

Appearance of ghost and gift authors in Ugeskrift for Læger and Danish Medical Journal

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ABSTRACT

INTRODUCTION: Authorship should establish accountability and transparency, but previous research into authorship has demonstrated that authors do not always meet the International Committee of Medical Journal Editors' (ICMJE) authorship criteria. Yet, these studies have mainly focused on international, high-impact journals. The aim of the present study was to assess Danish authors' general authorship experiences and views on authorship and authorship criteria.

MATERIAL AND METHODS: Corresponding authors of articles published in Ugeskrift for Læger and Danish Medical Journal in 2010 received a web-based questionnaire about the sampled article, co-authors and contributors, general authorship experiences and views on authorship and authorship criteria.

RESULTS: A total of 470 authors received the questionnaire and 292 responded (response rate 62%). 29% had experienced that "somebody" (the respondent himself/herself or an acquaintance/colleague) had been excluded from the author byline. 17% had been offered illegitimate authorship. 16% of the respondents had offered illegitimate authorship to somebody else. 25% of the respondents did not agree that legitimate authorship requires fulfilment of all three current ICMJE authorship criteria. Some contributions/functions not part of the current ICMJE criteria were also considered relevant for authorship, e.g. co-author supervision, statistical assistance and research group leadership.

CONCLUSION: Illegitimate authorship is prevalent also in low-impact, national journals. In order to promote legitimate authorship, mandatory contribution statements should be considered, but education and information about existing criteria for authorship may be even more important.

FUNDING: not relevant.

TRIAL REGISTRATION: not relevant.

Biomedical authorship ideally establishes accountability and transparency, but research into authorship has demonstrated that authorship is not always legitimate [1-10]. In other words, authorship criteria, as defined by the International Committee of Medical Journal Editors (ICMJE) [11], are not always followed. "Authors" who are listed on the byline even though they do not meet the authorship criteria are referred to as either gift-

ghost- or honorary authors. Ghost authors meet authorship criteria, but are not listed on the byline.

Previous studies have mainly focused on authors who have published in international, high-impact journals with large circulation numbers. It is, however, not known whether their results and conclusions can be extrapolated to journals operating in small biomedical communities – such as Ugeskrift for Læger (UfL) and Danish Medical Journal (DMJ).

The aim of the present study was to assess Danish authors' experiences and views on authorship, including their awareness and fulfilment of current authorship criteria, and on this basis to analyse the prevalence of illegitimate authorship, i.e. gift- and ghost authorship.

MATERIAL AND METHODS

All articles published in the UfL and the DMJ in 2010 were included (576 articles in total: 532 UfL articles, 44 DMJ articles). A total of 78 single-authored articles were excluded (13.5%) (Figure 1). The remaining 498 articles were classified into different categories: original research articles (n = 144), systematic reviews (n = 38), non-systematic reviews (n = 107), case reports (n = 113) and "others" (education, editorial, evidence-based medicine, picture of the month) (n = 96).

The corresponding author of each sampled article

ORIGINAL ARTICLE

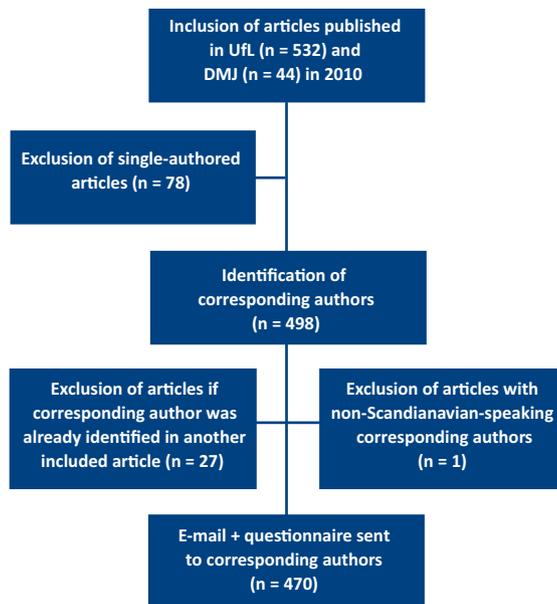
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FIGURE 1

Flow chart.



DMJ = Danish Medical Journal
UfL = Ugeskrift for Læger (Journal of the Danish Medical Association)

was identified. For individuals listed as corresponding author on more than one article ($n = 27$), one article was randomly selected for inclusion. Non-Scandinavian-speaking authors were excluded ($n = 1$) (see Figure 1).

Questionnaires used in previous English studies [1, 2] were incorporated into a questionnaire in Danish (web-based and available on the journal website as a supplemental file). The Danish questionnaire consisted of 39 items divided into different sections/themes: demographic data, data about the published article, data about other contributors/authors, general authorship experiences and views on authorship and authorship criteria. Some questions were deliberately formulated as open-ended questions in order to encourage broad-based responses. The questionnaire was face-validated by health professionals as well as non-professionals (thus taking into account that not all authors submitting to DMJ/UfL come from the health sciences). Feedback from test persons was incorporated into the final version of the questionnaire.

Corresponding authors ($n = 470$) were sent an e-mail in which the aim of the study was explained. Every e-mail contained a link to the questionnaire. It was emphasized that study participation was voluntary and anonymous (e-mail address and link were thus uncoupled). "Authorship" was defined using the ICMJE's authorship criteria: "Authorship credit should be based on 1) substantial contributions to conception and design, acquisition of data, or analysis and interpretation

of data; 2) drafting the article or revising it critically for important intellectual content; and 3) final approval of the version to be published. Authors should meet conditions 1, 2, and 3" [11]. Gift authors were defined as individuals who did not meet all three criteria, but who were listed on the byline anyway. Ghost authors were defined as individuals who made enough contributions to merit authorship, but who were not listed on the byline.

Results were mainly analysed descriptively. Differences in proportions between different article types were compared using the χ^2 test. Calculations were done using Microsoft Excel and IBM SPSS Statistics 19.

The questionnaire was designed and analysed using the online survey software SurveyMonkey [12].

Trial registration: not relevant.

RESULTS

The questionnaire was e-mailed to 470 corresponding authors and 292 responded (62%). Not every author answered every question; thus, response rates for individual questions differ. The total number of respondents is given for each question. The demographic characteristics of the respondents are provided in **Table 1**.

The articles in the present study comprised 103 original articles (38%), 69 case reports (25%), 45 non-

TABLE 1

Demographic characteristics of respondents.

Characteristics	
Gender, n (%)	
Male	177 (61)
Female	115 (39)
Median age, range, years	
	40-44
Holder of medical degree (MD), n (%)	
	276 (95)
Position (five most frequent), n (%)	
Senior registrar	67 (24)
Consultant doctor	60 (21)
Professor	37 (13)
PhD	23 (8)
Staff specialist	16 (6)
Clinical specialties (five most frequent), n (%)	
Anaesthesiology	20 (11)
Otorhinolaryngology	18 (10)
Paediatrics	17 (10)
Family medicine	15 (9)
Cardiology	15 (9)
No. of previous publications, median (range)	
In UfL	2 (0-30)
In DMJ	0 (0-14)
In other journals	3 (0-75)

DMJ = Danish Medical Journal

UfL = Ugeskrift for Læger (Journal of the Danish Medical Association)

systematic reports (17%), 36 systematic reviews (13%) and 19 "others" (7%). The median number of authors per article was three (range 2-14). Corresponding authorship belonged to first authors in 220 cases (82%), second authors in 18 cases (7%) and last (but not necessarily third) authors in 27 cases (10%).

The order of authors was determined according to the size of their contribution in 101 cases (38%), by first author in 59 cases (22%) and by last author in 29 cases (11%). Other methods for determining the authors' order were alphabetically or by lot. A total of 101/267 respondents (38%) stated that the process of determining the authors' order had been characterised by consensus.

Respondents declared what contributions/functions they and their co-authors had performed in relation to the published article (box ticking of predefined categories) (Table 2). It was calculated how often a specific contribution/function was performed by first authors, second authors, etc. (relative distributions). All except three contributions/functions were most often performed by first authors. Manuscript approval and co-author supervision were most often performed by second authors. Being head of the department was most often "performed" by the third authors (see Table 2).

A total of 251/251 respondents (100%) stated that they would feel comfortable explaining the major conclusions of the article, and 27/250 (10%) were not sure whether each of their co-authors would be able to do the same.

Furthermore, 23/245 (9%) respondents declared that one or more of the persons were listed as authors even though they should not have been. This prevalence of gift authorship was consistent with the proportion of respondents who declared that one or more "co-authors" performed one single contribution/function. With reference to article type, the prevalence of gift authorship was 7/45 (16%) for non-systematic reports, 6/69 (9%) for case reports, 3/36 (8%) for systematic reviews and 7/103 (7%) for original articles. Differences in proportions of gift authorship were not significant ($p = 0.396$). In 6/245 (2%) articles (three case reports and three original articles), one or more persons should have been listed as authors, but were not. In two articles, both gift- and ghost authorship occurred.

Regarding respondents' general authorship experiences, 69/237 (29%) respondents had experienced that "somebody" (the respondent himself/herself or an acquaintance/colleague) was excluded from the author byline, even though this was not legitimate. A total of 41/237 (17%) respondents had been offered authorship, even though this was not legitimate. Of these, seven (17%) declined the offer. In all 17/237 (7%) respondents had experienced being listed as author on an article that



TABLE 2

Contributions/functions performed by different authors (relative distributions), all results are stated as percentages.

Contribution/function	1st author	2nd author	3rd author	4th author	5th author	All authors
Being head of the department	17	26	32	10	7	100
Approving the final manuscript before submission	29	30	22	10	5	100
Supervising co-authors	30	32	23	9	4	100
100% going through the manuscript	30	30	22	10	4	100
Revising the manuscript	38	29	18	8	3	100
Recruiting study participants	39	31	16	7	4	100
Being head of the research group	40	16	24	10	4	100
Making intellectual changes	40	28	18	8	3	100
Analysing and interpreting data	41	27	20	7	4	100
Getting/applying for financial and/or material support	43	19	17	10	4	100
Analysing and interpreting literature	46	24	17	7	3	100
Conceiving and designing the work	46	23	17	8	3	100
Collecting data	49	24	15	8	3	100
Writing (parts of) the manuscript	50	23	17	7	3	100
Recruiting co-authors	52	17	18	7	3	100
Doing statistical analyses	56	22	16	3	1	100
Reading page proofs	59	18	15	5	1	100
Conducting literature search	60	20	11	6	2	100
Communicating with the journal about submission	82	7	7	3	0	100
Number of contributions in proportion to	50	22	12	9	4	100

he/she did not know about beforehand. 38/237 (16%) respondents had offered authorship to "somebody", even though this was not legitimate. In more than half of the cases, this was due to the existence of a local "code of conduct", including young authors offering illegitimate authorship to senior colleagues. In six of the cases, offering authorship was a prerequisite for obtaining necessary data/contributions.

In all 197/235 (84%) knew about the authorship criteria formulated by the ICMJE. Knowledge about the criteria had no connection with educational background or current position. 210/234 (90%) respondents agreed that an author should meet the first ICMJE criteria (substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data); 224/234 (96%) respondents agreed that an author should meet the second ICMJE criteria (drafting the article or revising it critically for important intellectual content); and 231/233 (99%) agreed that an author should meet the third ICMJE criteria (final approval of the version to be published). A total of 176/234 (75%) agreed that authors should fulfil all three authorship criteria, while 207 respondents gave their overall opinion about the current ICMJE authorship criteria. 145/207 (70%) described them as good/adequate, 19/207 (9%) described them as an ideal that was not always followed,

 TABLE 3

Contributions/functions considered irrelevant, relevant and/or essential for authorship (relative distributions), all results are stated as percentages.

Contribution/function	Contribution/function is irrelevant	Contribution/function is relevant, but not solely sufficient for authorship	Contribution/function is essential, but not solely sufficient for authorship	Contribution/function is essential and solely sufficient for authorship
Supervising co-authors	6	35	44	15
Recruiting co-authors	35	56	8	1
Recruiting study participants	14	49	30	8
Analysing and interpreting data	1	9	46	44
Conducting literature search	5	37	47	11
Analysing and interpreting literature	2	21	48	29
Revising the manuscript	2	15	58	24
Communicating with the journal about submission	21	37	35	7
Conceiving and designing the work	4	17	48	31
Collecting data	6	33	42	20
Getting/applying for financial and/or material support	21	44	28	7
Doing statistical analyses	6	36	43	15
Being head of the research group	16	34	38	12
Being head of the department	59	27	13	1
Writing (parts of) the manuscript	1	9	37	53
Approving the final manuscript before submission	4	20	55	22
Revising the manuscript	2	17	58	23
Making intellectual changes	4	22	54	20
Reading page proofs	18	42	36	5

and 9/207 (4%) found them to be too restrictive. Other responses centred on one or more specific criteria.

Respondents proposed possible initiatives for promoting legitimate authorship (i.e. fulfillment of authorship criteria). Among the initiatives were mandatory contribution statements, information/instructions, change of attitude including focus on senior authors not to include them automatically as authors without proper contributions, written author agreements entered into from the beginning of a study, guarantors (responsibility shared between one or more authors), editorial control (not otherwise specified) and author byline maxima (initiatives listed in descending order).

Respondents indicated what (predefined) contributions/functions they found irrelevant, relevant and/or essential for authorship (Table 3). "Being head of the department" was the contribution/function considered irrelevant by most respondents. "Writing (parts of) the manuscript" was the contribution/function considered essential and sufficient for authorship by most respondents.

Contributions/functions constituting the current ICMJE criteria were all considered essential, but not solely sufficient for authorship, except for "writing (parts of) the manuscript", which was considered essential and sufficient for meriting authorship. Other contributions/ functions that are not part of the current authorship criteria were also considered essential, but not solely sufficient for authorship, e.g. supervising co-

authors, doing statistical analyses and being head of the research group.

DISCUSSION

We found evidence of gift authorship in 9% of the included articles and evidence of ghost authorship in 2%. Yet, regarding the corresponding authors' general authorship experiences, 17% had at some point been offered gift authorship, and 16% had invited to gift authorship themselves. 29% of the respondents had experienced ghost authorship, e.g. that "somebody" (the respondent himself/herself or an acquaintance/colleague) was illegitimately excluded from the author byline.

Regarding authorship criteria, 15% of the respondents did not know about the authorship criteria formulated by the ICMJE, although manuscript submission requires every author to sign an authorship declaration declaring that all three authorship criteria have been met. 25% of the respondents did not agree that legitimate authorship requires fulfillment of all three current ICMJE authorship criteria.

Previous studies have found the prevalence of gift authorship in English language journals to be 18% [6], 19% [1], 26% [9], 32% [7], 39% [2], 56% [5] and 60% [3]. Similarly, the prevalence of ghost authorship has been reported to be 8% [6], 9% [2], 12% [1], 21% [5] and 75% [4]. A systematic review found that 29% of scientific authors have experienced authorship problems and/or misuse [13]. The prevalences of both gift- and ghost

authorship were lower in our study. The difference could be ascribed to the fact that previous studies have mainly focused on high-impact journals published in English. Yet, it should be noted that journals included in previous studies have not been comparable in terms of their impact factor, circulation number, publication language and area of focus (discipline, (sub)specialty, published manuscript types); the prevalence of illegitimate authorship may depend on these factors. One might argue that high-impact journals have stricter author guidelines and also stricter control mechanisms ensuring that these guidelines are followed. On the other hand, incentives to ignore criteria and guidelines for authorship may be more pronounced when submitting manuscripts to journals in this category. Another factor that seems to influence the prevalence of illegitimate authorship is whether or not a journal requires individual contribution statements. Such statements seem to reduce the occurrence of illegitimate authorship [14].

Previous studies have included different types of articles, resulting in different median/mean numbers of authors per article (for instance, the number of authors per original article is higher than the number of authors per non-systematic review). Different mean/median author numbers will influence the proportion of illegitimate authorship, as this is typically related to the length of the author byline [7]. Moreover, previous studies have defined legitimate/illegitimate authorship differently. In this study, illegitimate authorship hinged on whether or not an author met all three ICMJE criteria; some of the previous studies have used other/supplemental definitions, including/excluding different criteria. In some studies, legitimate authors would have to feel comfortable explaining the major conclusions of the article and perform more than one contribution/function [1, 6]. Lastly, the subject of authorship (and the accompanying responsibility) has gained increasing attention over the past years. This may have influenced the knowledge of, views on and experiences with authorship [6].

Previous studies have found that manuscript drafting, study design and statistical advice were contributions/functions that authors considered relevant and/or essential for authorship [9, 16]. In this study, manuscript drafting was regarded as essential and qualifying on its own. Yet, in line with previous studies, respondents also attached importance to contributions/functions that are not part of the current ICMJE authorship criteria (e.g. supervising co-authors, being head of the research group and statistical support).

This study had several limitations. The questionnaire was inspired by those used in previous studies and adapted to the Danish language, but the original English questionnaires were not formally validated. The sample size estimate was based on calculations

done in previous studies, but it is uncertain whether these data can be applied to this study since previous (quantitative) studies have mainly focused on international, high-impact journals with large circulation numbers. The response rate of 62% is acceptable [17] and, in addition, comparable to those quoted in previous studies. Yet, response rates for individual questions differ because not every respondent answered every question. We do not know whether non-respondents differed systematically from respondents. Even though it was emphasized that study participation would be anonymous, corresponding authors may still have feared that information tracking would be possible because of the relatively small size of the Danish biomedical community. Another limitation of the study was that data analyses were based on self-reporting; this might underestimate the true prevalence of illegitimate authorship. Furthermore, the possibility of recall bias cannot be excluded, although this should be minimal given the short lag time between the year of article publication (2010) and the survey (2011). Moreover, the questionnaire was sent to corresponding authors only. Although it seems reasonable to assume that the corresponding author is the person most closely involved with manuscript preparation and coordination, co-authors and contributors might have had other views and perspectives on these matters.

In conclusion, we found evidence of gift authorship in 9% of the included articles and evidence of ghost authorship in 2%; these prevalences are much lower than those previously reported for high-impact journals. Yet, regarding the corresponding authors' *general* authorship experiences, 17% had been offered gift authorship at some point and 16% had invited to gift authorship themselves. 29% of the respondents had experienced that "somebody" (the respondent himself/herself or an acquaintance/colleague) was illegitimately excluded from the author byline. A total of 15% of the respondents did not know about the authorship criteria formulated by the ICMJE, and 25% did not agree that legitimate authorship requires fulfilment of all three authorship criteria. Moreover, other contributions/functions not part of the current ICMJE criteria were also regarded as important. In order to promote legitimate authorship, transparency and accountability, individual contribution statements should be considered; but more importantly, education and information about legitimate authorship, including current authorship criteria, should be prioritised.

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