Med Health Care and Philos (2015) 18:171–175
DOI 10.1007/s11019-014-9585-6

SCIENTIFIC CONTRIBUTION

# Scientific authorship and intellectual involvement in the research: Should they coincide?

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Published online: 18 July 2014


**Abstract** An update of the widely acknowledged recommendations on how to handle authorship in research, issued by the International Committee of Medical Journal Editors (ICMJE), was issued in August, 2013. While the revised recommendations contain several clarifications compared to earlier versions, one arguably important aspect is still not addressed: the relationship between authorship and intellectual involvement in research. In this paper, it is argued that the ICMJE authorship criteria are flawed in this respect: they do not explicitly require of authors of scientific papers that they do research. It is further suggested that unless academic authorship clearly reflects to what extent individual researchers have been intellectually involved in the research and to what extent they have merely contributed with research-related work, they will, in many cases, be misleading about research merits.

**Keywords** Authorship · Ethics · Intellectual involvement · Research

## Introduction

Authorship is one of the main issues in research ethics. In most academic fields researchers are under a permanent pressure to publish, and publications in international peer-reviewed journals are normally the key to a successful academic career (Smith and Williams-Jones 2012; Kaufmann et al. 2010; Borry et al. 2006; Shamoo and Resnik 2003). Furthermore, the productivity of university departments is increasingly measured using bibliometric methods, which may serve as a basis for distribution of faculty funding (Karolinska Institutet 2013). Small wonder who gets their names on the paper, and why, is a big practical issue (as well as one of principle) wherever research cooperation and co-authoring is the norm.

The International Committee of Medical Journal Editors (ICMJE) issued an update of their widely acknowledged recommendations on how to handle authorship issues in August, 2013. The revision contains several improvements, such as increased clarity on what substantial contributions make up the basis for co-authorship (the first authorship criterion), an important statement on fairness in research cooperation (outside the list of criteria for authorship), and an added criterion stressing the duty of all authors of a paper to contribute constructively in case of an investigation of scientific misconduct (ICMJE 2013).

However, there is one thing that the updated criteria on authorship do not explicitly address that arguably is of relevance to a proper evaluation of academic authorship. It might seem that the ICMJE criteria do not require that you *do any research* to be an author of research papers—to do practical work, read the paper critically, and approve it is enough. Or so it might seem.

The purpose of the present paper is to examine whether this criticism is correct and what changes in the list of criteria, if any, is called for.

## ICMJE criteria for authorship

Let us first recapture the ICMJE criteria for authorship (ICMJE 2013):

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1. Substantial contributions to the conception and design of the work; or the acquisition, analysis, or interpretation of data for the work; AND
2. Drafting the work or revising it critically for important intellectual content; AND
3. Final approval of the version to be published; AND
4. Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

The criteria should be read as jointly necessary and sufficient: if you fulfil all criteria, then you should be included as author; if not, then you should not be designated as author (ICMJE 2013).

You may rightly criticize these criteria for being both vague and ambiguous (Helgesson 2011). *Vagueness* especially concerns the idea of "substantial contribution", since the requirement that a contribution should be substantial does not clearly state what is required. This vagueness is mainly unavoidable, because if the first criterion were more detailed about what is required, then it would probably not be applicable to the wide range of research that it is intended to be. However, the vagueness could in principle be reduced by adding further examples of what would, and what would not, count as a substantial contribution.

The main remaining *ambiguity* concerns the double meaning of "revising", acknowledged in any standard dictionary; on one interpretation you can critically revise a text without changing anything, on another you cannot. However, it seems clear that the first interpretation is the intended one; you may critically revise a paper without making any changes, otherwise researchers would have to make sure that the person drafting the work does not get everything right at once, thus expelling the other collaborators from authorship because they cannot fulfil the second criterion (Helgesson 2011).

One might further complain that the fourth criterion, added in the last version of the ICMJE Recommendations, is about *responsible* authorship rather than about authorship as such, but this actually goes for criterion 3 and partly for criterion 2 as well, and has been intended through all versions of the ICMJE view of authorship: in order to be able to take responsibility for a paper, you must read it critically, and the approval of the final version is an act by which authors make official that they take that responsibility.

But questions that remain are: Where is the researcher in the ICMJE criteria? And will you find others than the paper's researchers in the author list?

## The intuition

I suggest that a common and reasonable intuition among researchers is that (1) those who should be listed as authors of a paper are those who have been involved in the research of that paper, and (2) making a contribution to a study is not necessarily the same as doing research; there are the researchers and there are the researchers' helpers. To be a researcher in relation to a certain paper is, essentially, to be *intellectually involved* in the research questions of that paper, alone or with others engaged in that work, while making some specific contribution to the paper. How many people are intellectually involved in a study may vary, but it seems odd to claim that a person who is not intellectually involved is doing research, even if that person is doing research-related work.

The intuition seems to underlie comments I've got from doctoral students and senior researchers in medicine that it would be clearly out of place to include as authors technicians who provide necessary help with instruments or other equipment but are not involved in any part of the research. Making necessary contributions is simply not enough for "doing research" and therefore not sufficient for authorship. Many share this view also regarding biomedical analysts who perform laboratory work without being informed or interested in why the analyses or tests are run and regarding research nurses who spend their days recruiting patients or collecting patient data but without taking part of the plans for the studies. The same goes for external statisticians when they enter only to give recommendations on what statistical tests to use or to control that statistical methods are applied correctly.

The intuition that authorship should have something to do with participating in research, in the sense of being involved in and trying to contribute to stating or answering the research questions of the specific paper, and not only with performing some tasks related to this, also explains why people in academia find it reasonable, for instance, that doctoral students are listed as authors for laboratory work related to their thesis, while biomedical analysts may carry out very similar laboratory work, perhaps more swiftly and skillfully, without being included. Or why research nurses, or statisticians, so often are not included in papers. By this I do not mean to imply that no mistakes are made when statisticians, biomedical analysts, or research nurses are not given the opportunity to become co-authors. What is suggested is that mistakes are made in those cases where individuals in these professions have been intellectually involved in the work in a way that goes beyond contributing with some limited, although important, piece of work, like carrying out a series of analyses, collecting certain patient data, or suggesting some standard statistical analyses.

To the extent that the intuition is reasonable, it has substantive normative implications: one should not be included as author on a scientific paper unless one is doing research for that paper (in the sense presented here). Based on this, it is easy to identify a number of cases when people are included as authors without deserving to be so. Apart from cases that clearly deviate from the ICMJE recommendations—such as being included based exclusively on one's having funded the research, being head of the research group or department, or being supervisor to a doctoral student—there seems to be possible cases where an individual fulfils the ICMJE criteria for authorship, yet should not be included as author. Examples:

- People who contribute substantially to the collection of data, without being involved in the research apart from that, who do an acceptable job revising the paper, and who fulfil requirements 3–4.
- People who do laboratory or other analyses without being involved in the research, and who fulfil requirements 2–4.

In what follows, we will look at two ways to defend the ICMJE authorship criteria against the criticism that they do not consider research involvement properly. But before doing this, it should be noted that the ICMJE Recommendations are not entirely silent on the connection between authorship and intellectual contribution. In section IIA1, on "Why Authorship Matters" (ICMJE 2013, p. 2), it says:

> The following recommendations are intended to ensure that contributors who have made substantive intellectual contributions to a paper are given credit as authors, but also that contributors credited as authors understand their role in taking responsibility and being accountable for what is published.

So it may be the case that the ICMJE criteria for authorship are meant to imply that only those who have given substantive intellectual contributions should qualify as authors. But the quote may also be taken to say that *at least these* should qualify, not excluding those who have not made substantive intellectual contributions. That is, nothing said in the quote explicitly says that making a substantive intellectual contribution is a necessary condition. Regardless, proper criteria for authorship should be self-sufficient, so if an intellectual contribution would be required for authorship, then this requirement should be included in the criteria. Besides, the quoted passage is not given as an explication or explanation of the criteria, but as part of their introduction, so it cannot be interpreted as providing further explanation of the criteria. I therefore conclude that the quoted statement does not eliminate the criticism that the ICMJE authorship criteria do not consider research involvement properly.

## The stipulation response

A first potential defence of the ICMJE authorship criteria against this criticism is that you are free to define "authorship" any way you like, and to regard authorship in research as not necessarily linked to intellectual involvement in the research questions and the overall thrust of the study is the established way to understand it, at least in medicine.

The literature shows that there are many deviations from the authorship practices recommended by the ICMJE (Barbour 2010; Bennett and Taylor 2003; Strange 2008; Weijer and Akabayashi 2003; Moffat and Elliot 2007). Whether this shows that people disagree with the criteria, agree but cheat, or deviate for other reasons lies beyond the present discussion. My argument against the stipulation response does not concern its acceptance, but whether or not it is reasonable in the light of the purpose for which publications are used in academia. Authorship plays a central role as a ground for research merit: publication lists are supposed to say something about persons as researchers, and they are taken to be useful when comparing the merits of, for instance, different individuals competing for the same research positions (Smith and Williams-Jones 2012; Shamoo and Resnik 2003; Helgesson 2011). Because of the intended use, it is not arbitrary whether genuine research involvement should be part of the authorship criteria. To give an example: If someone with 30 publications in his CV has contributed with competent laboratory work but has never been involved in any other way, then this person cannot be said to have done any research (as specified above), although quite a bit of research-related work. Therefore it is misleading that he has 30 publications, which implies that he is a senior researcher. The fact that he has read through all the papers, and a few times identified and corrected serious mistakes in the description of the laboratory methods used, does not change this. Rather he should have been listed 30 times as a "contributor" (BMJ 2014; Smith 1997).

In conclusion: Arbitrary definitions or criteria must not be provided, since they may contribute to misleading descriptions of research merits. If publication lists are intended to reflect research experience (as discussed above), then the definition of "authorship" should reflect this.

## Critical revision as intellectual involvement

According to a second, and more promising, defence of the ICMJE authorship criteria, the intellectual involvement required for proper research authorship is guaranteed by the inclusion of the second criterion: You cannot draft the

paper, or revise it critically for important intellectual content, without knowing why it is written or what its bearing ideas are.

I will not argue with the first part of the claim—if you draft the paper, you have to know why it is written and get intellectually involved—but the second part is the interesting one in this context. Is it true that you cannot revise a paper critically without getting intellectually involved in the work to be published?

It depends on how much you ask of a critical revision. The 2013 version of the ICMJE Recommendations says only this (p. 2): "These authorship criteria are intended to reserve the status of authorship for those who deserve credit and can take responsibility for the work."[6] In studies where researchers from different areas cooperate, it can be expected that no one, or only a few, will be able to understand all the details of all the work done. It was probably with this in mind that the following passage was included in the previous (2010) version: "An author must take responsibility for at least one component of the work" (ICMJE 2010). If it is a correct reading of the ICMJE authorship criteria that it is sufficient that you make a substantial contribution under the first criterion and then critically revise the part of the paper that covers your own contribution, then this criterion does not in principle prevent that you are included as author without being intellectually involved in the research questions that the paper addresses. However, the absence of the quoted 2010 passage in the 2013 version of the ICMJE Recommendations perhaps indicates that this reading is not intended.

On the other hand, if each author is required to take responsibility for all research in a paper, then too many people are included as authors in many papers. Such a requirement does not seem reasonable. It would leave us with no authors in collaborations across research fields where no one can critically evaluate everything that the paper builds on.

However, there is a middle ground between taking responsibility for one's own contribution only and taking responsibility for every detail of the paper. Understanding the main thrust of the study and critically reviewing, to the best of one's knowledge, the different parts of the paper may require less than understanding every detail. This suggests that you may be intellectually involved without fulfilling the strictest interpretation of critical revision. What a less strict, and more reasonable, second criterion would require in terms of intellectual involvement is not entirely clear. However, it does seem to require some general intellectual grasp of the content of the paper; if not beforehand, then at least as the paper is revised. This renders support to the view that the second criterion requires intellectual involvement. If it does, it would be helpful for future authorship discussions, and for practical application of the criteria, if this were spelled out more clearly. Such engagement is certainly not always asked for in practice among collaborating researchers, and it is my impression from medicine that it is not generally perceived as required by the ICMJE Recommendations.

## Too late?

It could be argued that getting intellectually involved in a study no earlier than at the time of revising the paper is in fact not to be genuinely involved in the work that the paper presents, and that one should therefore not be included as author. A person entering intellectually at the revision stage has obviously not been intellectually involved in the research for the major part of the time and has, thus, not shared the journey with the other authors. But this aspect should not generally disqualify for authorship—a latecomer may add more substance to a paper in short time than the others have contributed jointly before that; it would then be strange, and unfair, not to include that person. This defense, however, could be understood as relying on cases where the late contribution is exceptional, or at least considerable. Our discussion should also cover cases where people make a substantial non-intellectual contribution and then are fairly ambitious in their revision, but are not involved beyond that. Are they correctly identified as researchers of that study and therefore as authors of the paper? It seems to me that they are, because they are intellectually involved—at last. There are certainly different levels of involvement, which can be reflected in the authorship order (Brennan et al. 2013).

## The purpose of identifying the authors

I suggest that we cannot decide where to draw the line between sufficient and insufficient contributions and involvement based exclusively on language use and moral intuitions. The answer will have to depend on the intended use of authorship criteria. What are claims about authorship in academia meant to tell?

It is clear that the interest in getting listed as author of research papers usually has to do with the implications in terms of academic merit. The publication list is seen as an important (perhaps the most important) inventory of academic accomplishments. But research-related merits may be relevant in different ways, depending on the context. Sometimes it is the laboratory experience, or the experience with recruiting patients to studies, that is evaluated. At other times, experience in conducting research is in focus. I recommend that the established labels "contributorship" and "authorship" are used to distinguish between various

contributions to research on the one hand and intellectual involvement in the research on the other (including the ICMJE authorship criteria). "Authorship" should then be used to cover those who have been intellectually involved in the research of the paper.

Exactly what it takes in terms of involvement in the research questions and the way the study is designed and carried out to be a research author proper may not be possible to specify in general terms. The intellectual involvement has to be "sufficient" much the same way as the contribution under the first authorship criterion has to be sufficiently substantial. What is clear from applying that requirement (i.e., the first criterion) is that even though "substantial" is inherently vague, the criterion is nevertheless useful for identifying several sets of cases where it is not satisfied.

## Conclusion

This paper has argued that the ICMJE authorship criteria are flawed in an important respect: they do not explicitly require of authors of research papers that they are intellectually involved in the research. Unless publication lists clearly reflect to what extent individual researchers have conducted research (in this sense) and to what extent they have merely contributed with research-related work, they will, in many cases, be misleading about research merits.

**Acknowledgments** I am grateful for constructive comments from Niklas Juth, Niels Lynöe, and Tomas Månsson on an earlier version of this paper.

**Conflict of interest** The author declares that there are no competing interests.

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