Women's and Men's Authorship Experiences: A Prospective Meta-Analysis

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*The opaqueness of author naming and ordering, when coupled with power dynamics, can lead to a number of disadvantages in academic careers. In this commentary, we investigate gender differences in authorship experiences in a large prospective meta-analytic study (*k = 46; n = 3,565; 12 countries). We find that women's and men's authorship experiences differ significantly with women reporting greater prevalence of problematic behaviors. We present seven actionable recommendations for improving the receipt and reporting of intellectual credit. Such actions are needed to ensure fairness in authorship, which is one of the most powerful factors in academics' career outcomes.*

Authorship affirms credit and signals responsibility for research-related contributions (Chang, 2019). Yet, despite its importance in nearly every metric of academic success, as well as the existence of professional guidelines (Smith, Bélisle-Pipon, & Resnik, 2019), the determination of authorship and authorship order is influenced by power dynamics and unevenly applied criteria (Ni, Smith, Yuan, Larivière, & Sugimoto, 2021). Fair assignment of intellectual credit is a critical issue, as authorship of publications is one of the best predictors of future career outcomes of management researchers, and there is strong pressure to publish in high-visibility journals (Aguinis, Cummings, Ramani & Cummings, 2020) or perish (McGrail, Rickard, & Jones, 2006; Tijdink, Verbeke, & Smulders, 2014). Yet, ambiguity in authorship practices means that certain scholars could be disadvantaged in the process. Specifically, it is important to understand the authorship experiences of women and men in academia given the evidence that women are disproportionately disadvantaged in a number of ways in the recognition and ordering of authorship (Ni et al., 2021; Ross, Glennon, Murciano-Goroff, Berkes, Weinberg, & Lane, 2022; Smith & Master, 2017; West, Jacquet, King, Correll, & Bergstrom, 2013).

Knowledge about how men and women experience the process of assigning authorship is obfuscated by three primary factors. First, as indicated above, there is insufficient transparency in authorship naming (i.e., who gets to be an author) and ordering (i.e., authorship order on publications indicating the magnitude of credit in many disciplines; McCann & Polacsek, 2018). A lack of openness can also lead to more problematic author practices including ghost authorship (i.e., unwilling exclusion as authors of individuals who contributed to a work; Lacasee & Leo, 2010; Ren, Su, Lu, Dong, Ouyang, & Talhelm, 2016) and gift authorship (i.e., inclusion of authors who did not sufficiently contribute; Eriksson, Godskesen, Andersson, & Helgesson, 2018; Ren et al., 2016). Inadequate transparency results in variability both across and within disciplines in naming and ordering norms (e.g., alphabetical order), listing principal investigators first or last, and exclusion of doctoral students (da Silva & Dobránszki, 2016).

Second, there is no common standard to reference when deciding on author naming and ordering. Ambiguity can even exist within disciplines when a standard does exist, such as the one provided by the American Psychological Association (APA; e.g., how much is one to "weigh" the act of writing compared to analysis?). It is not clear how consistent scholars are in applying such standards either. Typical journal reporting standards only require an order of authors without information on the manner in which authors contributed. This paucity of guidance is particularly troublesome given that various types of intellectual contributions are often weighted differently across disciplines (e.g., securing funding, data collection, data analysis, and writing). Research suggests that women are disproportionately affected by this lack of clarity in authorship practices (Macaluso, Larivière, Sugimoto, & Sugimoto, 2016; Ross et al., 2022). Due, in part, to traditional gender roles of maintaining harmony in groups (Eagly, 2013),

women may be expected to acquiesce rather than speak up about receiving deserved authorship credit. Or, they may be assigned or elect project roles that are seen as less prestigious by some (Paustian-Underdahl, Sockbeson, Hall, & Halliday, 2024). Naturally, both men and women play a role and have responsibility in terms of ensuring fair reporting of intellectual credit (Auschra, Bartosch, & Lohmeyer, 2022). Unfortunately, historically, the responsibility of men to promote inclusive practices in the sciences has been neglected with many solutions, such as training, being aimed at women (Yavorsky, Banks, & McGonagle, 2019). Everyone has a responsibility to engage in open and transparent authorship practices.

A third issue is the lack of policies and tools for preventing and resolving authorship disputes. A review of all Research 1 (R1) and Research 2 (R2) universities in the United States (U.S.; as defined by Carnegie Classifications) demonstrated that 76% do not have policies around authorship or a formal dispute resolution process (Rasmussen, Hausfeld, Williams, Banks, & Davis, 2020). Thus, men and women at different stages of their career may be disadvantaged due to insufficient guidance, training, and/or oversight to address potential conflicts of interest and power differentials. Here women, especially when in critical transition points (e.g., Ph.D. students, post-doctoral scholars), seem to be adversely affected by authorship decisions when ambiguity is present (De Welde & Laursen, 2011; Feldon, Peugh, Maher, Roksa, & Tofel-Grehl, 2017). For example, relative to men, women report themselves lower in authorship order than what their contributions warrant (Macaluso et al., 2016; Ross et al., 2022; West et al., 2013). Alternatively, men are, on average, given more visible and high-status opportunities than women in science (Yoder, Schleicher, & McDonald, 1998). Even if only very small amounts of variance in evaluations of women and men can be explained by gender, this can result in a great deal of adverse impact over the course of careers (Martell, Lane, & Emrich, 1996; Samuelson, Levine, Barth, Wessel, & Grand, 2019). That is, small differences, especially at the start of a career, can create large disparities in the long run.

In the present commentary, we examine gender differences in authorship experiences using data from 3,565 university researchers in 46 independent samples across 12 countries. We present seven actionable and clear guidelines to prevent and resolve authorship disputes. Ultimately, open and transparent authorship practices serve to benefit all stakeholders and can promote a broader research ethics culture.

Our Approach

Open Science Practices

Anonymized, aggregated data, study materials, analytic code, transparency checklist, and study preregistration can be found on the Open Science Framework (OSF) (https://osf.io/fvm84/?view_only=d05470d2745844fdb5af6c5f5d32c45c).[1] The online appendix includes a description of the qualitative Constant Comparative Analysis that was completed on the open-ended survey response text used to help inform these recommendations.

Participants, Design, and Measures

The sampling strategy targeted management researchers but also a broad range of scholars to better understand authorship practices. Collaborating authors were recruited through

the network of the lead author team—which represented a steering committee—as well as through broad calls over the Academy of Management listservs. We collected data at 55 universities. However, nine institutions only had one survey response and were excluded from any analysis that focused on gender. A total of 46 samples ($k = 46$) were included in analyses on researcher experiences by gender (Sample sizes: median: $n = 46$; minimum $n = 7$; maximum: $n = 312$).

Faculty, as participants, were not offered any incentives. The incentives for graduate student participants typically involved a $5 Amazon gift card given to the first 100 respondents and the opportunity to be included in a random drawing for one of two $50 Amazon gift cards. Graduate student incentives varied slightly per institution to meet ethics board standards (some institutions did not allow random drawings; non-Amazon gift cards were used in some countries).

Following guidance from Heggestad, Scheaf, Banks, Hausfeld, Tonidandel, and Williams (2019) on scale adaptation, we used an adapted version of a previous authorship measure (Smith & Master, 2017) to collect data. We surveyed participants on the timing of when authorship was discussed and decided as well as authorship naming (who gets to be an author) and authorship order (who gets more or less credit). We also asked about disagreements within teams as well as authorship practices related to ghost authorship (i.e., inappropriate exclusion of an author) and gift authorship (i.e., inappropriate inclusion of an author). We inquired about participants' comfort level in discussing authorship as well as their perspective about receiving intellectual credit. Finally, we gave participants the opportunity to provide open-ended responses to allow for a qualitative analysis of additional experiences participants shared.

Drawing upon the Carnegie Classifications, 42% of the samples were from very high research activity institutions (R1), 36% from high research activity institutions (R2), 16% from low research activity institutions, and 5% from mixed organizational listservs (e.g., the Australian–New Zealand Academy of Management listserv). Approximations were made for non-U.S. institutions based on the criteria used by Carnegie. About 2% of samples were from Africa, 15% from Asia, 5% from Australia/New Zealand, 16% from Europe, and 60% from North America (including the U.S., Mexico, and Canada). Overall, 46% of the sample researchers identified as women. About 22% of researchers were from the natural sciences, 35% were from the social sciences, and 43% were from other areas, such as the humanities (or a combination of areas). Finally, 38% of the scholars were in the early stages of their career (e.g., doctoral students or post-doctoral scholars), 17% were at a mid-career point (e.g., assistant professors), and 35% were fully established in their careers (e.g., associate or full professors). Of the scholars, 10% did not indicate career stage. Some researchers held joint appointments with academic and non-academic institutions.

Detailed results pertaining to our hypotheses and research questions and their preregistration status can be found in the supplementary information online as well as at the OSF project appendix with the RMarkdown file, which further distinguishes confirmatory and exploratory analyses. Descriptions of the open-ended response text and the resulting qualitative constant comparison analysis can also be found in the supplementary information as well as on the OSF project page (data and R code are available there).

Key Findings

Summary of Findings

Most respondents reported experiencing problematic behaviors related to attributions of intellectual credit. For instance, 68% of respondents stated that they had seen occurrences of gift authorship and 55% reported observing ghost authorship. The qualitative responses illustrated these practices such as, "I have worked with colleagues who operate under the principle that if they as much as 'breathe' on the data, they demand author attribution" and "Professors who unfairly ghost [i.e., leave off] their students in terms of authorship."

Gender differences emerged in these responses. Women reported more disagreements regarding naming authors in collaboration: Cohen's $d=0.29$ ($k=46$; $n=3,565$; 95% CI$=.21$ to .37; $I^2=76.0\%$). Women also expressed greater disagreements with collaborators when determining authorship order: Cohen's $d=0.24$ ($k=46$; $n=3,565$; 95% CI$=.17$ to .32; $I^2=77.5\%$). In addition, women felt less comfortable discussing authorship on research teams: Cohen's $d=-0.29$ ($k=46$; $n=3,565$; 95% CI$=-.37$ to $-.18$; $I^2=84.5\%$), as well as reporting greater concerns in terms of receiving the credit they felt they deserved on collaborative publications: Cohen's $d=0.21$ ($k=46$; $n=3,565$; 95% CI$=.11$ to .31; $I^2=85.5\%$).

Supplemental Analyses

In comparing scholars in the natural sciences relative to the social sciences ($n=1,849$; $k=28$), we did not observe practically significant differences in authorship inclusion/exclusion disagreements or authorship order. We found no difference in terms of reporting regarding receiving less credit than deserved or perceived comfort in discussing authorship. Furthermore, we found no difference in the extent to which decisions regarding authorship were arrived at through open discussion and with general agreement.

A central element of open and transparent reporting of authorship credit is discussing authorship and credit throughout the lifecycle of a research project. Overall, only 12% of the 3,975 responding researchers indicated that project roles were always outlined at the beginning of research collaborations compared to 41% who responded most of the time, 15% about half of the time, 12% less than half of the time, 17% rarely, and 3% indicated project roles were never discussed at the beginning of the projects. Similar patterns were observed for when authorship order was discussed. Specifically, 27% of researchers answered that authorship order is typically discussed when the team is first formed, 25% indicated that authorship order is discussed throughout the research project, 53% stated it is discussed during the write-up process, 28% when the manuscript is ready to be published, and 8% stated that authorship order is never discussed. To illustrate the challenges that can manifest overtime, one participant stated, "Sometimes 'co-authors' agree to work, make minimal initial effort, and then disappear altogether. Then you have a kind of obligation to include them in the publication, when they should be excluded."

Our overall findings provide evidence that we, as a field, are not doing enough to ensure the effective and accurate assignment of authors and authorship credit. Further, our gender-based findings provide evidence that women may experience disproportionate harm by not having better authorship policies and practices in place.

Recommendations for Open Authorship Practices

We conclude that there are important opportunities for improvement in terms of open authorship practices. Notably, women consistently reported different experiences around authorship practices. That is, we do see some gender differences in the authorship experiences of men and women such that women report experiencing more challenges. We suggest that these findings are meaningful, particularly as differences between men and women can accumulate as individuals progress through critical stages of careers (Martell et al., 1996; Samuelson et al., 2019). Further, this work, one of the largest scale studies to date on authorship, revealed engagement in inappropriate authorship practices, such as widespread experiences with ghost and gift authorship (e.g., 68% of respondents stated that they had seen occurrences of gift authorship, and 55% reported observing ghost authorship).

We offer seven recommendations to promote the fair assignment of intellectual credit. We suggest that these recommendations will benefit individuals of all genders and that there is an equal responsibility regardless of one's own gender to promote such practices.

#1. Open Communication on Contribution Roles

Arguably, the most immediate step to facilitating improved authorship practice, and ultimately a more ethical research culture, is for scientists to promote open communication in their collaboration to address the documented issues around authorship. In this meta-analysis, women reported feeling less comfortable discussing authorship on research teams. Notably, men and women described the infrequency with which authorship roles were discussed at the start of projects. Open communication throughout the research lifecycle involves the sharing of information about expectations, work roles, concerns, and changing circumstances. Open communication also necessitates two-way communication, which ensures that both women and men can have voice in conversations related to determining and reporting intellectual contributions. Gender and power dynamics may play a moderating role here, and both men and women have a responsibility to ensure that conversations relating to authorship are open and transparent. For instance, one participant shared that "Collaboration of any kind hinges on the willingness to communicate. My experiences, while limited, benefited from the awareness and open discussion of contribution of the process of writing" [*sic*].

Furthermore, communication practices and a culture that emphasizes values congruent with open communication (voice, psychological safety, etc.) may mitigate some of the reluctance in graduate students or researchers with junior roles (again, perhaps especially women). One participant shared what happens when such a culture is absent, stating that "there is a cultural expectation in my department, specifically, regarding adding advisors or faculty to work when their influence was secondary or none."

Authors' contributions can be reported via the Contributor Roles Taxonomy (CRediT) or other formal and informal mechanisms (Ross et al., 2022). Documentation can include supplemental materials that do not necessarily need to reflect the same authorship order. For example, one collaborator may be the lead author on analytic Python or R code posted to a GitHub page but perhaps is not the lead contributor on the overarching project published in a journal. Such documentation facilitates conversations around the completed work and should aid in making decisions about authorship naming and authorship order. An additional

suggested step here is to encourage all authors to create, and journals to require submission of, an Authorship Contribution Disclosure (Sauermann & Haeussler, 2017).

#2. Authorship and Dispute Resolution Policies

There is a systemic lack of guidance related to the reporting of intellectual credit. And, tragically, the majority of academic research institutions in the U.S. do not have authorship or dispute resolution policies (Rasmussen et al., 2020). This may have contributed to women having reported experiencing more disagreements regarding naming authors in collaboration as well as determining authorship order. University policies explicitly stating which authorship practices are unethical are needed, and such guidelines can facilitate open conversations about authorship throughout the research lifecycle (for a best practice example see Authorship Policy and Resolution Procedures; University Policy #318[2]). In particular, conversations about authorship that occur at multiple points in a project (e.g., the start, middle, at submission and after any revisions) can ensure transparency, open communication, and aligned expectations (Hosseini, Lewis, Zwart, & Gordijn, 2022). Yet, when disputes arrive at the conclusion of projects, journals typically refer such problems back to scholars or their institutions which, again, typically lack guiding policies (Rasmussen et al., 2020). One participant's response illustrates this point: "There is a strong element in this process that has to do with power within institutions, lack of clear rules (which sometimes appear intentionally unclear) and lack of accountability when academics with more institutional power abuse it."

#3. Clear Department Expectations Regarding Authorship

We suggest that departments should work with faculty to establish clear expectations regarding authorship. Department chairs are particularly important here to ensure that their departments engage in serious, informed, and honest conversations with faculty and doctoral students about authorship policies and the problems people encounter regarding the issues highlighted in this commentary. The primary goal would be to integrate the values of fair and equitable authorship policies into department culture and evaluation systems.

Formal training for men and women faculty can be beneficial as a complement to more informal conversations about norms and expectations. Men, who are often in higher status roles (e.g., endowed-chair professors), can be helpful in normalizing attending training related to activities that promote open authorship practices (Yavorsky et al., 2019). Authorship training serves to reduce concerns that an inappropriate "hidden curriculum" (informal lessons provided outside of a classroom) is being taught to graduate students, which then perpetuates further authorship concerns (Fryer-Edwards, 2002).

One specific way to address this is to encourage faculty to have a conversation with their students about authorship practices. Faculty members could be provided with a five-minute video highlighting key points for discussion in advance. Another option might be to require faculty who work with graduate students to complete authorship training to maintain graduate faculty status and the ability to serve on dissertation and thesis committees. For open-access authorship training based on funding by the National Science Foundation, see: https://www.authorshipproject.org/ (Holladay-Sandidge, Rasmussen, McBride, Demeter, Banks, & Hall-Hertel, 2023).

#4. Teaching Open Authorship Values to Graduate Students

Graduate students represent the next generation of scholars. Thus, it is important that graduate students are also taught open authorship values related to transparency, two-way dialogue, and fairness. Such values are needed to navigate conversations with research collaborators. One study participant expressed that authorship "needs to become more central to our training of researchers, in particular in social sciences where research is often undertaken on an individual basis during the PhD, before moving to team based projects post-PhD." While such education is typically included in most "Responsible Conduct of Research" or research integrity courses, more specific education at the department level or training integrated formally into research methods courses would clearly be beneficial. This training may facilitate shared knowledge about authorship and empower men and women to create an open dialogue and to transparently report authorship within project teams for generations of researchers to come.

#5. Authorship Agreements

Authorship agreements align expectations between collaborators and can be used to normalize and increase comfort levels for women (and men) when discussing authorship. They may be used systematically and formally (i.e., signed by collaborators) or informally as a tool to facilitate conversations. In the latter case, for example, a graduate student could use the document as a guide to know what questions to ask their mentor. These agreements are documents that can be revised or expanded as projects evolve. Fundamental components of authorship agreements should include basic project information, such as a tentative title, aims and scope, target outlet, authorship guidelines to be followed (e.g., guidance by the APA; https://www.apa.org/science/), tasks and roles, as well as a plan on when the collaborators will discuss authorship naming and ordering. Multiple examples and templates of authorship agreements are publicly available and have been translated into six languages (Rasmussen, Banks, Demeter, Holladay-Sandidge, McBride, Hall-Hertel, & Tonidandel, 2023).[3]

#6. Documentation Throughout the Research Lifecycle

Research projects can take long periods of time to conduct and are dynamic in that the nature of the work and roles may change from start to finish. Efforts should be taken to document the work that each collaborator contributes to the project (e.g., lab notebooks, annotating code, archiving of draft versions, initial study materials). Such documentation may ensure that both men and women receive fair recognition and rewards for the work they complete through key domains of academic science. The Open Science Framework (https://osf.io/) is just one example of where preregistrations, materials, and the general workflow process of a project can be documented, along with an early opportunity to indicate collaborators and to assign separate DOI numbers to distinct elements produced in a project.

#7. Reactive Steps for Individuals

The steps we have suggested here are largely proactive and help to prevent authorship issues from arising. However, that is not always possible, especially for individual

researchers. If an individual has concerns about authorship on a project, we encourage that scholar to reach out to someone. Ideally, if there are concerns, individuals should contact the leader of the project (the earlier in the process the better). Yet, if a scholar does not feel comfortable discussing the concern with the project lead or other collaborators, they can reach out to others (e.g., one's department chair, a graduate course instructor, another student, the Ombuds office at their university, or even a colleague at another university). Sometimes letting the situation go and resolving not to let it happen in the future may be the right choice. However, the bottom line is that it is good to talk things through with someone you trust; doing so can help one decide how to proceed. If the situation is particularly serious, the university research integrity officer is often a good point of contact. Again, however, many universities do not yet have clear policies to help (Rasmussen et al., 2020). Accordingly, reviewing professional standards in one's field, such as APA's, can help one to become more familiar with one's rights as a collaborator.

Conclusion

Our work here represents the most systematic and far-reaching review of authorship policies and practices in management research conducted to date. Accordingly, we provided seven recommendations related to how authors, editors, and stakeholders can create an open environment that allows for the accurate and fair allotment of credit for one's intellectual contribution regardless of their affiliation, nationality, and gender. Open and transparent authorship practices are a responsibility of all researchers. Such practices benefit academically-oriented stakeholders as well as promote a broader research ethics culture. Further, a key point to remember is that even high performing, collegial research teams can benefit from promoting open authorship activities. We hope the recommendations discussed here serve to facilitate such practices.

Author Contributions

Conceptualization: GCB, LMR, JMP, ST, MMH, CEW, ED
Data curation: GCB, ST
External funding acquisition: CNGB
Investigation: GCB, LMR, JMP, ST, BHA, CEW, MMH, JAA, NB, JHB, AAB, RB, CMC, BADJ, JAD, CNGB, JGF, MFA, MFG, WLG, JJG, LMG, MGGM, LGV, RG, ASH, ZH, SK, TK, DTK, ML, LPM, CM, MAM, LBN, WGO, EHO, JRP, DMP, RRP, DER, ST, JST, TV, JV, CEW, HGW, HMW, TY, TLL, CW
Formal Analysis: GCB, ST, BHA, MMH
Methodology: GCB, ST, BHA, MMH, CEW
Project administration: GB
Resources: GCB, LMR, JMP, ST, BHA, CEW, MMH, JAA, NB, JHB, AAB, RB, CMC, BADJ, JAD, CNGB, JGF, MFA, MFG, WLG, JJG, LMG, MGGM, LGV, RG, ASH, ZH, SK, TK, DTK, ML, LPM, CM, MAM, LBN, WGO, EHO, JRP, DMP, RRP, DER, ST, JST, TV, JV, CEW, HGW, HMW, TY, TLL, CW
Software: Not applicable
Supervision: GCB
Validation: ST, BHA
Visualization: GCB, ST

Writing original draft: GCB
Writing–review & editing: GCB, LMR, JMP, ST, BHA, CW, MMH, JAA, NB, JHB, AAB, RB, CMC, BADJ, ED, JAD, CNGB, JGF, MFA, MFG, WLG, JJG, LMG, MGGM, LGV, RG, ASH, ZH, SK, TK, DTK, ML, LPM, CM, MAM, LBN, WGO, EHO, JRP, DMP, RRP, DER, ST, JST, TV, JV, CEW, HGW, HMW, TY, TLL, CW

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Notes

1. https://osf.io/fvm84/?view_only=d05470d2745844fdb5af6c5f5d32c45c
2. https://graduateschool.charlotte.edu/responsible-research/authorship#:~:text=The%20University%20of%20North%20Carolina,formal%20steps%20for%20dispute%20resolution
3. For example, see here: https://ninercommons.charlotte.edu/islandora/object/work:921, as well as here: https://rwa-web.shinyapps.io/AuthorshipAgreement/

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