



Credit where credit is due? Regulation, research integrity and the attribution of authorship in the health sciences

Jackie M. Street^{a,*}, Wendy A. Rogers^{b,c}, Mark Israel^{d,e}, Annette J. Braunack-Mayer^a

^a School of Population Health and Clinical Practice, University of Adelaide, Adelaide 5005, Australia

^b Philosophy Department, Australian School of Advanced Medicine, Macquarie University, Sydney, Australia

^c School of Medicine, Flinders University, Adelaide, Australia

^d Faculty of Law, University of Western Australia, Perth, Australia

^e School of Law, Flinders University, Adelaide, Australia

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ABSTRACT

Despite attempts at clear direction in international, national and journal guidelines, attribution of authorship can be a confusing area for both new and established researchers. As journal articles are valuable intellectual property, authorship can be hotly contested. Individual authors' responsibilities for the integrity of article content have not been well explored.

Semi-structured interviews ($n = 17$) were conducted with staff, student advocates and doctoral candidates working in health research in two universities in Australia. Stratified sampling ensured participants reflected a range of experience across biomedical, clinical and social science disciplines. Participants were asked about their experience with research publication and their views on the responsibilities of authorship.

Participants gave a variety of reasons for attribution of authorship including: writing the paper; seniority; and student supervision. Gift authorship was seen by some participants as: a way of maintaining relationships; a reward; a means to increase a paper's credibility; or a demonstration of collaboration between authors. Norms and beliefs differed markedly between disciplines for authorship attribution and, to a lesser extent, for authors' responsibility for content integrity. Discussions about the effect of power differentials on authorship were common across disciplines.

This paper describes a broad range of beliefs, values and practice norms held by health science researchers with respect to attribution of authorship and author responsibility for scientific publications. The findings support the need for clarity in relation to authorship, and a research environment which is supportive of ethical behaviour in the publication of research.

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Introduction

Health science journals have had long-standing concerns that the names that appear at the top of an article do not reflect its true authorship (Bhopal et al., 1997; Flanagan et al., 1998; Geelhoed, Phillips, Fischer, Shpungin, & Gong, 2007; Hewitt, 1957; Martinson, Anderson, & De Vries, 2005; Marusic et al., 2004; Mowatt et al., 2002; Pignatelli, Maisonneuve, & Chapuis, 2005; Ross, Hill, Egilman, & Krumholz, 2008; Sheikh, 2000; Smith, 2001; Swazey, Anderson, & Seashore Lewis, 1993). Survey results from both junior and senior researchers indicate these concerns are valid. For example, a British study of 66 staff in the University of Newcastle's medical school found

that almost two-thirds of respondents had experienced difficulties; 38 per cent of these with gift and 48 per cent with ghost authorship (Bhopal et al., 1997). In a survey of more than 3000 NIH grant-funded scientists in the USA, 10% of the respondents admitted to 'inappropriately assigning authorship credit' (Martinson et al., 2005, p. 737). Likewise, Swazey et al.'s (1993) survey of 2000 US doctoral candidates and faculty found that 30% knew of an instance of 'inappropriate assigning authorship credit' by faculty, while Mowatt et al. (2002) showed that at least a third of all Cochrane Reviews had evidence of ghost authorship. Although these surveys are useful in quantifying the extent of misappropriation of authorship they are limited by their inability to identify what the participants understood by the term 'inappropriate'.

The implications of ghost and gift authorship can be serious. First, concerns about authorship may bring the integrity of the research into question. Quite simply, the people who are putting

* Corresponding author. Tel.: +61 8 8303 6498; fax: +61 8 8303 6885.
E-mail address: jackie.street@adelaide.edu.au (J.M. Street).

their names to the research might not be able to attest to a lack of fabrication or falsification of results. If these forms of misconduct were rife, such misrepresentation might be sufficiently high to bias the evidence base in health sciences (Gardner, Lidz, & Hartwig, 2005; Pryor, Habermann, & Broome, 2007). Second, accepting practices that exploit junior colleagues or involve outright falsehoods undermines respect owed to, and the value of, academic research. Finally, any failure to tackle dubious practices may entrench a culture that rewards with funding, promotion and prestige those researchers who, at best, make questionable decisions about attributing authorship (Louis, Holdsworth, Anderson, & Campbell, 2008). Rewarding researchers who develop their own publication record through unfair practices threatens the meaning and value of all track records in the academy. As Rennie and Flanagan (1994, p. 471) warned, if publications are ‘counted as coins to assess academic worth... the value of the coins is obscure’.

Given the potentially serious consequences, one might expect considerable investigation of authorship practices. However very little empirical research has been carried out and, to date, qualitative research in the area has been neglected. In this article, we report the experience and perspectives of 17 researchers working in health research and explore the coherence between these findings and the guidelines, regulations, organisational structures, and cultures which underpin norms of behaviour in publication of health research.

Misrepresenting authorship

Guidelines and regulation relating to assignation of authorship for scientific papers have been primarily driven by the scientific journals that publish the work. The most influential organisation in this respect is the International Committee of Medical Journal Editors (ICMJE) which under the Vancouver Protocol (Updated 2008) sets the following three conditions for inclusion as an author:

1. Substantial contribution to conception and design, or acquisition of data, or analysis and interpretation of data;
2. Drafting the article or revising it critically for important intellectual content;
3. Final approval of the version to be published.

Under ICMJE requirements, anyone listed as an author should be able to take public responsibility for ‘appropriate portions of the content’ (section II A.1). ICMJE also note that some journals require at least one author be designated as guarantor of the entire article. (section II A. 1). The Australian Code for the Responsible Conduct of Research draws on the Vancouver Protocol and has similar requirements (NHMRC/ARC/Universities Australia, 2007).

The British-based Committee on Publication Ethics (COPE, 2003), a voluntary body for scientific journal editors, has acknowledged that ‘there is no universally agreed definition of authorship’ but required ‘as a minimum, authors should take responsibility for a particular section of the study’ (Guidelines on Good Publication Practice, section 3). Where authors can only take responsibility for specialist disciplinary contributions, this can be indicated in the article (section 3(4)). COPE requires that the names of any professional writers be disclosed (section 3(3)) and urges that researchers be ‘vigilant’ in ensuring their name is not added to a paper simply to ‘add credibility’ (section 3(6)).

COPE also urges researchers to reach early agreement on what is expected of each contributor and collaborator and how this will be reflected in decisions about authorship (COPE, section 2(5)) while the ICMJE notes the importance of a making a joint decision about who is to be regarded as an author or contributor before submitting a manuscript for publication (ICMJE, 2008).

The gap between the ICMJE and COPE guidelines emphasises the contentious nature of what constitutes academic authorship. Given this uncertainty, it is perhaps not surprising that misappropriation of authorship rarely attracts attention unless it is part of a larger review involving extensive research misconduct. COPE (2003, p. 5) advised that given ‘current uncertainties’, authors should refer to the guidelines offered by the particular journal to which an article is submitted, in effect conceding that different journals have different rules (Bates, Anic, Marusic, & Marusic, 2004).

The word, ‘misconduct’ is usually only ascribed to research which involves fabrication, falsification and plagiarism. Instead, misattribution of authorship has been variously described as ‘scientific dishonesty’ (Riis, 2001), irresponsible authorship (Rennie, Flanagan, & Yank, 2000) and ‘questionable research practice’ (Swazey et al., 1993). Globally, issues arising from the practice are frequently seen as misdemeanours and handled by the respective journal or at an institutional level. In high profile fraud cases, co-authors, in their scramble to distance themselves from involvement, often reveal gross failure to comply with ICMJE authorship guidelines, yet this failure is not subject to further investigation or, if investigated, incurs few, if any, penalties. For example, Gerald P. Schatten, a co-author of discredited Korean researcher, Hwang Woo Suk, was investigated by his employer, the University of Pittsburgh and found to have engaged in ‘research misbehaviour’ rather than ‘research misconduct’ (University of Pittsburgh, February 8th 2006, p. 9). The finding hinged on the fact that Schatten had composed the first and each subsequent draft of the text of a paper published in the journal, *Science*, which included fabricated results. Schatten was ‘senior’ and corresponding author on that paper, yet was not able to take responsibility for the validity of the results, since they were all carried out in Korea under the aegis of Hwang. He also signed a false statement stating that all the authors on the paper had read a final draft. No disciplinary action against Dr Schatten was recorded. Research studies show that misrepresentation of authorship frequently goes unremarked and unrecorded (Bhopal et al., 1997; Flanagan et al., 1998; Martinson et al., 2005; Mowatt et al., 2002; Swazey et al., 1993). Schatten’s actions were investigated only because of the high profile nature of the research and subsequent fraud allegations.

Over ten years ago, Drummond Rennie, commenting on authorship issues, said: ‘Vagueness results in egregious behaviour being left unexamined because roles and expectations are undefined and undisclosed’ (Rennie, Yank, & Emanuel, 1997). Persisting vagueness and dispute about authorship affects regulatory responses. The US Office of Research Integrity, then and now, will not investigate complaints about authorship unless these fulfil the criteria for plagiarism and, as illustrated by the example above, institutions are similarly reluctant to act to regulate this behaviour. Yet, as shown by publicised cases, students found guilty of similar acts during their degree courses can suffer considerable penalties (e.g. Anonymous, 22/08/2007; Tomsho, 8/15/2006; Young, 7/6/2001). A *Nature* editorial in 2007 described the core of the regulatory problem: ‘Misconduct investigators go out of their way to spare anyone apart from the direct perpetrators’ and suggested that ‘If the damage to reputations were more widespread in the event of fraud, researchers would be even more fastidious about the data emanating from their labs’ (Editorial, 2007, p. 1). This is particularly pertinent in the case of Schatten since it is likely that the inclusion of Schatten as senior and corresponding author expedited publication of the fraudulent study and enhanced its credibility in academic circles (University of Pittsburgh, February 8th 2006). Thus there is a disjunct between authorship standards as defined by journals and regulatory bodies, and those investigated and punished by institutions.

Organisational policy and the responsible conduct of research

Very few studies have examined the professional norms of research scientists (De Vries, Anderson, & Martinson, 2006; Korenman, Berk, Wenger, & Lew, 1998; Swazey et al., 1993). De Vries et al. (2006, p. 44) were critical of the failure to develop policies which were 'informed by what researchers see as behaviours that hamper the production of trustworthy science'. Policies, they concluded, seemed to develop on the basis of bureaucratic conceptions of relatively uncommon behaviours such as fabrication, falsification and plagiarism rather than an empirical investigation of the mundane 'normal misbehaviour' (De Vries et al., 2006, p. 48) of researchers.

Even fewer studies have looked directly at the structures and cultures (Victor & Cullen, 1988) of research organisations and the ways these might influence researchers' production and publication of health research. For example, the Institute of Medicine and National Research Council (2002, p. 49) Committee on Assessing Integrity in Research Environments could identify 'little empirical research to guide the development of hypotheses regarding the relationships between environmental factors and the responsible conduct of research'. However, the Committee drew on a US Office of Government Ethics (2000) study which suggested that individual government employees' ethical behaviour was strongly related to: the attention that their institutional managers and leaders paid to it; the consistency between policy and practice in their agency; and the openness with which ethical issues were discussed and handled. The Committee used these findings to suggest that research misconduct within an organisation may rest on the absence of leadership in developing appropriate institutional policy around ethics, and socialisation practices that entrench attitudes and behaviours that constitute misconduct rather than supporting the norms and values associated with the responsible conduct of research.

In Australia, the introduction of 'The Australian Code for the Responsible Conduct of Research' (NHMRC/ARC/Universities Australia, 2007) reinforced the employing institution as the party responsible for enforcing the Code and linked responsibility for ethical conduct with accountability to the major Australian research funding organisations, the Australian Research Council and the National Health and Medical Research Council. It is not entirely clear, however, how such accountability will be exercised or regulated. In the literature there is very little examination of how accountability for researcher behaviour is regulated globally or even how ethical conduct is supported in a coherent manner. In general, responses and support mechanisms are *ad hoc*.

Authorship and Australian health researchers

This small study conducted in 2006 used qualitative research methods to examine behaviours in the attribution of authorship for health research publications. We conducted semi-structured interviews of approximately one hour in length with staff and doctoral candidates engaged in health research at two Australian universities, both of which are research-intensive institutions awarding research doctorates. Ethical approval for this study was provided by the appropriate ethics committees of the two Universities involved in the study. The recruitment strategy was designed to select participants with a broad range of experience and to reflect the ordinary experience of health researchers. Of the 17 participants in this study, ten were randomly selected using stratified sampling across the range of biomedical, clinical and social science disciplines and all Australian academic levels A–E (associate lecturer to full professor). Three of the randomly selected staff members were also doctoral candidates. Six other randomly-selected staff members were

approached but one had left their job, one was on study leave and four did not respond to a written request for interview or a follow-up email. In addition, the postgraduate student association disseminated a single email to all doctoral candidates at the two universities leading to four positive responses, one of whom was also a staff member at a third university and a second who had held previous academic positions. Three student advocates were recruited; these individuals are counsellors employed by the postgraduate student association of each institution to provide advice to students on issues of concern and, if required, to fulfil an advocacy role in disputes. The counsellors were selected in order to ensure that the research recorded some of the more egregious problems associated with publication of research by students. A description of the participants in the study is provided in Table 1.

Participants were asked to reflect on a recent journal publication, conference presentation or report on which they had been an author and describe the circumstances surrounding the publication including who was included or excluded as an author, order of authors and responsibilities of the authors for the integrity of the data. More specific questions explored other publication experiences and issues including the decision-making process, approval of the final draft, decisions about the number of papers from a single project, obstruction of publication, duplication of publication, the

Table 1
Description of the academic role and discipline area of the research participants.

Number	Random/volunteer/selected	Identifier ^a	Doctoral candidate	Academic level	Discipline area
1	Random	A/DC4	Yes	Associate Lecturer	Biomedical
2	Random	B/DC5	Yes	Lecturer	Social sciences
3	Random	A/DC7	Yes	Associate Lecturer	Biomedical
4	Random	A1	No	Associate Lecturer	Social sciences
5	Random	A2	No	Associate Lecturer	Social sciences
6	Random	B1	No	Lecturer	Biomedical
7	Random	B2	No	Lecturer	Social sciences
8	Random	C	No	Senior Lecturer	Clinical
9	Random	D	No	Associate Professor	Social sciences
10	Random	E	No	Professor	Social sciences
11	Volunteer	DC1	Yes		Social sciences
12	Volunteer	DC2/C	Yes	Senior Lecturer	Clinical/Social sciences
13	Volunteer	DC3	Yes		Clinical/Social sciences
14	Volunteer	DC6	Yes	Former Lecturer	Clinical/Social sciences
15	Selected	SA1	No		Student advocate
16	Selected	SA2	No		Student advocate
17	Selected	SA3	No		Student advocate

The study received ethics approval from the Human Research Ethics Committees at both universities.

^a Participants are identified by their academic level (A–E) and/or as doctoral candidates (DC) or student advisors (SA). If more than one identifier is provided, the first designates the area under which the participant was selected. For example, A/DC4 was a Level A/Associate Lecturer recruited randomly through the staff register and was also a doctoral candidate. All participants were 'research only' except #8 who had clinical responsibilities and #1, 7 and 12 who had teaching responsibilities.

relationship between doctoral supervision and authorship, use of work or ideas without permission, and institutional support for good practice. Although the researchers were from only two universities, in their reflections on practice, eight participants drew on their experiences of research publication practices at other institutions, principally Australian and British universities and Australian teaching hospitals.

Data handling and analysis

Fourteen interviews were recorded for reference and note-taking but were not fully transcribed. In response to requests from participants, three interviews were not recorded, but extensive notes were taken during the interviews. The first author (JS) conducted the interviews and noted emerging themes. JS then listened to the tape of each interview to confirm emerging themes and make detailed notes. Short sections of the interviews which illustrated the themes were anonymised and transcribed. The notes and transcribed sections were then analysed thematically in N-Vivo, in the tradition of Grounded Theory as described by Liamputtong and Ezzy (2005) using codes derived from the interview schedule or directly from the data.

Initial codes were descriptive, for example 'inclusions' or 'exclusions', describing the reasons why an individual may be included or excluded as an author. Other codes rose directly from the data such as 'roundtables' and 'bun fight' describing two opposing approaches to authorship. As more interviews were conducted, incidents which had appeared as isolated conflicts in individual interviews emerged as themes across the interview findings. These included 'power differentials' and 'disciplinary-based practice'.

Results

Authorship

Participants offered several reasons why someone would be included as an author. Not surprisingly, doing the work was seen as the primary reason for including someone as an author. A doctoral student working across clinical sciences and social sciences suggested:

"...if you want to put your name to something as an author you really have to think carefully about the input that you have had and... if you are in a position to put up an argument for what you are stating in the paper." [DC3]

This view was echoed by a professor: "I think increasingly it is viewed that you have to have a significant involvement with all the major stages of a project for it to warrant authorship." [E1]

For some researchers, definitions of "doing the work" turned out to be very broad with one participant attributing authorship to "anyone who has contributed something to the development of the paper." [A1] This included: writing the paper, developing methodology, engaging in statistical analysis, data analysis, problem-solving or doing technical assays. In some cases, this extended to those who did as little as contribute an idea, provide a venue or supply a reagent used in the work. One doctoral student working across clinical/social sciences described this as:

"a slap bang approach to anybody who's contributed in some way to that paper whether that be throughout the research process or whatever." [DC3]

This level of inclusivity worked both ways – many participants described colleagues with expectations of being included on a paper despite very minor contributions.

On the other hand, political reasons were described for a long list of authors. Some reasons were related to the internal working relationships of an institution. One doctoral candidate saw the gift of authorship as a way of making sure "everyone is happy." [A/DC7] Gift authorship was used as a tool for avoiding conflict and maintaining good relationships:

"It tends to be much easier to just include people rather than exclude them and then make excuses as to why they weren't included on there." [A/DC7]

Several participants indicated that, on occasion, gift authorship was expedient. A senior lecturer had avoided the problems faced by a co-worker who refused to add to the list of authors:

"I understood the politics better and was prepared to play along with it, I don't think it was corrupt, it wasn't like these people had no reason to be on these papers, they were involved." [C1]

Being involved, however, might reflect a superficial connection as a 'team member', a director of a research centre associated with the research or a drug company representative. Often an individual would be included as a matter of course as author on multiple papers without contributing any specific work to those papers.

At times, authorship was used as a reward. One doctoral candidate, who reported a rocky doctoral course, saw the inclusion of her present supervisor as an author as, in part, "kind of rewarding <supervisor> for picking me up and sorting me out." [A/DC4]. However, this research student also found other reasons external to the relationship for including the name of the previous supervisor because this would "show that link that I have worked with this person." [A/DC4]

So, there were external, structural reasons for adding names to publications. The name of a senior academic on a publication can lend credibility to the paper and increase the probability of publication of the paper in a high impact journal (De Vries & Lemmens, 2006). One of our research participants suggested that:

"If I had submitted something with my name first it probably wouldn't have got published and yet with her name first it got published and just things like having the PhD/Doctor in front, those kinds of things, it seemed to play a bit of a role so I gave up things initially with the view that – I'm not entirely happy about it but I am getting other benefits." [DC2/C]

Other participants described it in terms of the power that an individual might wield with a journal editor. For example, one participant was influenced by the fact that a co-author: "had far more power than myself, or my primary supervisor, in getting that article published." [DC3]

Corresponding author

Very few participants experienced problems with the assignment of corresponding author on their publications. It was common for the first author to take the corresponding author role but this was not always the case. One senior social scientist [E1] described how the role of corresponding author might go to the person responsible for the larger program of work with an understanding of where each study fits within it, whereas the first author might have more depth in the particular study described in the paper. However, disagreements about who should be corresponding author could cause problems, as one participant explained:

"[I was] told in very stern words that I was not to be the corresponding author... because <my> felt very strongly that he was the chief investigator of the overall study and that all correspondence should go through him." [DC3]

The doctoral candidate felt “*this was a commentary piece so it wasn't really any research relating to the study per se.*” Another doctoral candidate told how his supervisor was corresponding author on his first joint paper “*by default. I didn't even discuss it*” [A/DC7] but that in later papers as his confidence increased he took steps to ensure that he was nominated for this role.

Exclusions

Denial of authorship was uncommon in the supervisor–student relationship but appeared to be more common outside of it. In particular, nurse researchers seemed vulnerable to exclusion from authorship. One doctoral candidate referred to her early experience as a nurse researcher working with a team of doctors:

“I did all the work for the research, I put all the results together and I literally wrote the results up and I didn't get acknowledged on the paper as contributing not even as the secretary got a mention for having typed up the paper [laughs] because I was a nurse, I was being paid to do the job.” [DC6]

Participants also described excluding people who they felt should have been included as authors because contact had been lost:

“I didn't know where she was and one of the issues with papers is that you need all the authors' signature and I didn't know where she was to get the signature.” [B2]

A doctoral candidate reported that her previous supervisor had retired and “*he is also kind of not speaking to me*” so she did not expect him to agree to be an author on the paper she was currently writing. [A/DC4]

One case of direct theft of work was reported, where a self-published handbook by two junior researchers was substantially plagiarised by a senior internationally-acclaimed colleague. No action was taken by the junior colleagues because the participant felt “*It is very difficult to prove plagiarism particularly when they are a professor and that [research area] is their speciality.*” [DC6]

Within the supervisory relationship, a student advocate reported the case of an international doctoral candidate who believed she had been denied authorship by exclusion from any substantive work which might lead to a publication. The student complained of being “*moved to a given area of research in the lab until the point where it becomes interesting enough to publish and then moved off it and this is a repeating pattern.*” [SA2] Such allegations are extremely difficult to prove and as the advocate herself indicated are often “*muddled with other issues.*” [SA2] The student was the only female and the only doctoral candidate in an environment where the other researchers were all post-doctoral, and her national origins also marked her as different. These factors distilled into a power imbalance as the advocate observed, “*she [was] the least powerful person in this whole scenario unquestionably.*” [SA2]

Discipline-based practices

Researchers in health come from a range of disciplines and often find themselves working within multi-disciplinary teams. Respondents reported that criteria for authorship differed markedly between disciplines. In some areas of the social sciences, particularly anthropology and sociology, single authorship was described as common and supervisors were rarely included as an author. In contrast, in the clinical sciences multiple authors and guest authorship were common and supervisors were always included as authors. Interestingly, many of the participants were unaware of disciplinary diversity in authorship norms and practices. Two biomedical participants were incredulous that, given the norms of

single authorship in some social science, a supervisor might not be included. One participant said, “*What are they doing supervising then?*” [B1] Similar disparities between disciplines concerned responsibility for validity of data and the ultimate integrity of the paper and even whether publication was encouraged or discouraged during doctoral candidacy.

Power structures were seen to influence attribution of authorship: clinical research and nursing was described as having a strong hierarchical basis so that seniority was an important factor in ascribing authorship. In contrast, the social science disciplines tended to divide the rewards of authorship more equitably, allocating individuals on a rotating basis to ‘take the lead’ on each publication arising from a project.

Order of authors

Conventions about the order of authors were also discipline specific and influenced by internal and external factors, as notions of merit based on contribution vied with publication strategies, professional need and relative seniority. All disciplines agreed that the first author was the most valuable position on a paper. However, the value of the last author varied widely across disciplines: in the clinical and biomedical sciences it was seen as an indication of seniority or a supervisory role on the research project; whereas in the social sciences it might be accorded very little value.

Both social and biomedical sciences ascribed considerably less value to being a named author in the other positions and, particularly in the biomedical sciences, middle authorship carried much less authority than first and last author:

“You may as well have a football team in the middle I don't think it really matters so I'd rather keep everyone happy.” [B1]

One social scientist suggested there was no difference in the value of authorship placement other than the first author but there was recognition that authors lower down the list were less likely to be ‘seen’ in the citation.

Decision-making processes

The decision-making process for authorship attribution and order of authors was generally *ad hoc*. Some interviewees felt it was important to discuss authorship at the beginning of a project but one participant pointed out the problems with this approach:

“the notion of right from the outset of the project identifying the [lead author]. I don't think I have been involved in any project where that has been really possible because too many things happen ...and you don't necessarily get back in your data what you thought you might get back from it so the papers that you originally planned look quite different.” [E1]

In most cases, there was little or no discussion amongst the research team involved in a publication about assignment of author order. In some environments, the person who controlled task allocation in writing a paper could act as a gate-keeper in attribution of authorship and authorship order, no matter what the division of labour had been either before or during the writing of the paper. Several participants, both junior staff and doctoral candidates, described the decision being handed down from a senior staff member or supervisor in a way that “*you didn't feel like you had an opportunity to challenge it.*” [DC2/C] This left at least one junior staff member dependent on “*the goodwill of the people I worked with.*” [A1] In some cases this meant “*I have been quite badly exploited*” but there had been “*other situations where people have been quite generous.*” [A1] Another described how the laboratory

head was “*patriarchal, even authoritative*” in assigning authorship to publications emerging from the laboratory:

“I know that he did play those kinds of games. He thought he was being fair by sharing the first authorship around the lab but it wasn’t necessarily, in his mind, based on who did what. So that was kind of a bad role model.” [A/DC4]

One participant described how the chief investigator on a grant “*saw fit that he should be the first author even though he barely knew what it was about*” and despite the fact that the participant had developed the idea, collected the data and written the paper [B2]. In contrast, one supervisor described assigning first authorship of an “*easy paper*” to a student “*because she has not written one yet and I know she will be slow*” but “*I want her to have a good career and she needs papers too.*” [B1]

Guidelines

Guidelines were rarely used or referred to by the participants and interviewees were often not aware of guidelines except as they related to specific journals. None of the participants had attended, at their present or any other university, induction processes that included discussion about ethical issues in publication, apart from one doctoral candidate who had attended a workshop on plagiarism. In general, the participants’ knowledge of the area had been acquired informally:

“...within science these things are known. I don’t know how we know them though. I think it is just general pub discussion, social discussions and these things come up.” [B1]

One senior staff member suggested that induction training needed to be across the board to be effective:

“It is one thing to send all the young ones off to induction training but what do you do about your cohort who are still behaving badly and are in positions of power control over the younger ones. What tends to happen is that it gets reinforced that that behaviour is what gets you ahead.” [D1]

Trust

Many participants referred to the importance of trust in the publication of research. Authors, particularly in multi-disciplinary research or where specialist skills such as statistics are required, are required to ‘trust’ that their co-authors’ work is competent.

Several participants described avoiding working with researchers whom they did not trust. For example, one doctoral candidate [DC5] described how she had allowed a colleague from a non-government organisation associated with her research project to read the transcript of a focus group she had conducted. DC5 was dismayed when the colleague used some of the findings from the focus group in an open forum without permission. Another doctoral candidate [DC4] doubted the validity of data coming out of a unit she had worked in and so was less willing to be an author on papers emerging from the unit unless she had personally supervised the work. A third interviewee described losing trust in people who treated them badly:

“There are people who have really exploited my position and I just don’t work for them.” [A1]

Power

The theme of power relations and its effect on authorship and publication practice recurred throughout the interviews. One participant was particularly outspoken:

“It is about power and lack of power and lack of control and unfortunately there are a lot of very powerful people who are incredibly ignorant and incredibly arrogant and yet they get the voice and they get listened to.” [D1]

However, in some cases, power differentials as such were not the issue, but rather how the researchers behaved within these differentials. One doctoral student reflected:

“Power differentials can work fine if everybody’s not really bothered or worried about that.” [DC2/C]

For example, a doctoral candidate described her first supervisor as “*very patriarchal but also very fair*” including naming “*problem solving*” research assistants as authors on journal papers [A/DC4] and a senior staff member talked about the head of the department “*mentoring [junior staff] and training them up and they are always included if they have contributed.*” [D1] In contrast, several participants described how co-authors belittled them or made them feel powerless. One doctoral candidate described his medical co-supervisor as “*very dismissive*” [DC3] and another disclosed how a co-author with “*an incredibly forthright personality would phrase things in such a way that you really had no response.*” [DC1] One researcher described how, in a dispute over authorship, a chief investigator overtly used the power card: “*He said, well let’s go to the other investigators and see what they decide ... but I reserve the right of veto.*” [B2]

The personal ambitions of some researchers and the highly competitive nature of academia were contributory factors in issues such as exclusion from authorship or inappropriate authorship. One doctoral student reflecting on the two difficult cases that she had encountered said:

“the main thing that I came up with was they were both incredibly ambitious people... you could almost say at the cost of whoever else.” [DC2/C]

Participants described situations where powerful researchers were able to avoid scrutiny of their actions because of their success. One participant describing duplication of publication by a successful colleague said: “*she’s a professor, she was successful, no-one has pulled her up on it.*” [A1] The ability to avoid scrutiny may be reinforced by structures within institutions: a student who wished to challenge the unethical behaviour of a supervisor was told by a student advocate “*he’s an important person, do you really want to do this?*” [D1]

Although students and junior staff were willing to tolerate inappropriate attribution of authorship because they saw themselves as inexperienced, this tended to change as they gained in confidence and experience. Over time, several described resenting the expectations of supervisors or senior staff to be inappropriately included as authors or as first author but “*part of the problem is you have set up a process and it just keeps repeating itself.*” [DC2/C]

Responsibility of authors

Participants from all disciplines felt that authorship came with a responsibility for the validity of the data. As one participant in the biomedical sciences said:

“I think if your name is anywhere on there, the buck stops with you but even more so if you are first author and even more so if you are that last named head of department.” [A/DC4]

Some participants saw problems in such an approach, particularly with studies that brought together people with disparate experience. In particular, one participant described how only the statistician may be able to interpret the statistics on a paper and the

other authors would rely on the statistician to “*get it right*”. Alternatively, one participant from the social sciences suggested that, at least in qualitative research, all the authors shared responsibility for the validity of the paper.

Generally, responsibility for oversight of ethical behaviour fell to individuals. One junior biomedical academic claimed parent institutions had little influence on the behaviour of researchers saying: “*Each lab is an empire*” where “*the wider institution really tends not to penetrate*.” [A/DC4] Another described the difficulties in working within the power differentials:

“The responsibility has been with me to protect myself and that has not worked. There are a lot of senior staff around me and for me to go and say to them – no I am not going to do this – is very difficult.” [A1]

Discussion

The integrity of the research publication process is fundamental to the integrity of research as a whole. Society’s trust in research findings, including trust in public health guidelines and medical advice, is founded on a belief in the trustworthiness of research scientists. The evidence base on which health decisions, practice guidelines, vaccination regimes, screening programs and drug registration are made, relies to a significant extent upon the integrity of published research. In addition, publication records of individual researchers play an important role in academic advancement and securing grant funding. Inappropriate attribution of authorship can skew publication records, to the advantage or disadvantage of those involved.

When a researcher is listed as an author on a paper, a reader might be forgiven for assuming the researcher has contributed in some substantial way to the study described. Our qualitative study supports previous survey work that indicates that, in the health sciences, frequently this is not the case and that misappropriation of authorship is not confined to this small group of Australian researchers (Bhopal et al., 1997; Martinson et al., 2005; Mowatt et al., 2002; Swazey et al., 1993). Six focus groups carried out at three US research universities reported a number of issues concerning misappropriation of authorship in a study looking at ‘misbehaviour’ in research more broadly (De Vries et al., 2006). The value of our qualitative study is that it provides an in-depth look at researchers’ perceptions of practice in the publication of research. It confirms that the choice of authors listed on some research papers may reflect who ‘did the work’ but it may also reflect a more complex set of parameters including social and cultural pressures.

Many of the behaviours recorded in this study relating to attribution of authorship across the health sciences, breach ICMJE, COPE and the Australian Code guidelines on authorship (NHMRC/ARC/Universities Australia, 2007). Most of the examples that we have given, however, would not be examined further by editors, institutions, or funding authorities unless they were associated with an investigation of serious misbehaviour such as alleged fabrication, falsification or plagiarism. As long as it does not constitute plagiarism, taking credit for other people’s work seems to be regarded by many as just part of the academic game.

It is apparent from our findings that there are entrenched cultural norms in the publication of research with implicit rules of play. Our findings also suggest that the current system, in which senior researchers acculturate junior researchers in the ‘implicit rules of play’, is not sufficient to ensure the integrity of scientific research. There were some points of resistance to ‘house rules’. Many junior researchers disliked feeling exploited or receiving unwarranted favours, attributing their discomfort to their own sense of justice rather than to violation of professional codes.

Inappropriate attribution of authorship left some doctoral candidates questioning the whole system, described by one as “*a bit of a boys’ club*.” [DC7] Two doctoral candidates struggled with the ethical dilemma of what they saw as unwarranted authorship on papers. They felt guilty about it but found it difficult to refuse inclusion on papers, particularly in high impact journals:

“that’s where I have to take a step back and have a look at myself and have a look at my values in publishing...: do I want my name, do I want to be used in that way, and I know career-wise that it advances me but morally and ethically I might have different values about it.” [DC3]

This appears to be the root of the problem: ethically questionable cultural norms are supported by organisational rewards and recognition. Wagena has called for gift authorship to be outlawed citing the argument that ‘used appropriately, authorship establishes accountability, responsibility and credit’ (Wagena, 2005, p. 308). Used inappropriately, we suggest it undermines the integrity of research and the validity of scientific information.

The story of authorship with respect to scientific publications can be couched in terms of individual responsibility. Yet, there is an alternative story, one that might explain why academics engage in such practices and why their institutions might not be keen to stop them. Within the structure of research administration there are what regulatory theorists call ‘perverse incentives’ for misbehaviour. As previously discussed, there is considerable emphasis on peer-reviewed publication within the ‘reward’ systems of research both for individuals and their institutions. A good publication record can assist with both competitive research funding and recruitment and promotion. Our study supports the contention of Wagena in a 2005 commentary that implicit within the informal research training are directions about ‘how to work your way onto the byline of articles without contributing sufficiently’ (Wagena, 2005, p. 308).

A further difficulty relates to career structures in research. The more senior a researcher becomes, the greater their managerial responsibilities and the lesser their day to day involvement in performing research. We do not have a formal way of acknowledging management contributions. A stint in administration can lead to gaps in a senior researcher’s publication record that can undermine their ability to gain funding or move to new positions. It is counter-intuitive to expect researchers to ‘play by the rules’ when the rules exclude their efforts and intellectual property from the standard reward system and there are no other avenues to gain recognition for their work. It is hardly surprising to find that researchers are more likely to engage in unethical behaviour if they feel that the procedures in place result in unjust distribution of resources (Martinson, Anderson, Crain, & De Vries, 2006).

Difficulties can be exacerbated by cross- or multi-disciplinary research, in which there are different expectations in relation to authorship and publication. These issues are particularly important in publications resulting from postgraduate study, where there is inevitably a power imbalance between the student and his/her supervisors. Increased emphasis on multi-disciplinary and international collaboration to solve complex research questions means that the issues observed in our small sample may become more common given divergent understandings of authorship within and between disciplines and countries.

Conclusion

Researchers have to maintain a difficult balance between, on the one hand, the demands of personal ethical standards, regulatory guidelines and the example of exemplary mentors and, on the other, the requirements of a perverse reward system, the ever increasing competitiveness in research, and the examples and

demands of successful researchers who do not follow the rules. International empirical research is needed in order to establish cultural differences and there is a need for further discussion on the ways in which institutional structures can support researcher integrity in the publication of research.

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