

Annie M. Hughes. Publication Behaviors of the Signers of the Public Library of Science (PLoS) “Open Letter to Scientific Publishers”. A Master’s Paper for the M.S. in L.S. degree. April, 2008. 51 pages. Advisor: Diane Kelly

The purpose of this work is to determine publishing behaviors of academic scientists who signed the PLoS (Public Library of Science) “Open Letter to Scientific Publishers”. From the original 3,741 signers in the United States on the PLoS list, a random stratified sample of both medical and biological academic scientists who are either Assistant, Associate or Full professors was selected. After selecting the sample, names were entered into Google and Google Scholar to compile full lists of authors’ publications, mainly by collecting publication lists provided on curriculum vitae. Following the collection of publication lists, journal names were resolved and coded as open access or non-open access by using Sherpa RoMEO and DOAJ (Directory of Open Access Journals). Publication behaviors were tracked from 2001 – 2007 in order to discover any trends. Results show that trends were similar for both medical and biological disciplines, and overall, professors adhered to the “Open Letter” pledge.

#### Headings:

Open Access Publishing

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PUBLICATION BEHAVIORS OF THE SIGNERS OF THE PUBLIC LIBRARY OF  
SCIENCE (PLOS) “OPEN LETTER TO SCIENTIFIC PUBLISHERS”.

by  
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Approved by

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## **Chapter 1: Introduction**

From the early seventeenth century until late in the twentieth century, the printed word was the major form of communication for scholars. The advent of electronic publication and the Internet changed the face of publishing and gave new meaning to scholarly communication, especially within the scientific and biomedical community.

In the latter part of the twentieth century commercial publishing began to form “an increasingly harmful monopoly on a number of journals which are essential to disseminating new ideas and research” (Gibson, xi). The fear of research, especially publicly funded research, being self-contained and not disbursed widely caused some researchers, scientists and librarians to gather and launch what is now known as the Open Access Initiative (OAI). Three of the major issues that prompted the launch of the Open Access Initiative were 1) copyright retention and authors’ rights; 2) the ‘serials crisis’; 3) access issues.

With regard to copyright, authors found that oftentimes the journal publishers’ agreements contained language that allowed for retention of all rights to the work or article; therefore, an author would not be able to disseminate an article for free. Instead they would have to pay the journal to buy back material they created. Logic led authors to realize that this was not an acceptable aspect of journal publishing.

The 'serials crisis' has been ongoing for the past 20 years. Subscription prices for libraries and other research institutions increase dramatically each year. According to the "Library and Information Statistics Unit (LISU) at Loughborough University in the UK: from 2000 to 2004 the increase in the median price of journals from a group of 12 publishers has been from 27 percent to 94 percent per annum" (Jacobs 9). Society publishers also show a price increase of 7.5% per annum. Libraries suffered most from these major yearly increases, as their budgets did not provide for such price increases.

Finally, the greatest impetus for initiating open access publishing was the issue of access to information. Scientists were and are producing information at an alarming rate, and information cannot be disseminated quickly enough via traditional publishing models, print or electronic. The publication cycle, including peer review and editing could take almost 2 years in some cases and due to this, research progress is inhibited.

Due to this need for new policy surrounding scholarly communication, a 'Meeting on Open Access Publishing' was conducted on April 11th, 2003 in Chevy Chase, Maryland in order to construct a plan for making information openly accessible and available to the biomedical research community. It was at this meeting that open access was defined. According to the Bethesda Statement, the definition of an open access publication is as follows:

- 1) The author(s) and copyright holder(s) grant(s) to all users a free, irrevocable, worldwide, perpetual right of access to, and a license to copy, use, distribute, transmit and display the work publicly and to make and distribute derivative works, in any digital medium for any responsible purpose, subject to proper attribution of authorship, as well as the right to make small numbers of printed copies for their personal use.
- 2) A complete version of the work and all supplemental materials, including a copy of the permission as stated above, in a suitable standard electronic format is deposited immediately upon initial publication in at least one online

repository that is supported by an academic institution, scholarly society, government agency, or other well-established organization that seeks to enable open access, unrestricted distribution, interoperability, and long-term archiving (for the biomedical sciences, PubMed Central is such a repository), (Bethesda Statement on Open Access Publishing).

The meeting at Bethesda laid the foundation for the open access movement and allowed for solutions to be developed for the issues surrounding electronic publishing.

Meetings such as the one in Bethesda and the goals set forth by open access publishers emphasize the importance of this topic to librarians. According to Park and Qin, “there are two main social constructs that . . . driv[e] open scholarly publishing. One is the noble idea of disseminating and sharing knowledge freely; the other is the demand for faster, wider, and more effective dissemination of research products” (78). It is these noble ideas or social constructs with which librarians are most concerned.

### **The Public Library of Science (PLoS):**

In October 2000, biomedical scientists, Harold E. Varmus, Patrick O. Brown, and Michael B. Eisen developed a solution to scholarly publishing issues and began PLoS, or the Public Library of Science. They began their grassroots initiative by circulating an “Open Letter to Scientific Publishers” which scientists, researchers and librarians were asked to sign. In signing the letter, these individuals agreed to the following:

We pledge that beginning in September 2001, we will publish in, edit or review for, and personally subscribe to only those scholarly and scientific journals that have agreed to grant unrestricted free distribution rights to any and all original research reports that they have published, through PubMed Central and similar online public resources, within 6 months of their initial publication date (Public Library of Science (PLoS)).

Over 34,000 individuals worldwide signed the “Open Letter to Scientific Publishers” and over 3,700 individuals signed in the United States alone.

The letter was important in that a significant amount of scientists, 34,000 of them, were interested in making a change in the publishing process. By agreeing to the terms of the letter, scientists were stating that they wanted research to be made available for free within a reasonable amount of time. They were also interested in being able to retain rights to their work and they wanted to have a choice with regard to dissemination of that work. Librarians who signed were interested in alleviating the ‘serials crisis’, or doing away with expensive journal subscriptions that were eating into their annual budgets. However, the letter had little weight and publishers did not respond in the way in which the PLoS founders anticipated – publishers did not lower subscription rates, nor did they make articles available within six months of publication.

In 2003, due to publishers’ lack of interest in changing their business models, PLoS began their own non-profit open access publishing venture. Today PLoS journals are considered to be some of the highest quality, highest impact open access publications (PLoS, About Us).

### **Scholarly Publishing Issues:**

While it is known in the scientific community that PLoS and other open access journals are an alternative to traditional publishing, there are a few concerns, which may deter scientists and researchers from publishing in the open access format. Some of the major concerns of scholarly journal authors are: the peer-review process; journal quality and citation impact; status, tenure and promotion issues; and costs of open access.

Peer review is the process of other scholars in a discipline reviewing an article to determine whether its quality meets the standards of a particular journal. With respect to open access, there is a fear that if articles are posted openly and freely that this process will decline and then there will be no way to determine the quality of the research.

Journal quality is also an issue of concern. If journals are available for free, then who is assuring that the content is worthy or reputable? An author's fear of participating in publishing in a journal considered to be full of junk science is understandable. Citation impacts are an accepted form of rating a journal's quality. However, authors may not be aware that there is evidence that citation impact is higher for some open access journals since articles are easily accessible and therefore used more frequently.

Journal quality leads straight to authors' fears about promotion and tenure, especially if the journal is perceived to be of lower quality, impeding their status within an academic department. The phrase 'publish or perish' is familiar to most, if not, all academics. Junior faculty are faced with the pressure to publish in prestigious journals in order to receive tenure, and it is possible they would not choose to publish somewhere that could be a risk to their career or status within a department.

Finally, there is the issue of 'author pays' models. Many open access publishers require that an author pay anywhere from \$500 to \$1,000 in order to publish in a journal. Most times this money would come from grant funding or other funds, however, the idea of having to pay to publish could deter several authors. Authors who do not get grant funding would likely not be able to publish in open access journals that follow this business model. Although, there are universities, such as The University of



North Carolina at Chapel Hill that are providing funding for those who wish to publish in open access journals. Eligible authors are UNC-CH faculty, post-doctoral researchers, and graduate or professional students who are without funding. The fund is provided by the Office of the Vice Chancellor for Research and Economic Development and is managed by UNC's Health Sciences Library (UNC Health Sciences Library).

Currently, universities such as The University of California, The University of Kansas, and The University of North Carolina at Chapel Hill are involved in advocacy surrounding the issue of scholarly publishing and open access. Librarians are an integral part of this advocacy process, and they are concerned with promoting the benefits of open access to faculty and researchers within their communities, as well as alleviating any worries researchers may have. Studies show that while many scientists and researchers are supportive of the ideas behind open access and dissemination of information, they are not always informed of how to move forward with the actual process and, as stated earlier, their fears of the process have not been properly allayed. For instance, a recent survey of University of California faculty researchers states that "results highlight an apparent disconnect between the faculty's expressed level of concern [about Open Access] and willingness to take action" (University of California Office of Scholarly Communications, 6). It is possible that the issues stated earlier impede their willingness to actually publish in this format.

## **Purpose of Research**

The purpose of this research is to investigate, over a time period of seven years (2001-2007), the publishing trends of academic faculty in the United States who signed the PLoS agreement. The following questions were investigated:

- 1) What are the publication behaviors of academic PLoS signers?
- 2) What is the relationship between the status of signers and their publishing behavior?

By analyzing these 3,700 signers and deriving a sample of academics, mainly in the biological sciences and medical sciences, it is possible to discuss and evaluate the impact of open access publishing in the scholarly community. Once publishing trends and behaviors have been established, librarians and other promoters of open access publishing can then direct their efforts in the appropriate fashion. Biology and medical disciplines were selected for study due to the large number of academic signers who teach and publish in these fields and because scientists in these fields are at the forefront of the open access movement.

## Chapter 2: Literature Review

The literature selected was published between 2004 and 2007 and publications are organized thematically. The first articles discuss background and history of the open access initiative and the remaining publications discuss advantages of open access, opinions, attitudes and behaviors of faculty, scientists on the topic, along with information on economic issues.

### **Open access background and history:**

Virginia Barbour and M. Patterson, two researchers working for the Public Library of Science (PLOS) begin their article, *Open Access: The View of the Public Library of Science*, by quoting Sir Antonio Panizzi, Principal Librarian of the British Museum, 1836: “I want a poor student to have the same means of indulging his learned curiosity, of following his rational pursuits, of consulting the same authorities, of fathoming the most intricate inquiry as the richest man in the kingdom” (Barbour 1450). By quoting this passage, Barbour and Patterson show that the idea behind open access to information is not a new one.

The authors discuss how publishers of medical journals in the 19th century followed the same processes as they do today: peer-review and paid subscriptions to recuperate the costs of publishing and distribution, and copyright. According to Barbour and Patterson, journal authors were held to the same process until the advent of the Internet, which was revolutionary in changing the scientific publishing world. Because

of the Internet, paper is no longer needed to disseminate information, information can be disseminated globally, storage space is unlimited, and the contents of the Internet can be searched. Because articles are now available via an alternative format, this allowed for open access, or the ability to disseminate information openly. The authors discuss the benefits of open access and how this type of access allows authors to widen their audience. Open access also allows the general public to access research that they could not access prior to the Internet, even though, ironically much of the medical research conducted in the United States is paid for by taxpayers.

*Open Access: Key Strategic, Technical and Economic Aspects* edited by Neil Jacobs is written by key advocates for and researchers of open access publishing and addresses several of the underlying issues in the open access debate. The text describes how the serials crisis and excessive publisher charges led to the decision that there was a need for an alternative form of publishing. The reluctance for publishers to change may stem from the fact that “the total revenues of scholarly publishers are estimated at around \$10 billion per year. This is a huge sum, but the world’s annual spending on research and development amounts to about \$1,000 billion dollars per year . . . It is easy to see why there would be a reluctance to make drastic changes in something that costs just 1% of the total” (32). Aside from cost issues of journal publishing, cultural issues are addressed. Alma Swan writes that “The last couple of years have seen the acceptance of Open Access (OA) as a desirable goal by institutions, research funders, libraries and some publishers, to the point that action has been taken by these parties toward achieving it” (53). Swan goes on to discuss an apparent disconnect of intent and practice with regard to researchers and states that “many researchers simply remain

unaware of the concept of Open Access, or if they have heard of it, they remain largely in ignorance of its implications” (54). Other chapters discuss varying business models in open access publishing as well as specific open access initiatives in the UK, Australia, United States, and India.

Peter Suber, an independent policy strategist for open access to scientific and scholarly research is a major name in the open access world has created a web page called *Open Access Overview*. Suber is best known for his blog called “Open Access News” that is devoted to disseminating all current information on the topic. This particular document bullets all major points with regard to open access. Suber discusses the background of open access, copyright and legal issues, the open access campaign, peer-review, open access journals and repositories, and he also provides several arguments for the implementation of open access. The most interesting argument Suber makes is that open access is constructive and not destructive; the movement is not trying to put traditional publishers out of business and toll access can exist as well as open access. Suber also discusses how open access is not necessarily synonymous with universal access – there are several barriers that occur even after content is made available. Oftentimes, users, especially those in developing countries, do not have access to the technology needed to access content, even if it is technically barrier free. Open access serves authors by giving them a worldwide audience, readers by giving them access to information they may need, teachers and students by putting rich and poor on an equal footing, and libraries by solving the serials crisis and by allowing librarians access to information without limits that are generally in place due to budget constraints. Open access also serves universities by increasing the visibility of faculty

and the institution itself. Journals and publishers gain visibility because their articles are more discoverable. Funding agencies and governments get a return on their investment in research by providing public access. And finally citizens benefit by giving them access to peer-reviewed research that, in reality, they have already paid for indirectly through their taxes.

David Prosser's, *Open Access: The Future of Scholarly Communication* (2005), begins by discussing the historical background of scholarly publishing, which began in the 17th century. He then segues into a discussion of readers of research and how there is a "gap between the proportion of the literature libraries can access and the information that researchers need to be effective" (Prosser 7). This gap has resulted in dissatisfaction with the traditional publishing model, and many researchers are opting to pay in order to have their information made available to society as a whole, as societies lose if information channels are restricted.

According to Prosser, journals perform four functions: registration, certification, awareness, archiving (9). Otherwise known as recognition for a work, peer-review, communicating to peer group, and archiving for posterity. Each of these factors worked well in the print world, however, after the Budapest Open Access Initiative, new publishing models were created.

Finally, the publication *Why PLoS Became a Publisher: Message from the Founders* (2003) discusses the historical background of the Public Library of Science (PLoS) and open access, the importance of their initiative, and their general mission:

This online public library of science will form a valuable resource for science education, lead to more informed healthcare decisions by doctors and patients, level the playing field for scientists in smaller or less wealthy institutions, and ensure that no one will be unable to read an important

paper just because his or her institution does not subscribe to a particular journal (Brown, 1).

PLoS's mission is achieved through the journals that they publish, along with their advocacy and promotion of the topic of open access.

### **The advantages of open access publishing:**

Citation impact and journal impact are major concerns of authors. Does their research make an impact on the scholarly community? Gunther Eysenbach's *Citation Advantage of Open Access articles* (2006), discusses how open access research literature has the potential "to accelerate recognition and dissemination of research findings" (1).

Eysenbach performed a longitudinal bibliometric analysis of a cohort of open access articles published between June and December 2004 in the same journal: PNAS (Proceedings of the National Academy of Sciences). Citation data were compared between the two groups, and the research found that an article published immediately as open access had a higher impact than self-archived articles. Eysenbach found that even if a journal is widely available to researchers in a library, open access articles were more likely to be cited immediately than non-open access articles published in the same journal. The issue of availability of open access articles proves to be a distinct advantage to non-open access articles.

According to John Willinsky's *Why Open Access to Research and Scholarship?* (2006), "only a small portion of all the research published each year can be read without either having a subscription or paying to view an individual article." It is this inability to

access content that most drives the open access movement and proves that there are advantages to publishing and consuming articles in this format. There are concerns, though, about how journals can offer free access and remain financially stable.

Willinsky's article says that whether or not a journal can afford to put content up for free, the issue of open access is one of principle. The ability to circulate research more quickly and effectively has already been proved, and more and more researchers are utilizing and trusting research that is openly available.

Another article that argues for the advantages of open access, this time as a global good, is *Knowledge as a Public Good: The Role and Importance of Open Access* (2006) by Gert Verschraegen and Michael Schiltz. Verschraegen and Schiltz argue that knowledge should be a public commodity, not a private right. The authors discuss the 'digital divide' and how disposing of strict intellectual property laws can help close the gap. They discuss how there is a need to do away with monetary reward for publication production and how incentives should be dissemination of information for the world's benefit. Also, they point out that there is a difference between scholarly authors and authors of more traditional texts. Scholarly authors are generally interested in recognition and career development as opposed to monetary reward.

One thing that inhibits Open Access throughout the world, even if it is fully adopted, is not necessarily information being open, but the ability to access it. Oftentimes individuals in developing countries do not have computer capabilities that allow for accessing information electronically. Also, it is possible there is a lack of computer literacy in these countries.



Human development is also an important aspect with regard to Open Access. By making information openly available to developing countries, individuals and communities can move toward being better able to provide medical care along with a variety of other similar human-related needs.

Knowledge as a 'public good' is likely the most important reason for Open Access promotion. Cutting down on serials costs is important in the scope of concern for libraries, however, providing adequate health services and information to those who are truly in need is imperative.

#### **Author perceptions and attitudes:**

The following publications discuss a variety of faculty and researcher attitudes about open access publishing. Utilizing surveys, questionnaires and interviews, the following studies support the notions that while faculty and researchers are in support of the ideas behind open access, they may not be aware of publishing procedures, journal quality, affect on career, or the impact their research will have if placed in this type of publication, and therefore may not choose to publish in open access journals. The publications are arranged chronologically in order to attempt to depict the trends over the past 3 years.

Sara Schroter's article *Perceptions of Open Access Publishing: Interviews with Journal Authors* (2005) demonstrates that journal authors do support the concept of open access journal publishing, but do not necessarily submit their work to open access journals. Schroter conducted semi-structured interviews and randomly selected 28 international authors that submitted to *BMJ* in 2003. Findings show that 'authors

consider perceived journal quality as more important than open access when deciding where to submit papers” (1). Journal authors were also not satisfied with the ‘author pays’ model where the author is required to pay a fee in order to publish in a particular journal. Schroter also discusses authors’ unwillingness to change their current publishing behaviors. Fear of losing the peer review process and the lack of journal quality, along with having to absorb costs to publish were some of the authors’ major worries with regard to publishing in open access journals.

In 2005, David Nicholas, Paul Huntington, and Ian Rowlands published the article: *Open Access Journal Publishing: The Views of Some of the World’s Senior Authors*. The main purpose of their research was to discover the volume of authors publishing in Open Access journals, the attitudes of authors, and the authors’ ideas of the implications of publishing in Open Access journals.

Their sample consisted of 4,000 authors derived from mailing lists provided by ISI. They provided a questionnaire that was sent via email with a link to a survey database. Closed-questions were utilized to gather data, and statistical analysis was performed with geographic and discipline area in mind. Nicholas, et al. performed three rounds of extensive piloting. They received responses from 97 countries, Asia slightly under-represented and received 3,787 usable questionnaires. Typical respondents were males over the age of 35 from the West, and biomedicine was the discipline containing the most respondents.

The survey resulted in a variety of findings including the following: a small proportion of authors already published in Open Access journals - 11%, and 46% of authors knew of the Open Access format, but had not published in it (503).

Overall, this particular study informs the topic greatly, however, it does not provide statistics for more junior authors and their publishing habits. The article also mentions that the authors felt that open access publishing was evolving so quickly that this particular study would need to be enhanced by further follow up studies.

In 2006, Nicholas and Rowlands, along with Hamid R. Jamali published a similar article called *On the Tips of their Tongues: Authors and their Views on Scholarly Publishing*. In this paper, 5,513 authors participated in a questionnaire consisting of 22 closed questions and one open-ended question that allowed authors to freely express their views. 1,943 authors responded to the open-ended question. The authors used QSR N6 textual analysis software to process the comments and extract themes. Results revealed that the issues scholars are most concerned with are speed of publication, better access to material, and journal prices. Nicholas et. al also discuss how authors are most concerned with losing the peer-review process and the quality of material published.

*An Evaluation of Emergency Medicine Investigators' Views on Open Access to Medical Literature* (2006) by R. M. Rodriguez et al. discussed Emergency Medical Investigators' (EMIs) views on Open Access. Surveys were mailed to 212 authors of original research articles published in 2002 and 2003 in *Annals of Emergency Medicine*, *Academic Emergency Medicine*, and *The Journal of Emergency Medicine*.

Results showed that 59% of authors were in favor of Open Access, however, the author pays model did have an effect on the willingness of authors to publish using this model. 69% said that the fees for author-pays journals, such as the PLoS journals, greatly impede their interest in publishing. 19% said that the fee would slightly impede

their interest and 39% said they wouldn't publish in Open Access journals because they had doubts about Open Access journal quality.

Rodriguez et al. addresses a smaller population, however, the statistical information provided by this report is important. The authors were concerned about the quality of their data only because they believed that positive response about the subject of open access could be influenced by 'social desirability' or satisficing. Even though there was a concern about satisficing, results show that EMIs were largely in favor of open access publishing.

Ji-Hong Park and Jian Qin recently published an article, "*Exploring the Willingness of Scholars to Accept Open Access: A Grounded Theory Approach* (2007). In this article, Park and Qin conducted open-ended, semi-structured interviews with eight faculty members and six doctoral students at Syracuse University in order to attempt to discover factors that influence a scholar's decision to publish or not publish within an open access journal. They determined that there are seven factors that influence a scholar's decision-making and by using a grounded theory approach, they examine how these seven factors relate to each other.

The results determined that perceived journal reputation, perceived topical relevance, and perceived availability are the most common factors leading to choosing closed access versus open access publishing. Park and Qin's article is important to the work proposed in this study in that they discuss the major factors of why scholars may choose not to publish within an open access journal even though they may express their support of the concept.

Another recent article of import is authored by Stefanie E. Warlick and K.T.L. Vaughan: *Factors influencing publication choice: Why faculty choose open access* (2007). This article also discusses the motivating factors behind decision-making with regard to Open Access and Open Archives. The study is limited to biomedical faculty at both Duke University and The University of North Carolina at Chapel Hill. Semi-structured individual interviews were conducted along with searches within PubMed and PubMed Central to identify faculty members from both institutions who published in Open Access journals.

Fourteen interviews were conducted and the interviewees were equally distributed within the academic community – they were junior and senior faculty. Seventeen questions were asked regarding decision-making. Warlick and Vaughan found that free access to information is an important characteristic and an incentive to publish within these journals, but it was not necessarily enough of an incentive. Journal quality was most important to these scholars.

The attitudes and perceptions of faculty regarding open access publishing do not waver from 2005 to 2007. The concerns remain the same: the peer-review process, quality of a journal, author pays fees, and impact upon career.

**Economic factors:**

Economic factors are a large part of why authors and libraries may support open access publishing, however, there are economic issues at play that could deter authors from publishing in open access journals.

In 2004, Richard Johnson published an article called *Open Access: Unlocking the Value of Scientific Research* in which the issue of inordinately high journal prices is discussed, and open access is discussed as a way to alleviate costs. Johnson describes how journal prices have risen considerably and the prices have outgrown library budgets and have forced libraries to cut back on journal subscriptions or to cancel them altogether. The journal bundling practice, where journals are sold in a package to libraries, is no longer a feasible way of accessing content for libraries and in 2002 there was a backlash against publisher control of content. Open access could be the solution to these costs, however, “open access is not a business model; it is an outcome that may be supported in a range of ways with an infinite variety of business models. These varieties are being worked out in the marketplace and in individual scholarly communities with different traditions and financial dynamics” (113).

Sally Morris’ article *The True Costs of Scholarly Journal Publishing* (2005) details the publishing process and discusses not only actual costs, but costs related to time and effort in publishing a journal article. Morris details tax costs for publishers, storage and archiving costs, customer service costs, along with the actual costs for doing research, and then goes on to discuss how some, if not all of these costs, may be alleviated by choosing to publish articles via open access.

Rick Anderson also discusses the scholarly communication marketplace in *Author Disincentives and Open Access* (2004). In this article, Anderson makes a case for authors being deterred by open access publishing due to authors having to possibly pay for publishing charges. “Given a choice between publishing in an OA journal at a cost of, say, \$1500 and publishing in an equally prestigious non-OA journal at no cost

to [the author], he or she would have to be either powerfully motivated by the moral arguments of OA or externally compelled to choose the OA option.” (289). Anderson makes a salient point in that if authors have to pay a fee to publish their content, even if they are contributing the public good, they may be deterred from the open access option.

Sara Schroter answers Rick Anderson’s discussion of author disincentives with the article *Open Access Publishing and Author-pays Business Models: A Survey of Authors’ Knowledge and Perceptions* (2006). Schroter surveyed authors of research papers submitted to BMJ, Archives of Disease in Childhood, and Journal of Medical Genetics in order to determine what authors know about the author-pays model. When questioned, 69% of those who had previously submitted to an open access author-pays journal said they would do so again, 16% said they would not do so again, and 22% said they weren’t sure. Schroter found that in 2006 there was more awareness of open access publishing, however knowledge of the publishing models was not widespread. Again, journal reputation and quality was more of a decision-making factor with regard to publishing in open access journals than costs to authors.

### **Librarians and Scientists:**

Two of the major stakeholders with regard to open access publishing are librarians and scientists, especially scientists in the biomedical world and medical and science librarians.

*Open Access: Implications for Scholarly Publishing and Medical Libraries* (2006) by Karen M. Albert discusses the medical library as a major stakeholder with

regard to open access. Librarians have long been advocating for change with regard to serials publishing charges, and most have become active in stopping serials monopolies. However, some librarians question if the author-pays model will actually be a solution to alleviating journal pricing issues. Elizabeth Turtle and Martin Courtois's article *Scholarly Communication: Science Librarians as Advocates for Change* (2007) also discusses how librarians have a unique opportunity to take a leadership role in promoting open access.

Scientists are generally at the forefront when it comes to use of new technologies and consumption of new ideas. In *The Open Access Scientific Journal: An Empirical Study* (2004), Turid Hedlund et al. describe how "even before mainstream publishers began to produce electronic versions of their journals, pioneering scientists and groups of scientists seized the opportunities offered by the Internet for unprecedented new modes of producing and delivering scientific publications" (200). It is the need for innovation and quick access to information, as well as a faster way for scientists to publish, that drive the open access movement in this discipline.

*Information Seeking Behavior of Academic Scientists* (2007) by Bradley M. Hemminger, Dihui Lu, K.T.L. Vaughan and Stephanie J. Adams discusses how the availability of electronic resources, along with Open Access publishing, is changing the way scientists search and look at scholarly materials. Both medical and basic academic scientists (biologists) were analyzed in order to determine if there are publishing trends. As this particular article shows, scientists are the leading stakeholders with regard to finding information quickly. The most interesting result to be noted in this particular article is that Open Access journals are the second most frequently utilized information



source for academic scientists, which is likely due to the need for quick and easy-to-access information. Electronic journal subscriptions made available to scientists via their institution's library were their number one source for information.

The need for quick access to information is also discussed in Virginia Barbour's short article *The Impact of Open Access Upon Public Health* (2006). Barbour makes the case for quick access and research being made available for free as a public health issue, because there is a "potentially deadly gap between the information-rich and the information-poor" (339).

#### **The University of California survey:**

The most recent and most relevant report on faculty attitudes and authors' perceptions of scholarly communication is *Faculty Attitudes and Behaviors Regarding Scholarly Communication: Survey Findings from the University of California* (2007).

The University of California is one of several universities currently involved in promoting the open access initiative. The University Office of Scholarly Communication:

initiated a multi-phase study in 2006 that aimed to deepen . . . understanding of faculty perspectives and behavior on a range of issues and developments within the scholarly communication arena. The study explored UC faculty members' sense of the overall health of scholarly communication systems, and their perspective on the role of tenure and promotion processes, copyright, alternative and emerging forms of publication and dissemination, policy interventions, and key services that the University does or could supply, including those of its eScholarship publishing services (1).

In order to investigate faculty perceptions, attitudes and behaviors, UC utilized structured interviews, and invited a random stratified sample of UC's faculty to answer

a 32-question online survey. There were 1,118 respondents – about 23% of those who were invited. Results produced 13 different points in regard to faculty and researcher attitude, along with 4 points directed at stakeholders with regard to promotion of open access.

Assistant, Associate and Full professors were surveyed with regard to issues of tenure, perceived journal quality, impact factors, and knowledge of open access in general. With regard to professor status: “Assistant Professors tend to feel the most constrained by impositions of the tenure and promotion system, although Associate Professors also exhibit some of the same attitudes and behaviors, albeit to a lesser extent” (5). Overall, a greater proportion of Assistant professors and Associate professors feel that tenure issues drive their interest in publishing behavior more than any other factor. Full, Associate, and Assistant professors tended to have similar views about key issues, however. They had similar feelings about commercial publishers, journal costs, and copyright management. Statistics were also gathered regarding discipline. Again, the physical sciences and life sciences appear to have the most at stake with regard to scholarly communication.

### Chapter 3: Methodology

The following methods were employed in order to answer the research questions: “What are the publication behaviors of academic PLoS signers?” and “What is the relationship between the status of the signers and their publishing behavior?”

Beginning with the list of over 34,000 signers from all over the globe, the sample was narrowed to only signers in the United States – 3,741 names in total. A full signer record contains the name, discipline, faculty status, along with university or institutional affiliation. The goal was to keep signers who are affiliated with universities, more specifically, those who are most likely to publish.

The 3,741 names were entered, alphabetically, into a spreadsheet and names were deleted according to the following criteria:

- 1) If the signer did not have an institution or discipline assigned.
- 2) If there was no faculty status listed.
- 3) If the signer was not affiliated with an academic institution (signer must be a librarian, assistant, associate, or full professor. OR a researcher, post-doctoral researcher, graduate student).

Once these criteria were followed and names were deleted, the list size decreased considerably to 1,882 names. The signers were then sorted and coded according to discipline. Each discipline was assigned a number, and there were over 35 disciplines included in the list of signers.

After sorting the signers according to discipline and status (i.e. librarian, researcher, professor), a decision was made to delete signers who were not labeled Assistant, Associate, or Full professor. The list was then reduced to 1,024 signers, and the status of signers was coded using (1) for Assistant, (2) for Associate, (3) for Full.

Upon reviewing the 1,024 signers and their disciplines, the list was reduced further by narrowing in upon two disciplines in particular: biology and medicine. Signers within the discipline of biology consisted of 331 names, and the discipline of medicine consisted of 178 names.

From the narrowed list, a sample was derived using a stratified sampling method. Stratified sampling is the process of sampling sub-populations independently. After creating sub-populations, in this case: Assistant, Associate, and Full professor . For the biology sample – 25% of Assistant professors, 20% of Associate professors, and 55% of Full professors were sampled. For medicine – 35% Assistant professors, 23% of Associate professors, and 42% of Full professors were sampled. These sample distributions matched the distribution in the population.

Once a sample was determined, it was then possible to obtain lists of faculty publications. In order to obtain full lists, a thorough search for Curriculum Vitae (CVs) was conducted using Google and university websites. If publication lists on CV's appeared to be incomplete, Google Scholar was used to supplement the list.

Unfortunately, once a stratified sample was obtained, it was difficult to get full lists for the professors originally sampled. It was necessary to find individuals who had full lists or at least had record of publication somewhere on the Internet. After finding

signers with CVs or publication lists, names were then selected from the list of 178 (Medicine) and 330 (Biology) to match the amount of signers selected for the sample

After compiling full lists, journal names were resolved by entering abbreviations into Google or PubMed's Journals Database. Full journal names were then entered into an Excel spreadsheet. The journal name was also entered into Sherpa RoMEO (<http://www.sherpa.ac.uk/romeo.php>), a website that details publishers' and journals' archiving and copyright policies. Each journal listed in Sherpa RoMEO is color-coded as green, yellow, blue, and white. Green has the most open archiving policy that allows for archiving at any time depending on the publisher's requirements and policy, which can also be found on Sherpa RoMEO. White is the least open and is a category that contains journals that follow no formal archiving policy. Yellow publications allow authors to post their articles prior to peer-review, however there are some restrictions in place. Blue allows for authors to post their work prior to the peer-review, but there are more restrictions involved.

- Green – can archive pre-print and post-print
- Yellow - can archive pre-print (i.e. pre-refereeing)
- Blue - can archive post-print (i.e. final draft post-refereeing)
- White - archiving not formally supported

The color code derived from Sherpa RoMEO was entered into the Excel spreadsheet next to the journal name, along with a code of (1) for open access or (0) not open. If there was no journal listing in Sherpa RoMEO, a web search was conducted to determine access status. Sherpa RoMEO also lists levels of type of access. For example, some journals are open via a sponsorship option and some journals are freely open without any publisher restriction. The level of access was also recorded.

Once journal names were entered into Sherpa RoMEO, they were also entered into the Directory of Open Access Journals or [www.doaj.org](http://www.doaj.org). DOAJ only lists journals that are specifically open access and do not have any restrictions with regard to publication.

After all journal names were resolved and entered into both Sherpa RoMEO and DOAJ to determine access status, the authors' publication lists were reviewed in order to determine if the publication was made available in an open access journal. Articles were coded as OPEN or NOT OPEN, and were then counted by year (articles were tracked from 2001 – 2007). Articles were considered OPEN if the journal they are published in is either Green or Yellow, or if the article is published in a fully open access journal listed in DOAJ. Open access status or type of access was also recorded. For instance, some publishers grant a sponsorship option where the author reports to a funding body and therefore requires that their interests be met. Some journals required subscriptions to access content, some were completely free on the web. According to the research conducted: the sponsorship option was most common, Open Choice, Online Open or Oxford Open were just a few of the open access choices large publishers grant their authors. In general, if the journal had Open Choice or other Open-type choices; it was coded as green in SherpaRoMEO. While Sherpa RoMEO shows that many journals have open access choices; the list compiled contained very few free to all open access journals. Each journal was entered into the Directory of Open Access Journals ([www.doaj.org](http://www.doaj.org)) and only 17 journals out of 327 (0.05%) were listed.

Total numbers of articles were then compiled to determine how many articles were published as open access by Assistant, Associate, and Full professors, along with totals in each discipline per year. Numbers were then analyzed to determine trends.

## Chapter 4: Results

Prior to narrowing the sample to include only the medical and biological disciplines (1,024 signers), an analysis of all signers was conducted. It was found that disciplines, 35 varieties in total, ranged from hard sciences and medicine to the humanities and professional disciplines, however, the hard sciences and medicine were the majority of the signers – out of the unclean data (1,882 signers), or data that was not yet subjected to the deletion criteria, 31% were in medicine and 18% in the biological sciences (see Table 1).

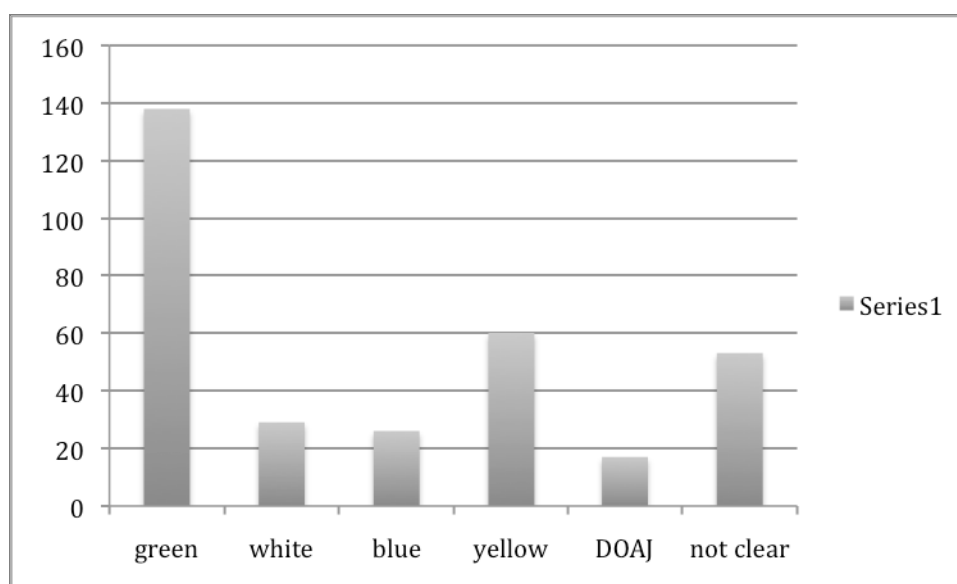
Discipline	Frequency	% Sample = 1882
2 – Biology	574	30.5
6 – Medicine	330	17.5
8 – Biochemistry	155	8.2
1 – Chemistry	131	7.0
3 – Environmental Sciences	96	5.1
11 – Genetics	79	4.2
22 – Neurosciences	78	4.1
14 – Mathematics	43	2.3
9 – Engineering	39	2.1
21 – Pharmacology	39	2.1
5 – Psychology	36	1.9
13 – Librarian/Info Sciences	36	1.9
12 – Computer Science/Technology	33	1.8



24 – Physiology & Biophysical Sciences	29	1.5
15 – Physics	27	1.4
4 – Public Health	25	1.3
7 – Entomology/Ornithology	19	1.0
19 – Psychiatry	18	1.0
25 – Zoology	15	.8
27 – Kinesiology	11	.6
10 – Anthropology	8	.4
31 – Food Sciences/Nutrition	8	.4
29 – Informatics	7	.4
32 – Linguistics	6	.3
34 – Economics/Business	6	.3
35 – Sociology	6	.3
20 – Dentistry	5	.3
28 – Philosophy	5	.3
30 – Epidemiology	5	.3
0 –not known	3	.2
17 – Education	3	.2
16 – Speech & Hearing/Audiology	2	.1
18 – Genomics	2	.1
23 – Communications	1	.1
26 – Literature	1	.1
33 – Architecture	1	.1

**Table 1: Signers and their discipline**

After analyzing discipline it was found that authors published in 327 journals, 87 of which were non-open access journals, and 240 were open access journals. Each journal was coded according to the color scheme that Sherpa RoMEO uses (green, yellow, blue, white). Green and yellow were generally considered open access journals and blue and white were deemed non-open access. The list of 327 journals contained: 26 blue, 138 green, 60 yellow, 29 white and 70 journals where, either the status was unclear, or journal information was not available in Sherpa RoMEO. These results are displayed in Figure 1.

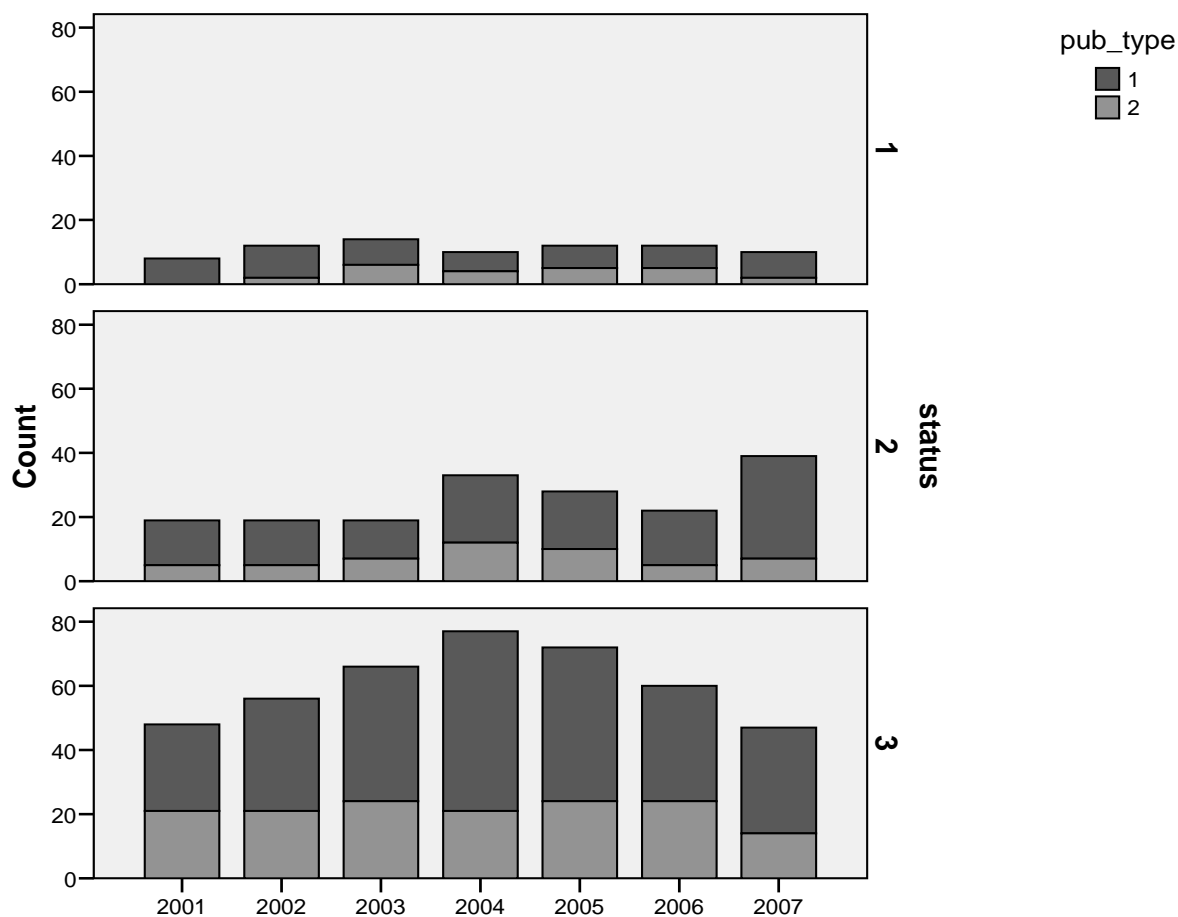


**Figure 1: Number of journals by Sherpa RoMEO color code**

### **Biology:**

The data collected on the biological sciences shows that, overall, biologists are publishing more in open access journals than they are in non-open access journals. Assistants, Associates, and Full professors all have relatively larger numbers of publications in this format.

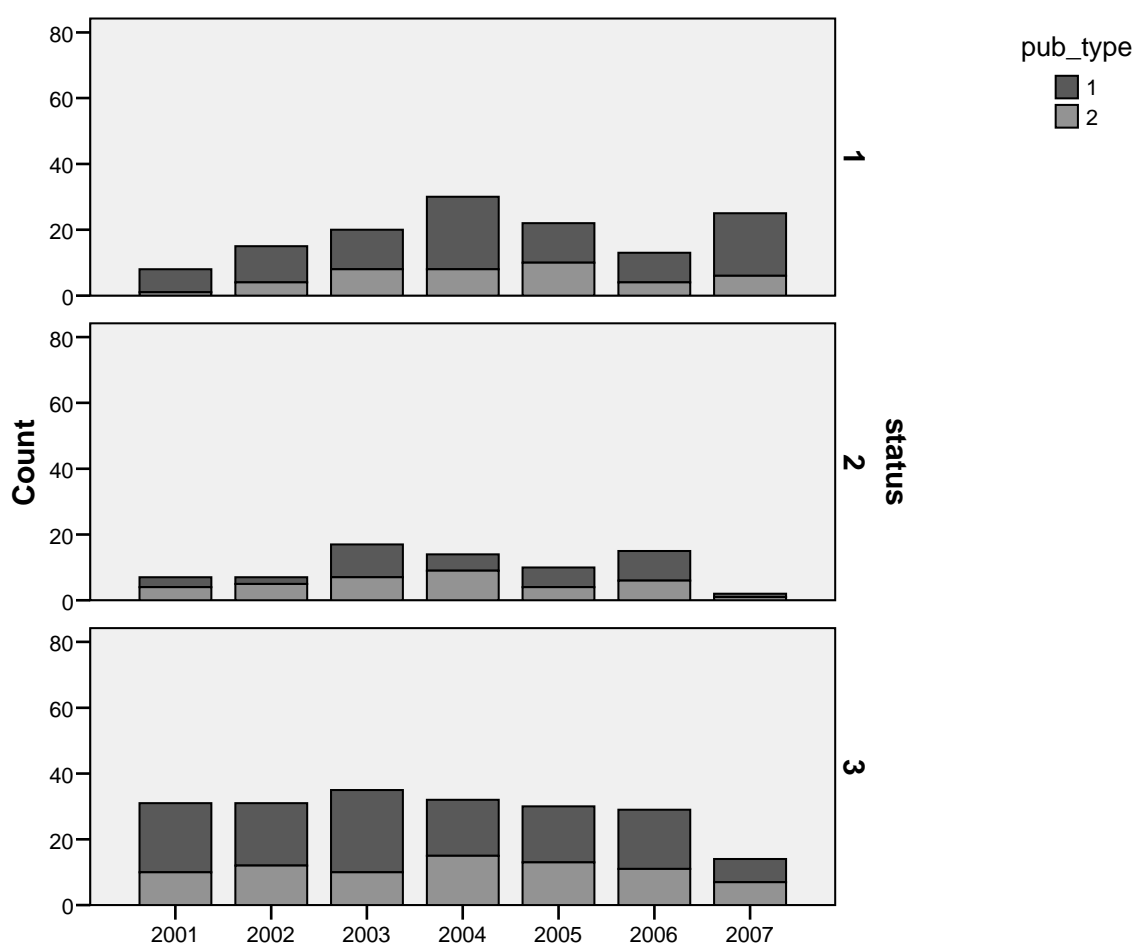
With regard to trend by year, 2003 to 2005 have the greatest spikes in open access publication. 2004 is an especially proliferative year with regard to publication in open access for both Associate and Full professors. There is also a spike in 2007 for open access publishing for all three types of professor. Results for the biological sciences are displayed in Figure 2.



**Figure 2: Total publications per year – Biology**  
 Pub-type - 1 = Open Access, 2 = Non-Open Access  
 Status - 1 = Assistant, 2 = Associate, 3 = Full

### Medicine:

Figure 3 shows that compared to biology, the medical discipline is publishing less in open access publications. However, the trend is the same in that overall, the medical field is publishing more in open access than non-open access. There are no significant spikes in publication per year, except in 2004 Assistant professors published more articles than any other year.



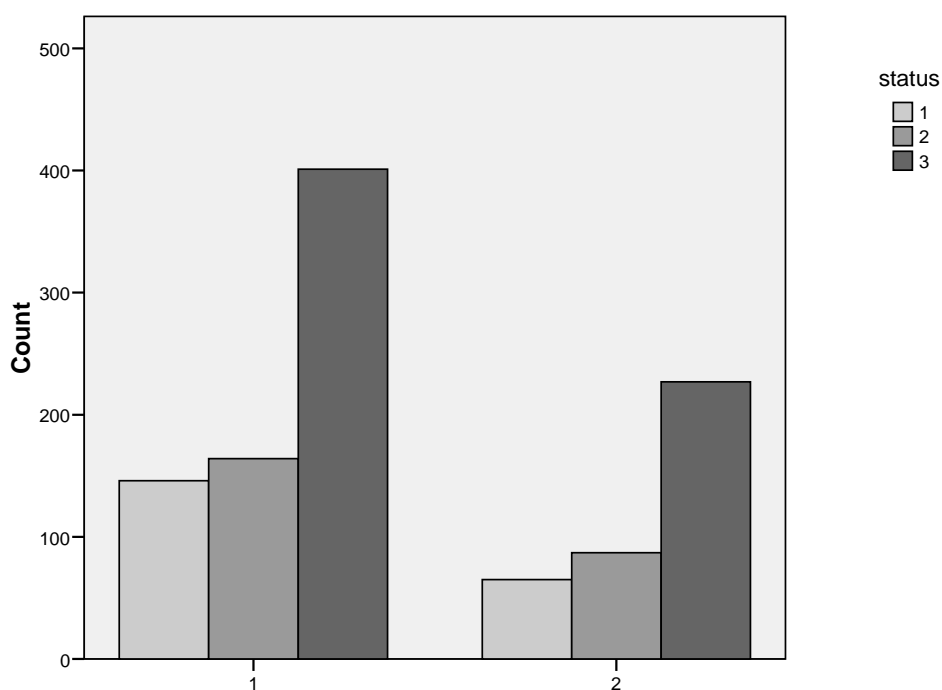
**Figure 3: Total publications per year – Medicine**

Pub-type - 1 = Open Access, 2 = Non-Open Access

Status - 1 = Assistant, 2 = Associate, 3 = Full

### Overall publication behaviors:

After journal status was compiled, publication lists were analyzed and the amount of open access publications and non-open access publications were recorded. Publications for each Assistant, Associate and Full professor were recorded by year and labeled either OA or Non-OA. Analysis of the amount of articles published in open access (Assistant = 1, Associate = 2, Full = 3) shows that overall, Full professors are publishing more in general compared to Assistant and Associate professors. And overall, professors did adhere to their pledge to publish in open access journals, as the number of open access publications is greater than non-open access publications. Figure 4 and Table 2 both show the amount of publications by status.



**Figure 4: Publication behaviors related to status**  
**Pub-type - 1 = Open Access, 2 = Non-Open Access**  
**Status - 1 = Assistant, 2 = Associate, 3 = Full**

		status			Total
		1	2	3	1
pub_type	1	146	164	401	711
	2	65	87	227	379
Total		211	251	628	1090

**Table 2: Number of OA and Non-OA publications by status of professor**  
 Pub-type - 1 = Open Access, 2 = Non-Open Access  
 Status – 1 = Assistant, 2 = Associate, 3 = Full

### Chi-Squared Test:

A Chi-Squared test was performed to determine whether status of faculty is related to the likelihood of publishing in open access publications. Results show that there was no relation between status of professor and publishing behavior as the result was not significant  $\chi^2(2, N = 1090) = 0.37, p > .05$

## Chapter 5: Discussion

The hope of an organization when eliciting a pledge is that the signers will adhere to the statements or the promise that the pledge contains. In the case of the PLoS “Open Letter to Scientific Publishers,” the goal was to have signers only publish in or subscribe to journals that are open access, or allow for access to content within a six month timeframe. The debate regarding open access over the past seven years, and evidence and research that states that authors understand open access, but do not publish in this format, could lead one to think that many of the PLoS signers did not in fact adhere to their pledge. The idea is a good one, however, fears about peer-review, journal quality, and tenure and promotion, could have potentially stopped signers from behaving in the way that the pledge suggests.

The results of this study show that the majority of PLoS signers are professors in the biomedical field and hard sciences, and a small percentage of the signers are in the humanities. Professional researchers, librarians, and students also signed the pledge, but it was important to look at professors specifically because most publishing is by professors, and several of the issues surrounding open access are discussed in an academic setting. With regard to why the list of PLoS “Open Letter” signers is so populated with those in the biomedical sciences; it is possible that community reached

by PLoS is biomedical researchers. PLoS publishes mainly biology and medical journals. It is also possible that this issue, as said before, is one that affects the scientific community most.

Narrowing in on both the biological and medical communities, data was collected to see if there was any relationship between status of a professor and their publication behaviors. The findings show that there is no relationship between status and publication behavior, however, when looking at data showing the number of publications produced by Assistant, Associate, and Full professor in both disciplines; Full professors published more overall, however, more Full professors were sampled. The sample sizes for Assistant, Associate and Full professors in the medical professors are relatively similar, however (Assistant = 6, Associate = 4, Full = 8), and one can see by looking at Figure 3 that Full professors still have numbers relatively higher than Assistant professors. A much larger sample was collected for Full professors = 18, in the biology discipline, compared to that of Assistant = 8, Associate = 7.

Overall publication behavior indicates that signers did adhere to their pledge as more open access articles were published. There were, however, very few signers who only published in open access publications. Many published in both. Very few of the subjects selected published only in one format, open access or non-open access. Open access publications do outweigh the number of non-open access publications as results show.



**Limitations:**

The PLoS list of signers was most heavily populated with professors that labeled themselves as Full professors, making up about half of the population studied: 56% of biology professors studied, and 42% of medical professors. First, there is the possibility that this type of professor was more represented in the list due to the fact that Full professors are less likely to be concerned with tenure and promotion and therefore feel free to publish wherever they'd like. Second, there is the issue that PLoS signers did not necessarily specify their status within the department and just said: Professor. All signers that listed "professor" as their occupation were coded as "Full" professors. Although this may be the case, the percentages of the population represented are similar for both the medical and biology fields in that they both make up the greater amount of the population.

Also, there are possible issues with using Sherpa RoMEO as a way to gauge level of access. Sherpa RoMEO lists the publisher's policies, but it doesn't necessarily mean that the content was available for free or within a 6 month time period.

Another limitation with regard to this research is that the sample size was limited to only medical and biology professors. By increasing the number of professors studied, results could potentially be different.

Curriculum Vitae collection also poses an issue with regard to collection of publication lists. There is a possibility that the lists were not complete, and therefore, data could be skewed.

Validity of status with regard to year could be called into question as well. Since the study looks at publication behavior over a span of seven years, it is possible

that many of the Assistant or Associate professors are now tenured or have been promoted. The Full professors could easily be retired as well, and this could skew data collection with regard to publication frequency.

## **Chapter 6: Conclusion**

The purpose of this research was to determine the publication behaviors of academic signers who signed the Public Library of Science (PLoS) “Open Letter to Scientific Publishers.” The secondary question investigated was whether or not status of the academic signers (Assistant, Associate, Full professor) has anything to do with publication behavior. This research showed that despite the issues surrounding the open access debate, academic signers of the PLoS “Open Letter to Scientific Publishers” are publishing in open access journals. While they are not publishing exclusively in this format, they are making an effort to allow for their content to be made freely available to all.

There are many stakeholders involved with regard to the open access debate. Librarians are especially invested because free access to content will allow for a more flexible budget, and quick access to information for patrons. Scientists, even if reluctant to change, benefit in that their work is disseminated more widely and has more impact. The public benefits by being able to access health information that could allow access to care. Developing countries, as long as technological barriers do not impede, can use the freely available information to improve health clinics or eliminate infection in hospitals. All of these benefits make open access a viable option when choosing to publish.

The National Institutes of Health (NIH) recently created legislation that will mandate that publications funded by NIH must be deposited into PubMed Central, a database of free content. The following is a list of specifics with regard to the policy:

- 1) The NIH Public Access Policy applies to all peer-reviewed articles that arise, in whole or in part, from direct costs 1 funded by NIH, or from NIH staff, that are accepted for publication on or after April 7, 2008.
- 2) Institutions and investigators are responsible for ensuring that any publishing or copyright agreements concerning submitted articles fully comply with this Policy.
- 3) PubMed Central (PMC) is the NIH digital archive of full-text, peer-reviewed journal articles. Its content is publicly accessible and integrated with other databases (<http://www.pubmedcentral.nih.gov/>).
- 4) The final, peer-reviewed manuscript includes all graphics and supplemental materials that are associated with the article.
- 5) Beginning May 25, 2008, anyone submitting an application, proposal or progress report to the NIH must include the PMC or NIH Manuscript Submission reference number when citing applicable articles that arise from their NIH funded research. This policy includes applications submitted to the NIH for the May 25, 2008 due date and subsequent due dates (National Institutes of Health, NIH).

This legislation requires authors to put their content into a freely accessible database, whereas prior to the legislation authors had a choice. By mandating that content be deposited into PubMedCentral, the government is making a statement that access to information, especially medical information, is imperative. This policy could lead to several changes in the academic world, along with the library world. Libraries will likely be asked to help implement this policy at their institutions and help guide authors.

Also, as discussed previously, universities such as the University of North Carolina – Chapel Hill have funds that are available for publishing in author-pays journals if the faculty member does not already have funding available to them. These sort of funds and initiatives of libraries will help to create more open access publications.

While there it is not certain how open access will change in the future, the NIH legislation is moving the initiative in a positive direction. The government now is showing that they recognize the importance of disseminating important information to more than just a small community of researchers.

**Future work:**

The data collected allows for several opportunities for further study. For instance, the sample size could be increased and a study of all professors listed in the PLoS letter could be implemented. The sample was limited to signers located in the United States. Of the 34,000 names, only about 4,000 were researchers from the U.S., so an analysis could be conducted by country. The United Kingdom and Canada are both fairly imbedded in the open access movement already, so publication behaviors could differ greatly within those populations.

Since the letter was published in 2001 – there is the possibility that several of the professors listed as “Assistant” are now at a higher level in their career. Studies could be conducted to see if the actual articles published were made available for free within a 6 month period, if there was an authors-pays model used, or if the author chose not to opt for the open option of the publisher.

Journal choice could be studied within disciplines too see if individuals in certain fields are publishing in the same places. Also, a more in-depth study of journal policies could be conducted to see what is involved and how open they actually are.

Also, interviews could be conducted with willing signers and a questionnaire could be implemented in order to find out what are their actual perceptions of the topic of open access and also try to attempt to find out what motivated them to sign the “Open Letter”.

With regard to the recent NIH policy, it would be interesting to implement another study within the next few years to see if authors are publishing a greater amount of open access publications. One would hope there would be a significant jump in open access publication as NIH threatens to remand funding if policy is not followed.

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## Appendix I:

<http://www.plos.org/about/letter.html>

### **Read the Open Letter:**

The Public Library of Science initiative began with the circulation of the following open letter, urging publishers to allow the research reports that have appeared in their journals to be distributed freely by independent, online public libraries of science.

Although our deadline of September 2001 has passed, and the focus of our efforts has shifted to publishing our own journals, you can continue to show your support for PLoS by joining **36022** of your colleagues from **249** countries in signing the following open letter to scientific publishers.

#### ***1.1 Open Letter:***

We support the establishment of an online public library that would provide the full contents of the published record of research and scholarly discourse in medicine and the life sciences in a freely accessible, fully searchable, interlinked form. Establishment of this public library would vastly increase the accessibility and utility of the scientific literature, enhance scientific productivity, and catalyze integration of the disparate communities of knowledge and ideas in biomedical sciences.

We recognize that the publishers of our scientific journals have a legitimate right to a fair financial return for their role in scientific communication. We believe, however, that the permanent, archival record of scientific research and ideas should neither be owned nor controlled by publishers, but should belong to the public and should be freely available through an international online public library.

To encourage the publishers of our journals to support this endeavor, we pledge that, beginning in September 2001, we will publish in, edit or review for, and personally subscribe to only those scholarly and scientific journals that have agreed to grant unrestricted free distribution rights to any and all original research reports that they have published, through PubMed Central and similar online public resources, within 6 months of their initial publication date.