organizational Dynamics*. 30(1): 48-61.

Kakabadse, N. K., Figueira, C., Nicolopoulou, K., Hong Yang, J., Kakabadse, A. P., & Özbilgin, M. F. 2015. 'Gender Diversity and Board Performance: Women's Experiences and Perspectives.' *Human Resource Management*, *54*(2): 265-281.

Kanter, R. M. 1977. 'Some effects of proportions on group life: Skewed sex ratios and responses to token women.' *American journal of Sociology*, 82(5): 965-990.

Kilduff, M. and Tsai, W. 2003. *Social Networks and Organizations*. London: SAGE.

Kimery, K.M., Mellon, M.J., and Rinehart, S.M. 2004. 'Publishing in the accounting journals: Is there a gender bias?' *Journal of Business Economics Research*, 2(4): 27-38.

Leung, K., 2007. 'The glory and tyranny of citation impact: An East Asian perspective.' *Academy of Management Journal*, 50: 510–513.

Long, R., Crawford, A., White, M and Davis, K. 2009. 'Determinants of faculty research productivity in information systems: An empirical analysis of the impact of academic origin and academic affiliation.' *Scientometiics* 78: 231-260.

Mainiero, L.A., and Sullivan, S.E. 2006. *The opt-out revolt: Why people are leaving companies to create kaleidoscope career*s. Palo Alto, CA: Davis-Black.

Menzies, H., and Newson, J. 2008. 'Time, stress and intellectual engagement in academic work: Exploring gender difference.' *Gender, Work & Organization*, 15(5): 504-522.

Metz, I. and Harzing, A.-W. 2009. 'Gender Diversity in Editorial Boards of Management Journals.' *Academy of Management Learning and Education* 8: 540-557.

McLeod, C., O'Donohoe, S., and Townley, B. 2009. 'The elephant in the room? Class and creative careers in British advertising agencies.' *Human Relations*, *62*(7): 1011-1039.

McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology*, 415-444.

Minca, C. 2000. 'Venetian geographical praxis.' *Environmental and Planning D: Society and Space* 18: 285-289.

Mishra, V., and Smyth, R. 2012. 'Are more senior academics really more research productive than junior academics? Evidence from Australian law schools.' *Scientometrics*, 1-15.

Mollica, K. A., Gray, B., & Trevino, L. K. (2003). Racial homophily and its persistence in newcomers' social networks. *Organization Science*, 14(2), 123-136.

Moran, P. A. P. 1950. 'Notes on continuous stochastic phenomena.' *Biometrika*, 37(1/2): 17–23.

Özbilgin, M. (2014). Promoting Diversity in Management Scholarship: Opening the Doors for Multiple Languages, and Interdisciplinary Dialogue and Developing Our Communities. *European Management Review*, *11*(1), 1-4.

Paasi, A. 2005. 'Globalisation, academic capitalism, and the uneven geographies of internal journal publishing spaces.' *Environmental Planning A,* 37: 769-789.

Parsons, E., and Priola, V. 2013. 'Agents for Change and Changed Agents: The Micro-politics of Change and Feminism in the Academy.' *Gender, Work & Organization*, 20(5): 580-598.

Pilbeam, C., and Denyer, D. 2009. 'Lone scholar or community member? The role of student networks in doctoral education in a UK management school.' *Studies in Higher Education*, 34(3), 301-318.

Racherla, P. and Hu, C.A. 2010. 'Social network perspective of tourism research collaborations.' *Annals of Tourism Research*, 37. 1012-1034.

Sabidussi, G. 1966. The centrality index of a graph. *Psychometrika*, 31: 581-603.

Sang, K., Al-Dajani, H., and Özbilgin, M. 2013. ‚Frayed Careers of Migrant Female Professors in British Academia: An Intersectional Perspective.' *Gender, Work & Organization*, 20: 158-171.

Seebruck, R., & Savage, S. V. (2014). The differential effects of racially homophilous sponsorship ties on job opportunities in an elite labor market: The case of NCAA basketball coaching. *Sociological Inquiry*, *84*(1), 75-101.

Singh, M., and Meng, H. 2013. 'Democratising western research using non-western theories: Rancière and mute Chinese theoretical tools.' *Studies in Higher Education*, 38(6): 907-920.

Sozen, H. C., Varoglu, D., Yeloglu, H. O., & Basim, H. N. (2016). Human or Social Resources Management: Which Conditions Force HR Departments to Select the Right Employees for Organizational Social Capital?. *European Management Review*. 13: 3-18.

Usunier, J. C. (2006). Relevance in business research: the case of country-of-origin research in marketing. *European Management Review*, *3*(1), 60-73.

Uzzi, B., Amaral, L. A., & Reed□Tsochas, F. (2007). Small□world networks and management science research: a review. *European Management Review*, *4*(2), 77-91.

Valle, M., and Schultz, K. 2011. 'The etiology of top-tier publications in management: a status attainment perspective on academic career success.' *Career Development International*, *16*(3): 220-237.

Vicari, S. (2013). Is the Problem Only Ours? A Question of Relevance in Management Research. *European Management Review*, *10*(4), 173-181.

Vázquez-Cupeiro, S. and Elston, M.A. 2006. 'Gender and academic career trajectories in Spain.' *Employee Relations*, 28: 588-603.

Appendix 1: Social Network Metrics Used in the Study

A. Node-Level Calculations.

Metric	Node-level calculation	Simple explanation of meaning
Degree Centrality (Freeman, 1979)	$C_D(n_i) = d(n_i)$ Where n_i is node i and d is the number of degrees.	The number of links or ties with a node.
Betweenness Centrality (Freeman, 1979)	$C_B(n_i) = \sum_{j<k} \frac{g_{jk}(n_i)}{g_{jk}}$ Which for node n_i is the sum of the proportions, for all pairs of actors j and k, in which actor i is involved in a pair's shortest links.	An indicator of the number of nodes connected indirectly through a node's links. Higher values are provided for nodes which bridge clusters.
Closeness Centrality (Sabidussi, 1966)	$C_C(n_i) = \left[\sum_{j=1}^{g} d(n_i, n_j)\right]^{-1}$ Where $d(n_i,n_j)$ is the distance between nodes n_i and n_j and this is summed to calculate the total distance between n_i and all other nodes, where g is the total number of nodes.	A measure of the sum of distances to all other nodes by the shortest route, whereby lower values represent closeness.
Two- or Three-Step Reach	The number of nodes connected to from node i in 2 or 3 steps or less.	
Eigenvector Centrality (Bonacich, 1972; 1987)	$x_i = \frac{1}{\lambda}\sum_{j=1}^{n} a_{i,j} x_j$ Where x_i is the score of the ith node, n is the number of nodes, λ is a constant so that the solution is non-zero, and $a_{i,j}$ is the adjacency matrix where $a_{i,j}=1$ if nodes i and j are adjacent and $a_{i,j}=0$ if not.	A measure of the importance of a node in a network based on relative scores attributed to linked nodes, with higher scores added for highly-connected nodes.
Flow Betweenness (Freeman et al., 1991)	$C_F(z) = \frac{\sum_{x\neq z}\sum_{x<y\neq z} m_{xy}(z)}{\sum_{x\neq z}\sum_{x<y\neq z} m_{xy}}$ Where z is the focal node, m_{xy} is the maximum flow between nodes x and y and $m_{xy}(z)$ is the amount of flow that goes via node z.	Similar to betweenness centrality, but more suitable for valued graphs and based on the proportion of paths between nodes x and y which travel via node z.
Structural Holes (Burt, 1992)	The measure is given by: $\sum_j m_{ij}\left[1-\sum_q p_{iq} m_{jq}\right] \quad q \neq i,j$ where i is the focal node, j and q are linked nodes, z is the matrix of network ties between nodes, $p_{iq} = \frac{(z_{iq}+z_{qi})}{\sum_j (z_{ij}+z_{ji})}, i \neq j$ and $m_{jq} = \frac{(z_{jq}+z_{qj})}{\max_k (z_{jk}+z_{kj})}, j \neq k$	Focuses on the network of a specific node (ego-network). A structural hole means that a node links two other nodes that would otherwise not be connected. This measures the importance of a node in linking other nodes.

B. Network-Level Calculations.

Metric	Calculation	Explanation
Moran's I Index (Moran, 1950)	$$I = \frac{N}{\sum_i \sum_j w_{ij}} \frac{\sum_i \sum_j w_{ij}(X_i - \overline{X})(X_j - \overline{X})}{\sum_i (X_i - \overline{X})^2}$$ where N is the number of nodes indexed by nodes i and j, X is the focal variable, $\overline{X}$ is the mean of X, and wij is a measure of proximity between actors i and j.	The index is comparable to a Pearson correlation coefficient in the sense that it is bounded between −1 and +1 with larger values indicating a higher degree of network autocorrelation.
Geary's C Index (Geary, 1954)	$$C = \frac{1}{2} \frac{N-1}{\sum_i \sum_j w_{ij}} \frac{\sum_i \sum_j w_{ij}(X_i - X_j)^2}{\sum_i (X_i - \overline{X})^2}$$ where N is the number of nodes indexed by nodes i and j, X is the focal variable, $\overline{X}$ is the mean of X, and wij is a measure of proximity between actors i and j.	Geary's C varies between 0 and 2; where 1 indicates no autocorrelation, less than 1 is a positive network autocorrelation and more than 1 is a negative autocorrelation. Geary's C is more sensitive to local autocorrelation between two connected actors than Moran's more global measure.

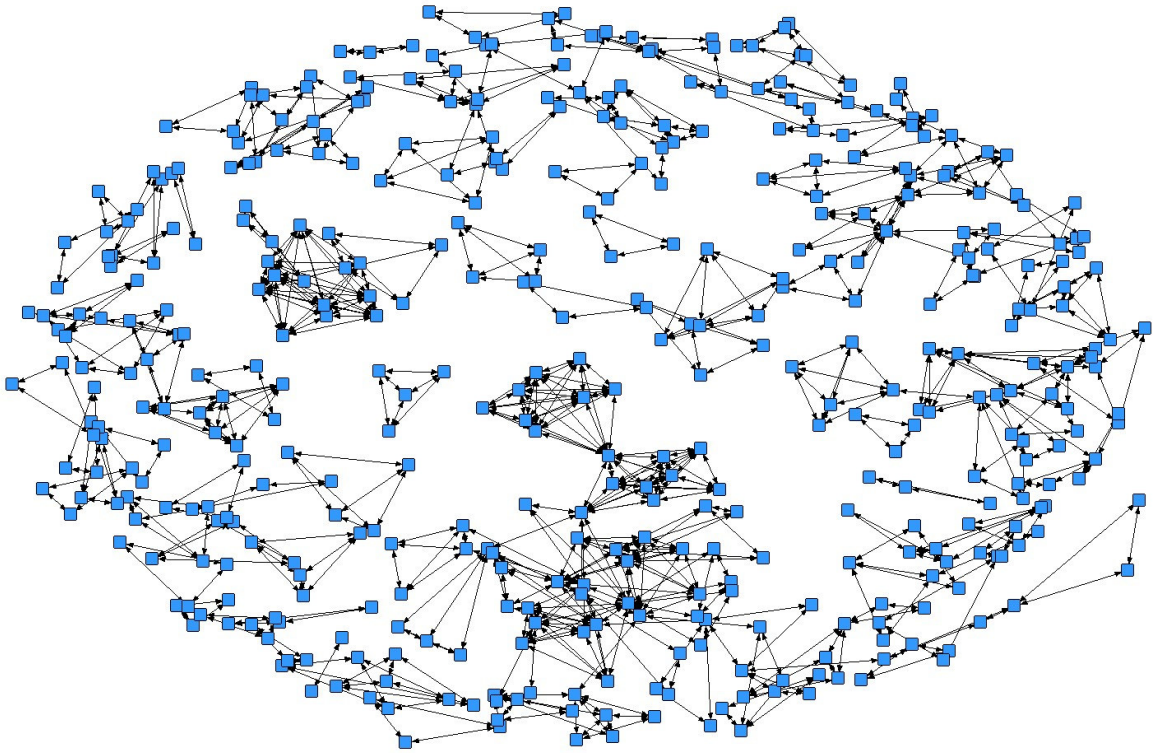

Figure 1: Social Network of Co-Authorship in Human Resource Management (2000-2009)

(Note: isolates and pendants removed for clarity).

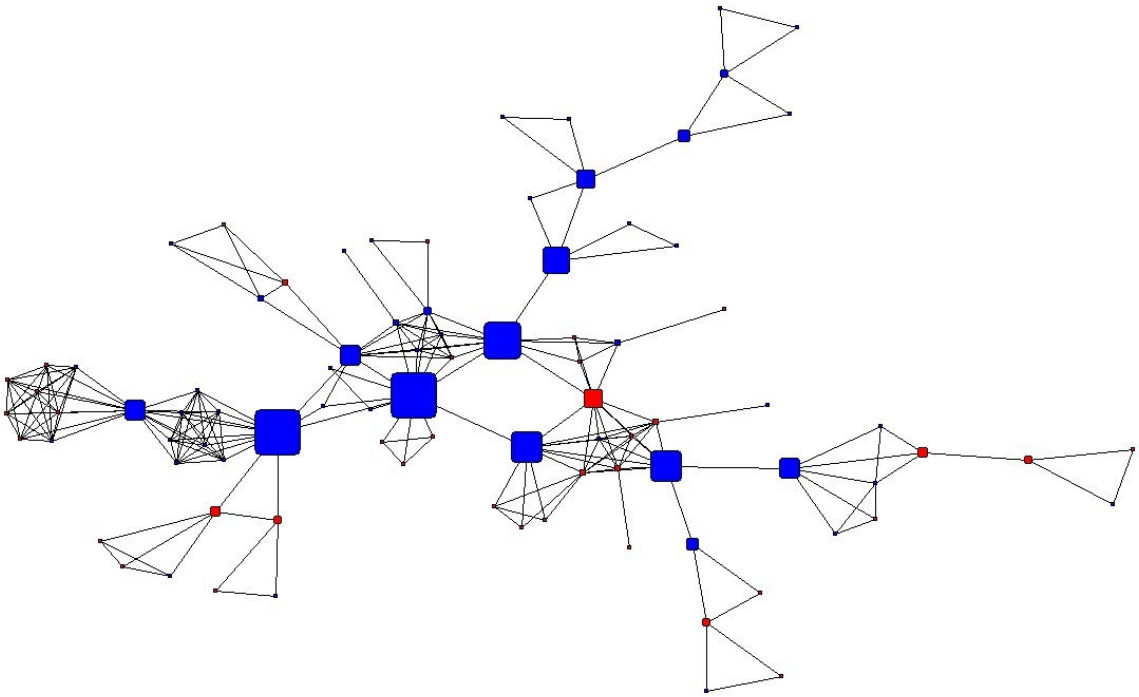

Figure 2: Network of Main Component

(Note: nodes sized for betweenness centrality; blue nodes are white males).

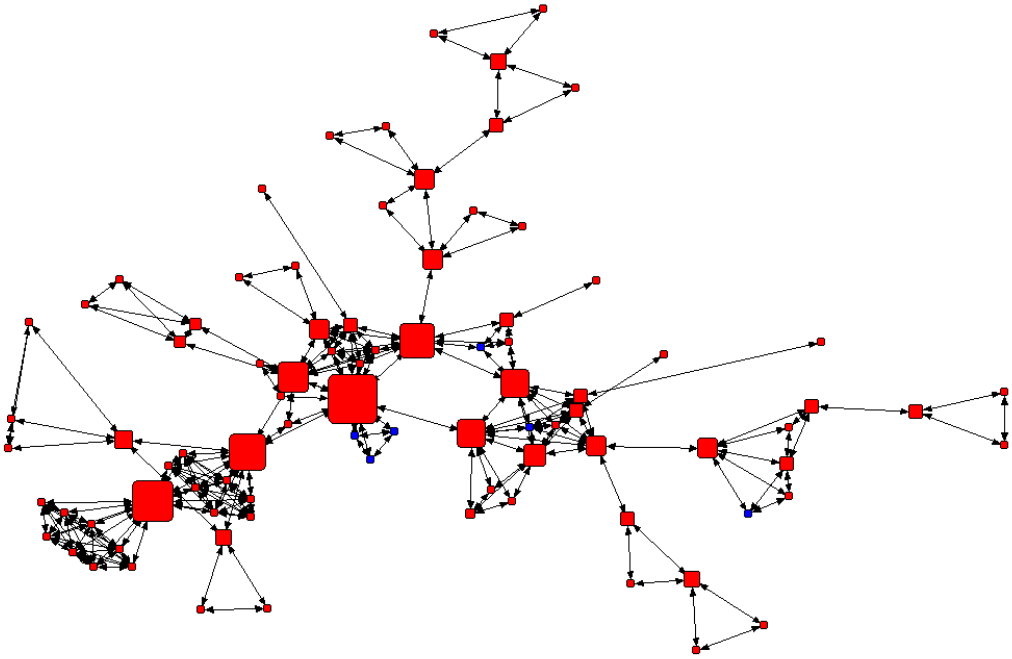

Figure 3: Structural Holes for Main Component for Western and Non-Western Authors

(Note: nodes sized for structural holes; red nodes are Western authors).

Table 1: Characteristics of Authors

Characteristic	Frequency (%)	
Gender		
Male	397 (59.5%)	
Female	270 (40.5%)	
Region	*Publication*	*Latest Institution*
North America	483 (72.4%)	477 (71.5%)
Europe	105 (15.7%)	107 (16.0%)
Asia	43 (6.5%)	44 (6.6%)
Australasia	30 (4.5%)	32 (4.8%)
Middle East	5 (0.7%)	6 (0.9%)
Africa	1 (0.2%)	1 (0.2%)
Ethnicity		
White	489 (73.3%)	
Chinese, Japanese, Korean or Other South-East Asia	65 (9.7%)	
Indian, Pakistani, Bangladeshi or Other (South) Asia	20 (3.0%)	
Hispanic	20 (3.0%)	
African, Caribbean or Black	17 (2.5%)	
Mixed or Multiple Ethnic Groups	5 (0.8%)	
Arab/North African	1 (0.2%)	
Other Ethnic Group	6 (0.9%)	
Race Unknown	44 (6.6%)	
White Male		
White Male	306 (45.9%)	
Other/Unknown	361 (54.1%)	
Sector	*Publication*	*Last Institution*
Academia	537 (80.5%)	547 (82.0%)
Other (including business, public sector or independ	130 (19.5%)	120 (18.0%)
Department		
Management, Business or Marketing	437 (65.5%)	
Psychology	40 (6.0%)	
Economics	9 (1.3%)	
Science or Technology	5 (0.8%)	
Education	5 (0.8%)	
Other, undefined or not available	171 (25.6%)	
ARWU List Prestige	*Publication*	*Last Institution*
Not listed or not a university	307 (46.0%)	321 (48.1%)
1-999	86 (12.9%)	80 (12.0%)
1000-1999	90 (13.5%)	91 (13.6%)
2000-2999	136 (20.4%)	135 (20.3%)
3000+	48 (7.2%)	40 (6.0%)
Financial Times List Prestige		
Not listed or not a university	524 (78.6%)	
1-249	28 (4.2%)	
250-499	56 (8.4%)	
500-749	36 (5.4%)	
750+	23 (3.4%)	

Table 2: Join-Count Statistics by Gender

Groups	Expected	Observed	Difference	P>=Diff	P<=Diff
1-1	137.176	182	44.824	0.001	0.999
1-2	404.898	329	-75.898	1.000	0.000
2-2	296.926	328	31.074	0.047	0.958

Note: group 1=female; group 2=male.

Table 3: Top-10 Authors for Centrality

	Degree Centrality		***Betweenness Centrality***		***Flow Betweenness***		***Two-Step Reach***		***Three-Step Reach***		***Structural Holes***	
1	Wright, P.	19	Wright, P.	1609.7	Gerhart, B.	3219.2	Wright, P.	6.6%	Wright, P.	10.2%	Wright, P.	11.9
2	Kochan, T.A.	16	Gerhart, B.	1584.0	Stahl, G.K.	2587.7	Gerhart, B.	6.0%	Snell, S.A.	9.6%	**De Cieri, H.**	9.5
3	Roehling, M.V.	14	Stahl, G.K.	1251.7	Feldman, D.C.	2139.8	Snell, S.A.	5.6%	Gerhart, B.	8.9%	Kochan, T.A.	9.0
4	**Boswell, W.R.**	13	Feldman, D.C.	1067.0	Mendenhall, M.E.	1712.0	Stahl, G.K.	5.4%	McMahan, G.C.	8.9%	Gerhart, B.	8.2
5	Gerhart, B.	13	Roehling, M.V.	1033.7	Kochan, T.A.	1278.0	Roehling, M.V.	4.8%	Stahl, G.K.	8.7%	Stahl, G.K.	8.1
6	Snell, S.A.	13	Mendenhall, M.E.	854.0	Klaas, B.S.	1270.8	**Caligiuri, P.M.**	4.1%	Roehling, M.V.	8.4%	Snell, S.A.	6.8
7	**De Cieri, H.**	13	Snell, S.A.	652.8	Gregersen, H.B.	1144.0	McMahan, G.C.	4.1%	Paauwe, J.	7.7%	Roehling, M.V.	6.8
8	Stahl, G.K.	12	Klaas, B.S.	637.0	Wright, P.	1130.2	Feldman, D.C.	3.9%	Morris, S.S.	7.7%	**Caligiuri, P.M.**	6.7
9	**Lee, M.D.**	11	Kochan, T.A.	632.0	Snell, S.A.	993.7	Paauwe, J.	3.8%	**Farndale, E.**	7.7%	Ulrich, D.O.	5.5
10	**Caligiuri, P.M.**	11	Gregersen, H.B.	570.0	Bolino, M.C.	667.0	Morris, S.S.	3.8%	Stiles, P.	7.7%	**Boswell, W.R.**	5.4

Table 4: RCT Analysis by Ethnicity (observed/expected, ratio in parentheses)

	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
0	9/3.57 (2.52)	75/81.27 (0.92)	0/0.17 (0)	5/3.32 (1.5)	4/3.32 (1.2)	0/10.8 (0)	1/2.83 (0.35)	0/0.83 (0)	0/1 (0)
1	75/81.27 (0.92)	528/450.7 (1.17)	3/1.85 (1.62)	26/36.94 (0.7)	23/36.94 (0.62)	63/120.06 (0.52)	20/31.4 (0.64)	11/9.24 (1.19)	7/11.08 (0.63)
2	0/0.17 (0)	3/1.85 (1.62)	0/0 (0)	0/0.08 (0)	0/0.08 (0)	0/0.25 (0)	0/0.06 (0)	0/0.02 (0)	0/0.02 (0)
3	5/3.32 (1.5)	26/36.94 (0.7)	0/0.08 (0)	7/0.72 (9.75)	1/1.51 (0.66)	0/4.91 (0)	1/1.28 (0.78)	0/0.38 (0)	0/0.45 (0)
4	4/3.32 (1.2)	23/36.94 (0.62)	0/0.08 (0)	1/1.51 (0.66)	1/0.72 (1.39)	5/4.91 (1.02)	1/1.28 (0.78)	0/0.38 (0)	0/0.45 (0)
5	0/10.8 (0)	63/120.06 (0.52)	0/0.25 (0)	0/4.91 (0)	5/4.91 (1.02)	41/7.86 (5.22)	0/4.17 (0)	0/1.23 (0)	0/1.47 (0)
6	1/2.83 (0.35)	20/31.4 (0.64)	0/0.06 (0)	1/1.28 (0.78)	1/1.28 (0.78)	0/4.17 (0)	7/0.51 (13.63)	0/0.32 (0)	0/0.39 (0)
7	0/0.83 (0)	11/9.24 (1.19)	0/0.02 (0)	0/0.38 (0)	0/0.38 (0)	0/1.23 (0)	0/0.32 (0)	0/0.04 (0)	0/0.11 (0)
8	0/1 (0)	7/11.08 (0.63)	0/0.02 (0)	0/0.45 (0)	0/0.45 (0)	0/1.47 (0)	0/0.39 (0)	0/0.11 (0)	0/0.06 (0)

Note: 0=race unknown; 1=white; 2=Arabic; 3=Hispanic; 4= Indian, Pakistani, Bangladeshi or Other (South) Asian; 5= Chinese, Japanese, Korean or Other South-East Asian; 6= African, Caribbean or Black; 7= Mixed or Multiple Ethnic Groups; 8=Other Ethnic Group.

Table 5: Measures of Centrality for Whites within the Network

Measure	Mean (Std. Dev.)	T-Test for White Male>Other
Degree Centrality	White = 2.753 (2.611) Other = 2.236 (1.422)	Significant, p=.005
Betweenness Centrality	White = 26.504 (153.928) Other = 3.077 (23.536)	Significant, p=.008
Closeness Centrality	White = 433084 (20259.480) Other =436704 (16622.260)	Non-Significant, p=.332
Two-Step Reach	White = 0.007 (0.009) Other = 0.005 (0.006)	Significant, p=.005
Three-Step Reach	White = 0.011 (0.018) Other = 0.008 (0.013)	Significant, p=.015
Eigenvector Centrality	White = -0.006 (0.045) Other = -0.000 (0.000)	Non-Significant, p=.965
Flow Betweenness	White = 47.310 (259.856) Other = 9.264 (47.751)	Significant, p=.008
Structural Holes	White = 1.402 (1.206) Other = 1.101 (0.387)	Significant, p<.001

Table 6: Join-Count Statistics by White Male/Other

Groups	Expected	Observed	Difference	P>=Diff	P<=Diff
1-1	245.455	280	34.545	0.027	0.977
1-2	417.273	323	-94.273	1.000	0.000
2-2	176.272	236	59.728	0.000	1.000

Note: group 2=white men; group 1=other.

Table 7: Measures of Centrality for White Men within the Network

Measure	Mean (Std. Dev.)	T-Test for White Male>Other
Degree Centrality	White Male = 2.716 (2.700) Other = 2.529 (2.033)	Non-Significant, p=.155
Betweenness Centrality	White Male = 37.029 (189.970) Other = 6.031 (39.180)	Significant, p=.001
Closeness Centrality	White Male = 386615.813 (61.405) Other = 434424.582 (19033.582)	Non-Significant, p=.687
Two-Step Reach	White Male = 0.007 (0.010) Other = 0.006 (0.006)	Significant, p=.013
Three-Step Reach	White Male = 0.012 (0.020) Other = 0.009 (0.014)	Significant, p=.010
Eigenvector Centrality	White Male = -0.007 (0.047) Other = -0.003 (0.029)	Non-Significant, p=.919
Flow Betweenness	White Male = 63.703 (320.892) Other = 14.655 (68.760)	Significant, p=.001
Structural Holes	White Male = 2.106 (1.182) Other = 1.317 (1.058)	Non-Significant, p=.075

Table 8: RCT Analysis by Region (observed/expected, ratio in parentheses)

	1	2	3	4	5	6
1	553/439.7	64/191.57	30/78.45	18/54.73	8/9.12	1/1.82
	(1.26)	(0.33)	(0.38)	(0.33)	(0.88)	(0.55)
2	64/191.57	77/20.62	2/17.05	9/11.9	3/1.98	0/0.4
	(0.33)	(3.73)	(0.12)	(0.76)	(1.51)	(0)
3	30/78.45	2/17.05	33/3.41	4/4.87	0/0.81	0/0.16
	(0.38)	(0.12)	(9.67)	(0.82)	(0)	(0)
4	18/54.73	9/11.9	4/4.87	32/1.64	2/0.57	0/0.11
	(0.33)	(0.76)	(0.82)	(19.47)	(3.53)	(0)
5	8/9.12	3/1.98	0/0.81	2/0.57	3/0.04	0/0.02
	(0.88)	(1.51)	(0)	(3.53)	(79.42)	(0)
6	1/1.82	0/0.4	0/0.16	0/0.11	0/0.02	0/0
	(0.55)	(0)	(0)	(0)	(0)	(0)

Note: 1=North America; 2=Europe; 3=Asia; 4=Australasia; 5=Middle East; 6=Africa.

Table 9: Join-Count Statistics by Western/Non-Western Authors

Groups	Expected	Observed	Difference	P>=Diff	P<=Diff
1-1	4.442	36.000	31.558	0.000	1.000
1-2	114.387	50.000	-64.387	1.000	0.000
2-2	720.171	753.000	32.829	0.006	0.995

Note: group 2=Western authors; group 1=Non-Western Authors.

Table 10: The Relationship between Prestige and Centrality for Nodes

Relationship	Correlation	Significance
Prestige <-> Degree Centrality	0.199	Significant, p<.001
Prestige <-> Betweenness Centrality	0.097	Significant, p=.010
Prestige <-> Two-Step Reach	0.185	Significant, p<.001
Prestige <-> Three-Step Reach	0.148	Significant, p<.001
Prestige <-> Eigenvector Centrality	0.040	Non-Significant, p=.313
Prestige <-> Flow Betweenness	0.096	Significant, p=.009
Prestige <-> Structural Holes	0.156	Significant, p<.001

Table 11: The Relationship between FT Prestige and Centrality for Nodes

Relationship	Correlation	Significance
FT Prestige <-> Degree Centrality	0.103	Significant, p=.009
FT Prestige <-> Betweenness Centrality	0.087	Significant, p=.025
FT Prestige <-> Two-Step Reach	0.133	Significant, p=.001
FT Prestige <-> Three-Step Reach	0.117	Significant, p=.003
FT Prestige <-> Eigenvector Centrality	0.000	Non-Significant, p=1.000
FT Prestige <-> Flow Betweenness	0.116	Significant, p=.006
FT Prestige <-> Structural Holes	0.090	Significant, p=.022