



Research Article

Authorship Trends in the *American Journal of Health Education*: 1996–2006

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ABSTRACT

Background: Publication is the primary means of contributing to and establishing credibility within the scientific community. Some researchers have reported an increase in the average number of authors per manuscript for some scholarly journals in the past two decades. Whereas author proliferation may be warranted in some cases, other reasons for increasing the overall number of authors per manuscript may have more dubious motives, including gratuitous authorship for embellishing curriculum vitae. **Purpose:** The purpose of this study was to determine whether there was evidence of authorship proliferation in the American Journal of Health Education during 1996–2006. In addition, other selected authorship information was identified. **Methods:** A content analysis of original articles published from January 1996 through December 2006 ($N=755$) was performed. **Results:** There has not been a statistically significant change in the number of authors per manuscript for the time period studied. **Discussion:** Although no significant change in number of authors was found, other investigative methods may be necessary to estimate the practice of gratuitous authorship. **Translation to Health Education Practice:** Health educators should be cognizant of the International Committee of Medical Journal Editors (ICMJE) criteria for authorship and endeavor to ensure that all authors meet these criteria.

Publication is the primary means of contributing to, and establishing credibility within, the scientific community. Some researchers conclude that there has been an increase over the past two decades in the average number of authors per manuscript.^{1–3} Plausible explanations for this apparent trend toward more multiple-authored papers is the increasing complexity of some of the research and the popularization of multicenter collaborations.^{1,4} Whereas authorship proliferation based on these factors may be warranted, other types of author augmentation practices may have more dubious motives, including gratuitous authorship for the purpose of embellishing curriculum vitae.

Khan et al.⁵ studied one journal's authorship trends over two decades and found that

the increase in authorship over time could not be exclusively attributed to increased collaboration. Drenth⁶ explored authorship increase, specifically examining the contribution of senior authors. Findings suggested that the increase in multiple-author papers in one particular journal was associated with an escalation in authorship among professors and department chairpersons.

Concerns regarding gratuitous authorship have prompted some journals to develop specific criteria that must be met to confer authorship.⁷ Moreover, the International Committee of Medical Journal Editors (ICMJE)⁸ developed the Uniform Requirements for Manuscripts Submitted to Biomedical Journals to outline explicit authorship criteria: (1) substantial contribution to the study's conception and design,

(2) drafting the article or revising it critically, and (3) final approval of the manuscript prior to publication. All three criteria must be met for one to be considered an author. Some journals, including the *Journal of the American Medical Association*, require that an authorship form outlining each author's contributions accompany submitted manuscripts.⁹

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Despite these guidelines, some editors and other authorities believe that gratuitous authorship continues to be an issue. Instances of authorship conferred without meeting ICMJE criteria usually fall into one of four categories: "honorary," "gift," "ghost," or "guest" authorship. Honorary authorship refers to authorship awarded without the attainment of ICMJE criteria.^{10,11} Sometimes honorary authors have authorship conferred in return for a favor (e.g., a department chairperson who provided release time for the writer; a fellow scientist who received funding to carry out the study but had no direct involvement in either the study or the preparation of the paper). Gift authorship is conferred on an individual "out of a sense of obligation," despite the absence of direct involvement with research or manuscript preparation.^{12(p.583)} For example, it might be conferred on a scientist who "loaned" another investigator laboratory facilities, supplies, or perhaps even a graduate assistant to help conduct the work. Honorary and gift authorships represent similar, sometimes identical phenomena.¹³ "Ghost" authorship is a practice whereby an individual is not listed as an author, despite meeting ICMJE criteria for authorship.¹⁰ Ghost authors may be medical or science writers brought on as "hired guns" to increase investigator output. "Guest" authorships are offered to individuals who have name recognition in the field or whose work is typically of such caliber that it is seldom refused publication. Such authorship may be conferred, in part, because of the expectation that its inclusion augments the importance of the work being submitted and enhances its publication potential.¹²

Several studies have been conducted to examine the prevalence of honorary and ghost authorship since the establishment of the ICMJE criteria.^{10,11,14} A study of reviews published in two issues from the *Cochrane Library* found that 39% of 362 reviews had evidence of honorary authors.¹¹ Flanagin et al.¹⁰ surveyed corresponding authors of articles in three peer-reviewed medical journals and found that 19% (156 out of 809) of articles had evidence of honorary authorship. These findings indicate that

simply establishing authorship criteria does not eliminate the possibility of gratuitous authorship.

Whereas some authors may be oblivious to these criteria, others who are aware may choose to ignore them in favor of assisting a colleague to survive in a publish or perish environment.¹⁴ Good intentions notwithstanding, gratuitous authorship is problematic because of its negative impact on professional integrity and because "it actually violates the standards to which we hold others who function all around us."^{15(p.817)} Furthermore, in some high-profile cases, coauthors appearing on fraudulent manuscripts have denied awareness of the falsified content.¹⁶ Authorship has been likened to a coin in that it has two sides—credit, on the one side, but responsibility on the other.¹⁷ Therefore, it is imperative that individuals who take credit for a manuscript be similarly prepared to defend it.

PURPOSE

The concerns emanating from some journal editors and other scholarly writers about the issue of author proliferation stimulated interest in the study of authorship trends in the *American Journal of Health Education* (AJHE). No previous studies of this kind are known to exist in the health education literature. Specifically, the intent of this study was to determine whether there was evidence of authorship proliferation in AJHE during the 11-year period of 1996 through 2006. This period of time approximated the interval over which dialogue related to authorship proliferation has been a subject of the professional literature in health and medicine as well as some other scholarly fields of endeavor.^{1,2,4-6,8-12,15,16}

METHODS

Sample

The sample consisted of all original articles published in AJHE (including those published under the journal's previous names) from January 1996 through December 2006 (N= 755). The scope of the sample included articles reporting original research findings, methodological approaches,

state-of-the-art reviews, and contributions to specialty columns (e.g., teaching ideas, commentaries, and so forth). Articles written on behalf of a group in which individual authors and their credentials were not listed (n=25) were excluded from the study.

Instrument

The author identification section was the source of authorship information for each article. This section lists the authors by name, degree(s), work affiliation(s), and contact information. Data collected from each article included (1) year and issue in which the article was printed, (2) type of article, (3) number of authors, (4) highest degree held by each author, and (5) work affiliation of each author (e.g., college/university, school/district, worksite, health department, healthcare setting, health agency). An "other" category was used if the work affiliation was not recognized or was not specifically health-related (e.g., a television station). For instances in which a university hospital or medical center was listed as the work affiliation, the affiliation was coded "university." If multiple degrees were presented, only the highest degree or the first degree listed (in the case of two or more terminal degrees) was recorded. Similarly, in the case of multiple work affiliations, only the first affiliation listed was included in the analysis.

Procedure

Using the measures identified above, articles were coded independently by two researchers, and data was entered directly into an SPSS 15.0 template. Kappa statistics tested whether agreement occurred by chance and was deemed satisfactory. Inter-rater reliability exceeded 90%, and the researchers discussed the remaining articles until agreement was reached.

Data Analysis

To address whether there were any significant changes in the number of authors per manuscript across the 11-year period, a one-way analysis of variance (ANOVA) was conducted. A second ANOVA was conducted to analyze changes in the number of authors for only articles reporting original research



findings. Additionally, because research indicates a rise in multiple-authored papers, the researchers assessed the proportion of single-authored manuscripts for each year. The first three years of the data collection period yielded articles that did not state author degree; therefore, it was decided that these years would be excluded from analyses examining author degree and only eight years were analyzed (n=528).

RESULTS

Year

The number of articles published each year ranged from 53 to 97. Whereas *AJHE* is published bimonthly, some years (1996, 1997, 1998, 1999, and 2003) also included supplemental issues, accounting for some of the difference in the number of articles published each year. The numbers of articles published each year are as follows: 1996 (n=77; 10.2%), 1997 (n=73; 9.7%), 1998 (n=77; 10.2%), 1999 (n=97; 12.8%), 2000 (n=64; 8.5%), 2001 (n=57; 7.5%), 2002 (n=68; 9.0%), 2003 (n=75; 9.9%), 2004 (n=59; 7.8%), 2005 (n=55; 7.3%), and 2006 (n=53; 7.0%).

Article Type

Articles reporting original research findings accounted for the highest proportion of articles appearing in *AJHE* (n=287/755; 38.0%), followed by teaching ideas (n=165/755; 21.9%), and state-of-the-art reviews (156/755; 20.7%). Together, these three types of articles accounted for 80.6% of articles. Table 1 provides the frequencies for each type of article.

Number of Authors

More than one individual authored most articles (n=483/755; 64.0%); only 20.0% (n=151/755) of articles were authored by more than three people (Table 2). The graph shown in Figure 1 suggests that no consistent trend in number of authors has occurred over the 11-year period; rather, the apparent effect is one of variation throughout the decade. The mean number of authors per manuscript for the entire 11-year period was 2.39 (SD=1.53). The one-way ANOVA analysis did not reveal a significant effect

Table 1. Frequency of AJHE Article Types, 1996–2006

Article Type	Frequency	Percent
Editorial	15	2.0
Personal perspective	50	6.6
Data-based research article	287	38.0
Review	156	20.7
Community learning ideas and procedures (CLIPs)	42	5.6
Teaching idea	165	21.9
Administrative idea	4	0.5
Scholar's address	9	1.2
Article commentary	15	2.0
Presidential address	8	1.1
Progress report	1	0.1
Other	3	0.4
Total	755	100.0

for year in the number of authors per manuscript ($F(10,744)=1.334, p=.208$).

The proportion of single-authored articles for each year was examined to determine evidence of a trend in multiple authorships. The graph in Figure 2 suggests that the proportion of single-authored articles declined from 2002 to 2005, indicating a rise in multiple-authored articles. Conversely, this proportion rose from 2005 to 2006, implying a resurgence of single-authored articles.

To analyze whether research articles (i.e., original research versus all other types) had an effect on whether the article had multiple authors, an odds ratio and a one-way ANOVA were conducted. If an article was a data-based research article, it was about 9 times ($OR=9.173, CI\ 6.031-13.952$) more likely to have more than one author. The one-way ANOVA did not reveal a significant effect for year in the number of authors per data based research article ($F(10,276)=1.336, p=.211$).

Primary Author Degree

Again, articles observed during the first three years of the data collection period did not state author degree. Additionally, there were 33 articles in which the primary author's degree was not listed. For the remaining articles, approximately 82.1% (n=404/492) of first authors possessed a terminal degree: doctoral degree (n=398/492; 80.9%), MD, DO, or JD (n=5/492; 1.0%),

and DDS (n=1/492; 0.2%). Most other primary authors held a master's degree (n=66/492; 13.4%), followed by a baccalaureate (n=8/492; 1.6%), unknown (n=10/492; 2.0%), and other (n=4/492; 0.8%). An "other" category was created for cases in which individuals were working toward, but did not possess, a baccalaureate degree.

Primary Author Work Affiliation

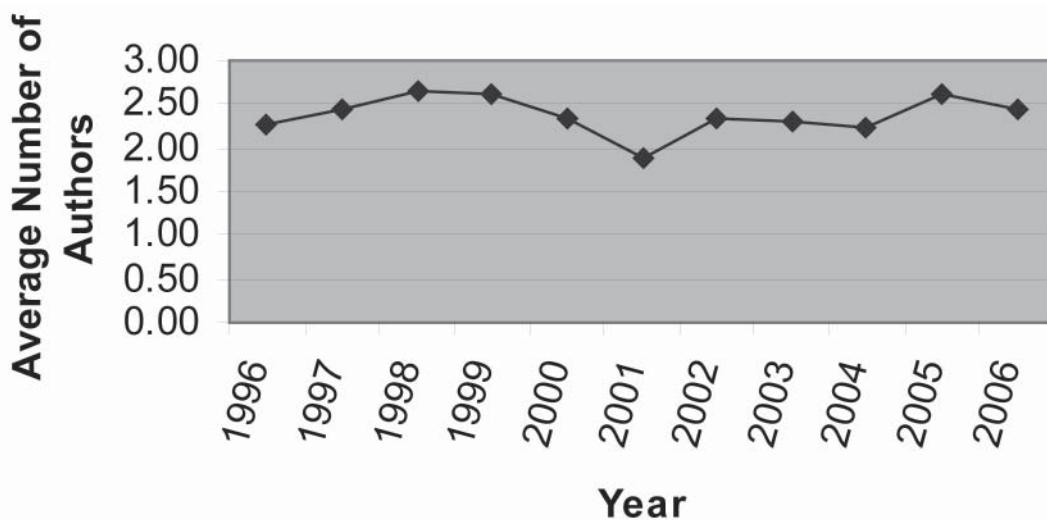
All 11 years were examined for authors' work affiliations. Overall, 85.7% (n=647/755) of primary authors were associated with a college or university. Primary authors affiliated with a health agency form the second largest group (n=54/755; 7.2%), followed by other (n=17/755; 2.3%), healthcare setting (n=11/755; 1.5%), unknown (n=9/755; 1.2%), and school or school district and health department (n=8/755; 1.1%).

DISCUSSION

The intent of this study was to determine whether there was evidence of authorship proliferation in *AJHE* during 1996–2006. In addition, the investigation explored other authorship traits during this same timeframe. The results indicate that there has not been a statistically significant change in the number of authors per manuscript for the time period studied. Although this finding does not demonstrate the presence or absence of gratuitous authorship,

**Table 2. Number of Authors Per AJHE Article, 1996–2006**

Year	Number of Authors										Total
	1	2	3	4	5	6	7	8	9	10	
1996	28	22	11	12	2	2	0	0	0	0	77
1997	23	25	13	4	4	2	0	0	2	0	73
1998	24	20	13	7	8	3	2	0	0	0	77
1999	39	18	13	11	9	2	4	0	0	1	97
2000	23	20	7	8	4	1	1	0	0	0	64
2001	23	21	10	3	0	0	0	0	0	0	57
2002	30	14	9	6	5	3	1	0	0	0	68
2003	30	21	9	7	4	2	2	0	0	0	75
2004	19	17	17	3	3	0	0	0	0	0	59
2005	13	16	12	10	2	1	1	0	0	0	55
2006	20	13	11	2	4	0	2	0	1	0	53
Total	272	207	125	73	45	16	13	0	3	1	755
Percent	36.0	27.4	16.6	9.7	6.0	2.1	1.7	0.0	0.4	0.1	100

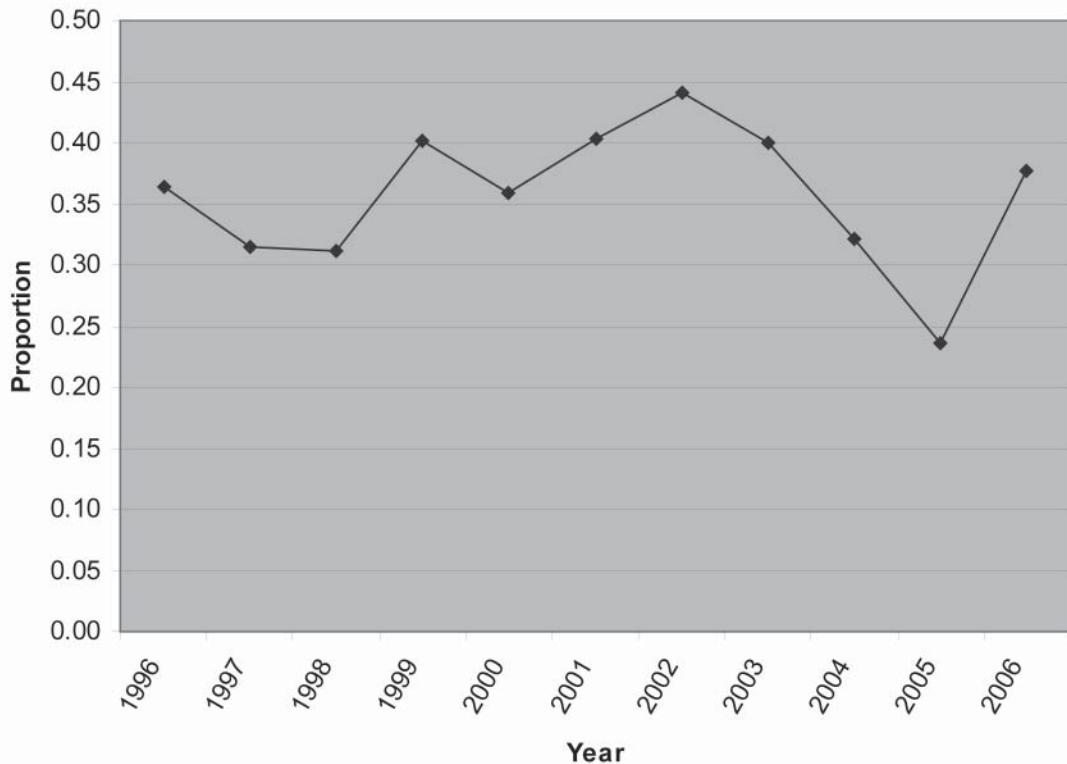
Figure 1. Average Annual Number of Authors per AJHE Article, 1996–2006

it does suggest the problem is not growing because a significant change in number of authors has been associated with evidence of gratuitous authorship.^{5,6} Furthermore, the average number of authors per manuscript is relatively low (2.39, SD=1.53). Some citation styles may deter undeserved authorship because they limit the number of authors who can be listed in a reference. This restriction diminishes the appeal of authorship if one is not part of an article's citation. American

Medical Association (AMA) citation style allows for the listing of six individuals followed by "et al."⁸ Another common citation style is that of the American Psychological Association (APA), which limits the number of named authors to six.¹⁸ The AMA and APA restrictions would affect only 2.3% of articles appearing in *AJHE* over the period studied.

Articles reporting findings from original research were the most frequently occurring

article type (n=287/755; 38.0%). This type of article is of interest because of the greater number of individuals potentially involved with the research process, compared with other article types. In the current study, the mean number of authors listed on a data-based research article, 3.29 (SD=1.64), was higher than for any other article type. Furthermore, this type of article was nine times more likely to have multiple authors than articles not reporting data-based research.

Figure 2. Annual Proportion of Single-Authored AJHE Article, 1996–2006

Although the mean number of authors is higher for data-based research articles than for other article types examined in this study, results suggest there has been no significant change in the number of authors for data-based research articles over the 11-year period. Again, this result does not suggest the absence of gratuitous authorship practices; rather, it reflects that authorship practices have not changed during the time period studied.

It is important to note that involvement with the research process does not automatically warrant authorship on a manuscript. In accordance with the ICMJE criteria, individuals must have made a substantial contribution to the study's conception and design, drafted the article or revised it critically, and given final approval of the manuscript prior to publication,⁸ with all three criteria required to qualify for authorship. The data collected in this study does not

make it possible to determine the role of each researcher; therefore it is not known whether authorship was truly warranted. Journals requiring authors to disclose their roles with research and subsequent manuscript preparation may help to identify individuals who truly deserve authorship, as well as deter the crediting of persons who do not.

With regard to authorship proliferation, it is conceivable that some authors may feel pressured to confer authorship to senior researchers. In this study, the primary author of most articles ($n=404/492$; 82.1%) possessed a terminal degree. Moreover, the majority of primary authors ($n=647/755$; 85.7%) were affiliated with a college or university. This data may or may not indicate unethical authorship practices in which senior researchers use their position and experience to control the primary author position or usurp the role of junior researchers. Kwok¹⁹ used the term "White Bull" to

describe a senior researcher who engages in deliberate scientific misconduct. The White Bull exploits the loopholes of the ICMJE criteria so that they are satisfied based on technicalities, and may pressure junior researchers into giving up the first-author position on a manuscript. Furthermore, tenure-track university faculty members generally are required to publish to demonstrate professional and scholarly development. It is plausible that the pressure to publish may lead to inappropriate inclusion in the byline of a colleague's manuscript.

Limitations

Authorship was examined over an 11-year period; therefore, results may not be indicative of authorship trends exceeding that timeframe. Moreover, whereas the number of authors per manuscript is somewhat indicative of the occurrence of conferring gratuitous authorship, it is not the sole method, and it does not allow for the assess-



ment of ghost authorship. Moreover, no attempt was made to identify other authorship practices that could be labeled as unethical (e.g., reporting of fraudulent data, plagiarism). In addition, only published papers were considered. Inclusion of papers submitted but rejected for publication would have increased the sample approximately four-fold or five-fold, and might have suggested different results with respect to authorship proliferation. Future research should focus on communicating with corresponding authors to gain insight as to how authorship was determined. Possibly, *AJHE* should consider having all authors identify their role in the creation of a paper to protect its integrity in the future, such as the *Journal of the American Medical Association* now does.⁹ Further study is warranted and should focus on surveying a random sample of authors to ascertain whether all three ICMJE criteria for authorship have been met.

TRANSLATION TO HEALTH EDUCATION PRACTICE

In 1999, the Coalition of National Health Education Organizations approved a set of professional guidelines in the *Code of Ethics for the Health Education Profession*.²⁰ Specifically, Article II outlines responsibility to the profession: "Health Educators are responsible for their professional behavior, for the reputation of the profession, and for promoting ethical conduct among their colleagues." In terms of publication, responsibility to the profession includes sharing processes and outcomes of one's work and properly recognizing others for their professional contributions. A violation of this code occurs when an individual is listed as an author in a manuscript's byline but does not meet the criteria for authorship. A similar infringement occurs when an individual meets the criteria but does not receive credit as an author. Health educators must uphold the integrity of the profession by ensuring that credit for authorship is provided when warranted.

This analysis provides insight into authorship practices of individuals who publish papers in *AJHE*. Regardless of the journal to which a manuscript is submitted, health educators should be cognizant of the ICMJE criteria for authorship and ensure that all authors meet these criteria. Instead of listing as an author someone who does not meet these criteria, health educators and other researchers can make sure to involve these individuals in all aspects of the research process. Discussion regarding authorship should occur at the beginning of a study to ensure that individuals understand what is required to qualify for authorship. All authors listed in the byline should be able to defend the publication for which they are receiving credit.

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