



*Evidence Summary*

***Open Access Articles Have a Greater Research Impact Than Articles Not Freely Available***

**A review of:**

Antelman, Kristin. "Do Open-Access Articles Have a Greater Research Impact?" College & Research Libraries 65.5 (Sep. 2004): 372-82.

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**Abstract**

**Objective** – To ascertain whether open access articles have a greater research impact than articles not freely available, as measured by citations in the ISI Web of Science database.

**Design** – Analysis of mean citation rates of a sample population of journal articles across four disciplines.

**Setting** – Journal literature across the disciplines of philosophy, political science, mathematics, and electrical and electronic engineering.

**Subjects** – A sample of 2,017 articles across the four disciplines published between 2001 and 2002 (for political science, mathematics,

and electrical and electronic engineering) and between 1999 and 2000 (for philosophy).

**Methods** – A systematic presample of articles for each of the disciplines was taken to calculate the necessary sample sizes. Based on this calculation, articles were sourced from ten leading journals in each discipline. The leading journals in political science, mathematics, and electrical and electronic engineering were defined by ISI's Journal Citation Reports for 2002. The ten leading philosophy journals were selected using a combination of other methods.

Once the sample population had been identified, each article title and the number of citations to each article (in the ISI Web of Science database) were recorded. Then the article title was searched in Google and if any freely available full text version was

found, the article was classified as open access. The mean citation rate for open access and non-open access articles in each discipline was identified, and the percentage difference between the means was calculated.

**Main results** – The four disciplines represented a range of open access uptake: 17% of articles in philosophy were open access, 29% in political science, 37% in electrical and electronic engineering, and 69% in mathematics. There was a significant difference in the mean citation rates for open access articles and non-open access articles in all four disciplines. The percentage difference in means was 45% in philosophy, 51% in electrical and electronic engineering, 86% in political science, and 91% in mathematics. Mathematics had the highest rate of open access availability of articles, but political science had the greatest difference in mean citation rates, suggesting there are other, discipline-specific factors apart from rate of open access uptake affecting research impact.

**Conclusion** – The finding that, across these four disciplines, open access articles have a greater research impact than non-open access articles, is only one aspect of the complex changes that are presently taking place in scholarly publishing and communication. However, it is useful information for librarians formulating strategies for building institutional repositories, or exploring open access publishing with patrons or publishers.

### **Commentary**

Journal impact factors have long been of interest to librarians building or maintaining core collections and to academics wishing to be published in high-impact journals. The latter group are also interested in how many times their published research is cited by other authors. This article, which examines

the research impact of individual articles, will be of interest to both groups as they face the challenges and opportunities of open access publishing.

In this well-constructed, highly readable study, Antelman demonstrates that open access articles have a greater research impact than non-open access articles in the disciplines of philosophy, mathematics, political science, and electrical and electronic engineering. The methodology used in this research is sound: select a number of high-impact journals, identify a sample of articles published in those journals, and compare the number of citations to open access versus non-open access articles. Enough detail is given in the methodology section to suggest that the sample size is sufficient. Articles published in 2001 and 2002 were selected on the basis that a two-year lag between publication and citation analysis is the commonly accepted time required for confirmation of impact (Garfield 92). The time frame was adjusted for philosophy where there is a lower level of citation of articles (reference period 1999-2000). The methodology used also takes into account the skewed distribution of citations in most fields, where 20% of articles may account for 80% of citations (Garfield 91), by using nonparametric methods.

This study raises two main points of discussion: one in relation to methodology, which is addressed by the author; and one in relation to the conclusions drawn from the study, which the author has addressed since this article was published.

The study's methodology is based on using 'citedness' as a measure of research impact. Citation has long been the standard measurement of impact in the scholarly community and the means of mapping networks of scientific research. However, in the complex environment of open access publishing, citation on its own is an

inadequate measure of research impact. The author acknowledges this when she states that "citedness as measured by ISI [Web of Science] is a measure that is commonly relied on as a surrogate for [research] impact." She admits that this study is concerned with "the effect of open access on *one* traditional and frequently used measure of research impact" (emphasis added). Other researchers in the field agree. Steven Harnad and Tim Brody, for example, have used the same methodology in their ongoing collaborative study of 14 million open access and non-open access articles across ten disciplines over ten years. However, others are developing new bibliometric methodologies appropriate to Web environments, giving rise to new terms such as webometrics, cybermetrics, and inflometrics (Cronin).

The more problematic issue raised by this study lies in the conclusions drawn by the author. This study demonstrates that open access articles have greater research impact than non-open access articles, but it does not demonstrate that open access *causes* greater research impact. Philip M. Davis has challenged the author on this point by proposing two alternative explanations for the greater research impact of open access articles: article duplication (open access itself being a form of duplication), and author self-promotion (such as posting articles published in prestigious journals to an author's own website) (103-4).

Antelman has replied that "[w]hile I intentionally phrased my conclusion as an association, rather than a causation [. . .] there clearly is an implied causation and I should have been more explicit that the data do not support that" (105). She also responds that, since conducting the original research reported in this article, she has collected additional data which suggests that author self-promotion, or "quality bias" is a significant issue in scholarly publishing.

This study—which, of course, is freely available online (<<http://www.la-press.com/include/Antelman.pdf>>)—will be of great interest to academic and special librarians negotiating the dynamic environment of open access publishing and document retrieval. It uses traditional citation analysis methodology but points to evolving bibliometrics and new citation measures. The author achieves the stated objective of demonstrating that freely available papers have a greater research impact than those not freely available online. However, it is identifying and measuring the multiple, interdependent factors that *cause* the greater impact that poses challenges for current and future researchers in this area.

#### Works Cited

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