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# Problems With Indexing and Citation of Articles With Group Authorship

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**G**ROUP AUTHORSHIP (ALSO known as corporate or collective authorship), the listing of the name of a group in place of the names of individual authors, has been recognized since at least 1841.<sup>1</sup> Modified group authorship, in which individual names are listed followed by the name of the group, is also used. Group authorship is most often used by investigators associated with studies involving many investigators (eg, multicenter clinical trials or genomics) because it allows investigators to share credit equally.<sup>2</sup>

PubMed is the National Library of Medicine's (NLM's) bibliographic database, with citations generally dating back to 1966. The NLM has not included group authors in the MEDLINE author field; rather, the group name has been included as an add-on to the title. As of April 2001, group authors will appear in a new, separate "collective name" field. In the case of modified group authorship, named authors have been included in the author field and the research group name in the title field.

Science Citation Index (SCI) is a scientific and biomedical bibliographic database used to track citations to individual articles. Instead of listing the research group in the author field in its source listing, SCI lists either all individual names in the group or the writing committee members' names in the order they are listed in the article (eg, the first author listed could be the first investigator name in an alphabetically ordered list).

**Context** It is not known whether articles with group authorship (ie, with a research group name listed as the author) are difficult to identify or whether use of group authorship may lead to problems with citation.

**Methods** To examine ways in which reports of controlled trials with group authorship are indexed and citations counted in bibliographic databases, we conducted a cross-sectional study in January 2000. We identified 47 controlled trials funded by the National Eye Institute and 285 associated articles. Between January and August 2000, we searched PubMed and Science Citation Index (SCI) and recorded the citation practices for these articles. Our main outcome measures were ways in which trial reports were listed in PubMed and SCI and number of citations to each report by type of authorship.

**Results** Of the 285 published reports identified, 126 (44%) had group authorship, 109 (38%) had modified group authorship (listing individual names plus the name of the research group), and 50 (18%) had named authors only. In PubMed, no group authors were listed in the author field (per MEDLINE rules); in SCI, group-authored reports generally were incorrectly attributed (first name on investigator list [35.3%], first name on writing committee [25.5%], contact name [16.7%], anonymous [16.7%], and other [5.9%]). Using the SCI general search, we identified citations to 16.7% of group-authored reports, compared with citations to 96.9% of reports with modified group authorship and 93.9% of citations to reports with named authors only. Other systematic search methods found that more than 98% of group-authored reports actually had been cited and that group-authored reports were cited more than other reports.

**Conclusions** Indexing systems are not optimally adapted to group authorship. We recommend that indexing services change their practices to include group authors in the author field to help correct the problem.

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We examine here how reports of controlled trials with group authorship are indexed in PubMed and SCI and how citations are listed in SCI.

## METHODS

We identified all controlled trials funded by the National Eye Institute (NEI) as listed on their Web site in January 2000. We chose to study randomized clinical trials because they are associated with a strong tradition of group authorship. We selected NEI because it has a long-standing Web-based register of its clinical trials and associated articles that would provide us with an unbiased sample for comparisons of group and named authorship.

Publications associated with each trial were identified using PubMed (searches conducted between January and August

2000). We excluded all letters, editorials, and abstracts. Identified records were downloaded directly into ProCite, paper copies retrieved, and all source data (eg, authorship, article title) entered exactly as listed on the publication.

Articles are listed in SCI in 2 ways: first as a *source* article, which contains the citation, abstract, and references cited in that article, as well as the number of times that article was cited in other publications; and second as a *cited reference* (all cases in which the article was cited as a reference in other publications). The SCI

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search options for finding articles in these 2 ways are the general and cited reference searches, respectively. We searched SCI during the period January to August 2000; the database included articles published from 1987 onward. To identify the actual SCI source record for each publication, we used the SCI general search option with various key words and author names until each record was found.

We next searched for citations to each publication (citation record) in SCI, first using the general search option. All source records included in SCI are linked to all cases in which a publication has been cited exactly in the way it is listed in the SCI source database. Thus, if a record is listed in the SCI source database incorrectly, a citation to that record would have to be incorrect in exactly the same way to be counted and linked.

We also used the cited reference search to count the number of citations to the articles in our sample. A single article may be cited many different ways, so we looked for citations that used named authors, when they existed; the full group name; an abbreviation of the group name, using SCI rules as well as the abbreviations used by the research study group (eg, ISCH OPT NEUR DEC as well as IONDT for the Ischemic Optic Neuropathy Decompression Trial); the first 4 letters of each term in the research group name; the first name on the writing committee; and the first name on the list of investigators.

Since it would be necessary for the searcher to guess at the potential incorrect spellings and typographical errors to capture all citations to any article, our standardized citation search strategy could be an underestimate of the true number of citations. To obtain a better estimate of the actual number of citations, we also performed an ad hoc search for citations to 3 publications emanating from the IONDT. We used the text search terms *ischemic optic neuropathy* and *optic nerve decompression*, as well as the authors' names for all 24 IONDT clinical center directors and compared the results of this ad hoc search with our standardized study searches.

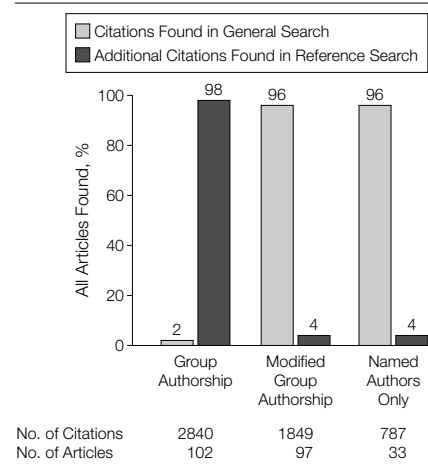
## RESULTS

We identified 47 NEI-funded controlled trials associated with 306 reports, of which 285 articles are indexed in PubMed. All 126 articles with group authorship were included in PubMed, but no author was listed in the author field, per NLM rules. All 109 articles with modified group authorship had the named authors listed in the author field, but the name of the research group was not listed there. All 50 articles with named authors had the named authors included in the author field. Eighty-one percent of the articles listed in PubMed (232/285) were included in the SCI source database. Excluded articles were all published before 1987.

Using the general search, we identified each article and recorded the way it was listed in the SCI source index. Articles with group authors ( $n=102$ ) were never listed as having a group author (per SCI guidelines): 35.3% listed the investigator names (sometimes numbering in the hundreds); 25.5% listed the names of the writing committee; 16.7% listed the contact person named in the publication; 16.7% listed "anonymous"; and 5.9% listed some other individual(s). Articles with modified group authorship ( $n=97$ ) were listed using the authors' names as they appeared on the publication 99% of the time. In 1 case, the same authors were listed but the order was different from that on the actual publication. Articles with named authors ( $n=33$ ) were listed 100% of the time using the same first author who appeared on the original publication.

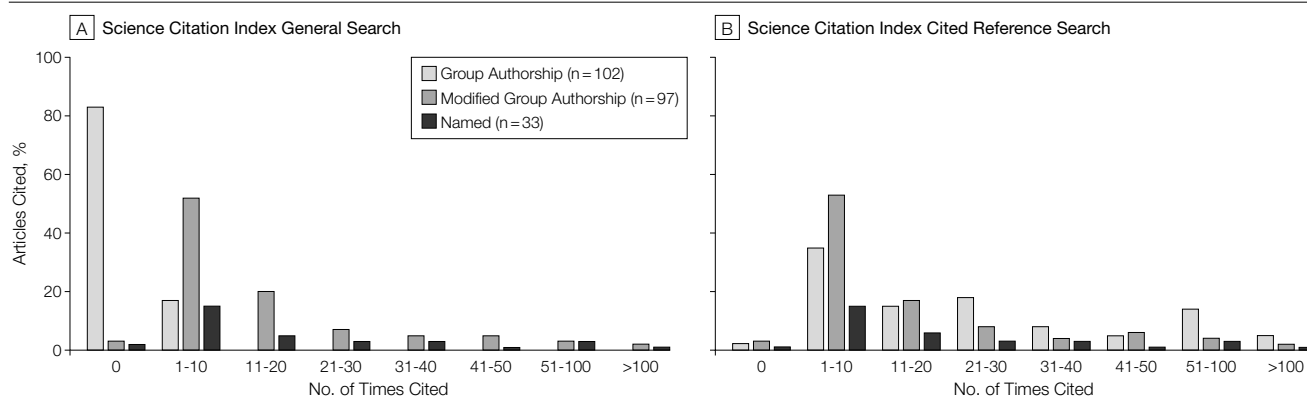
For each article located in the source database (ie, using the general search), we enumerated the number of citations listed: articles with named and modified group authorship were almost always recorded as being cited at least once (31/33 [93.9%] and 94/97 [96.9%]), respectively. Articles with group authorship, however, were listed as being cited only 16.7% of the time (17/102). This is not surprising, given that authorship was never listed correctly in the source database for articles with group authors, so only incorrect citations would have been counted.

**Figure 1.** Proportion of Citations Found Using General Search vs Cited Reference Search



When we searched for citations using the cited reference search, we found that 98.1% of the articles with group authorship (100/102) had actually been cited at least once. Citations were made using the actual group author (37/102 articles; 117 citations); the actual group author with the exception that the citation was abbreviated per SCI rules (99/102; 2671 citations); the first name on the writing committee (10/102; 19 citations); the first name on the investigator list (6/102; 18 citations); or another way (7/102; 15 citations). Some articles were cited in more than 1 way and were counted more than once. Articles with modified group authorship were cited most of the time using the named authors (94/97 articles; 1790 citations) but sometimes by using the actual or abbreviated group name (19/97; 54 citations) or another way (1/97; 5 citations). Articles with named authors were cited using the named author exclusively.

When we considered all known citations to an individual article, we found that almost all citations to articles with named and modified group authors were identified using the general search (FIGURE 1). Only a small proportion of citations to articles with group authorship were identified using the general search, however, and almost all were found using the search algorithm applied to the cited reference search.

**Figure 2.** Science Citation Index Search Results

Using information from the general search, it appeared as if articles with group authors were not cited as often as other articles (FIGURE 2A). The mean number of citations per report was 2.7 for articles with group authors, 18.9 for articles with modified group authors, and 24.5 for articles with named authors. Using the cited reference search, a different sort of picture emerged. On average, there were 10 times as many citations per article as we had found using the general search for group-authored articles (27.8 cites per article) but about the same mean number for articles with modified group authors (19.1 cites per article) and with named authors (23.8 cites per article) (Figure 2B). Thus, group-authored articles that were cited had a higher mean number of citations than articles with other types of authorship.

Most likely, even these results represent an underestimate of the number of citations to group-authored publications. When we completed an ad hoc cited reference search on the 3 group-authored publications of the IONDT,<sup>3-5</sup> we found 22 previously unidentified citations (68 total citations). None of the 22 citations had any entry whatsoever in the author field.

## COMMENT

Both NLM and SCI indexing policies make searching for group authors difficult for users, since most people are probably unaware of indexing rules and expect authors of all types to be listed

in the author field. These policies counter the effort authors have made to focus attention away from individual contributors and toward the products of successful collaboration. In addition, the fact the neither PubMed nor SCI recognizes group author names in the author field of the database implies a lesser status of these articles. University promotions committees do not always understand group authorship, and this problem is compounded when PubMed and other databases fail to acknowledge group authorship as a standard option. It is especially disappointing for an investigator to find a citation incorrectly listed under the name of a coinvestigator who may have earned first author position in the citation purely by his name's place in the alphabet or even by being listed in the acknowledgments.<sup>6</sup>

Failure to recognize group authorship has also meant that there may be a large undercount of citations to these articles.<sup>7</sup> For example, using multiple methods of identification, we found almost 70 citations to 3 group-authored articles from the IONDT. Using the SCI general search, the type that would typically be performed by the average searcher, we found zero. Given the fact that the cost of this trial was in the millions of dollars, this finding should be disconcerting to the funding agency.

Changes are needed immediately in bibliographic indexing systems so that appropriate credit can be accorded to those electing group authorship. Addition of a new field such as PubMed's

"collective name" is not sufficient. We specifically recommend that indexing services change their practices to include group authors in the author field.

**Author Contributions:** Study concept and design: Dickersin, Scherer.

Acquisition of data: Scherer, Gil-Montero.

Analysis and interpretation of data: Dickersin, Scherer, Suci, Gil-Montero.

Drafting of the manuscript: Dickersin.

Critical revision of the manuscript for important intellectual content: Dickersin, Scherer, Suci, Gil-Montero.

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