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Faculty Attitudes toward Open Access and Scholarly Communications: Disciplinary Differences on an Urban and Health Science Campus

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Access to scholarship in the health sciences has greatly increased in the last decade. The adoption of the 2008 U.S. National Institutes of Health Public Access Policy and the launch of successful open access journals in health sciences have done much to move the exchange of scholarship beyond the subscription-only model. One might assume, therefore, that scholars publishing in the health sciences would be supportive of these changes. However, the results of this survey of attitudes on a campus with a large medical faculty show that health science respondents were uncertain of the value of recent changes in the scholarly communication system.

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IMPLICATIONS FOR PRACTICE

For librarians interested in increasing the understanding of and participation in open access, the results of this study suggest strategic methods for engaging health science faculty.

1. Health science respondents were significantly more likely than other disciplinary respondents to care about publication outlet reputation over providing wider access to their work, therefore, focused outreach on the reputational benefits of open access, such as citation increases and widely-known, highly-ranked, open access journals is suggested.
2. Respondents in health sciences are familiar with open access journals, but less so with other approaches to open dissemination. Establishing and promoting an open access journal fund to support article processing charges for authors with limited grant support may be one path towards greater participation in library-supported open access programs—particularly when access to the fund is contingent upon participation in an institutional repository.
3. Health science respondents were significantly less likely to have knowingly self-archived in an open access repository. Nonetheless, much of the journal literature in the health sciences is openly archived in PubMed Central or published in open access journals. With this in mind, libraries could build their institutional repositories by archiving already open work on behalf of health science faculty while promoting self-submitting approaches to authors in other disciplines.

INTRODUCTION

The rise of open access (OA) in scholarly communication impacts scholars in all disciplines. Arguably, however, it has been the most visible in the health sciences. In 2003 three prominent health science researchers, Harold Varmus, Patrick Brown, and Michael Eisen, successfully launched Public Library of Science (PLOS) as an OA journal publishing effort focused on scientific and medical literature (PLOS, 2015). Supported by article processing charges (APCs), PLOS now publishes over 33,000 peer-reviewed articles online per year—all at no cost to readers (Denker, 2015). Similarly, BioMed Central began offering APC-supported, OA publishing in 2002 and now publishes 290 journals (BioMed Central, 2016). In a nearly simultaneous development, the U.S. National Institutes of Health (NIH), under the direction of Harold Varmus, launched an open access repository, PubMed Central (PMC), in 2000. The NIH and others subsequently advocated for federal legislation mandating that manuscripts of articles resulting from NIH funding be made freely available in the repository within one year of an article's publication date. The legislation passed and the NIH Public Access Policy was implemented in 2008 (Department of Health & Human Services, 2014). In November 2012, the NIH announced that it would “delay processing of non-competing continuation grant awards,”

if articles were found to be out of compliance with the policy (Office of Extramural Research, NIH, 2012). Currently, PMC provides free access to over 4.1 million articles (National Center for Biotechnology Information, 2016). These and other OA efforts in the health sciences have resulted in free access to over a third of the articles indexed by PubMed one year after the date of publication (Saunders, 2014).

Open access to scholarly publications has grown beyond the health sciences. A few disciplinary repositories, such as arXiv (which includes Physics, Mathematics, Computer Science, Quantitative Biology, Quantitative Finance, and Statistics) and SSRN (Social Science Research Network), have found success. At the same time, authors may rely on institutional repositories to disseminate their research. In support of this practice, faculty at many universities have adopted OA policies to retain the copyrights necessary for self-archiving in institutional repositories (SPARC, 2015). Many of these policies are based on the Harvard, opt-out model (Harvard Library Office of Scholarly Communication, 2015). Likewise, funding agencies are developing policies. Most significantly, the White House Office of Science and Technology Policy released a directive in 2013 that calls for public access policies for every U.S. agency with an extramural research budget greater than \$100M (Stebbins, 2013). Nonetheless, no other broad disciplinary area has been as widely impacted by OA publishing and archiving as have the health sciences. One might assume, therefore, that the attitudes and practices of scholars in the health sciences would reflect a deeper understanding and acceptance of new developments in scholarly communication. Similarly, one might expect that a campus with a substantial health science focus would be more interested in library-supported OA services. The current study seeks to determine if the scholarly communication attitudes of health science faculty differ from other faculty on a campus with a strong health science emphasis.

Context

Indiana University-Purdue University Indianapolis (IUPUI) was established in 1969 through a partnership of Indiana University and Purdue University, the two largest universities in the state. A public university campus serving the Indianapolis metropolitan area, IUPUI offers 243 undergraduate, graduate, and professional degree programs from both Indiana and Purdue Universities. Prior to the establishment of IUPUI, the campus was already the home to the state's first medical, dental, and nursing schools. Today these Indiana University schools are a part of the IUPUI campus and according to IUPUI Institutional Reports account for the majority of campus's 3,000 faculty members (2015).

University libraries have traditionally had a strong interest in the culture of scholarly communication on their campuses, and IUPUI is no exception. Like many academic libraries, the IUPUI libraries support campus authors by providing scholarly communication services, consultations, and tools, such as hosting an institutional repository (IR) and

open journal software, offering support for the NIH Public Access Policy, and offering assistance with a variety of topics relevant to authorship and authors' rights. Understanding the disciplinary differences in attitudes on the IUPUI campus helps the libraries develop and assess targeted scholarly communication services. A broad, faculty-wide survey is one approach to assessing campus cultures and attitudes regarding scholarly communication.

LITERATURE REVIEW

The question of how individual characteristics such as discipline might interact with scholarly communication attitudes and behaviors presents a mixed picture in the literature. Xia found that the existence of a strong pre-print culture (as in Physics, for example) does not necessarily lead to an increase in OA self-archiving in an institutional repository (2007). Kim, however, found that a respondent's perception of their discipline having a strong self-archiving culture was positively associated with faculty's self-archiving behavior (2010). Similarly, Cullen and Chawner found that an allegiance to an "invisible college" of disciplinary norms influenced faculty attitudes and behaviors concerning open access and may impede the inroads for OA initiatives (2011). However, Cullen and Chawner's study also showed that there was little difference across disciplines in attitudes towards IRs and that most respondents preferred subject repositories. Kim also found a preference for subject repositories (2011). Furthermore, Xia found that regardless of academic discipline, faculty value the same outcomes when they engage in any form of scholarly communication, the most important outcome being the ability to communicate with peers (2007).

A few studies (Björk et. al. 2010; Fry, Spezi, Proberts, & Creaser, 2015; Migheli and Rammello 2013) have focused on the attitudes of scholars in the health sciences. One possible factor that may result in disciplinary differences in attitudes is that many successful OA journals are found in the health sciences. Björk looked at where open access versions of articles in science fields are located and found that medicine, biochemistry and chemistry articles were more likely to come from OA journals than from author-posted articles (2010). In addition to the prevalence of OA journals in the health sciences, the NIH Public Access policy is also an often-mentioned possible factor that may influence attitudes. Pontika, however, found that the policy does not encourage authors to submit to PLOS journals, nor does it lead to greater familiarity with other OA options (2015). Likewise, both Cullen and Chawner (2011) and Creaser et al. (2010) found that health sciences faculty were less likely to have deposited their scholarship into an IR than scholars in other disciplines. In a 2015 follow-up to Creaser et al.'s 2010 study, Spezi, et al. found that differences among respondents' behaviors and attitudes were persistently shaped by disciplinary culture and norms and additionally found that the deposit of health science scholarship in open access repositories was more likely to be mediated by staff other than the faculty authors themselves (2013). While health science scholars appear to be less

aware of their institutions' OA repositories and less interested in self-archiving, a substantial number are also unaware of the NIH Public Access Policy—a policy that requires deposit of NIH-funded articles in the disciplinary repository, PubMed Central (PMC). Charbonneau and McGlone found that 30% of NIH grant recipients did not know about the agency's deposit requirement (2013). In short, prior research suggests that scholars in the health sciences may be less aware of and less participatory in the full range of OA approaches to scholarly communication. However, the specific factors that contribute to these disciplinary differences in attitudes are unclear. The research reported here seeks to explore these attitudinal differences and the factors that may lead authors to pursue different approaches to OA on a campus with both a strong library-supported scholarly communication service and a large health science faculty.

METHODS

The initial goal of this research was to examine a broad range of IUPUI faculty attitudes and practices regarding scholarly communication with the aim to help IUPUI librarians and OA advocates understand campus attitudes in the context of similar surveys (based on the same instrument) at the University of Toronto (Moore, 2011) and the University of California (2007). The IUPUI survey instrument (Odell, Palmer, & Dill, 2013) was adapted from the Toronto instrument. The Toronto preliminary report outlines the influence of the California instrument on their instrument design with substantial alterations to accommodate for time lapse, new issues in research, and differing governance structures (Moore, 2011). Readers should assume the survey questions and answer options presented during the current study were identical to Toronto's instrument unless otherwise specified. Exempt status through the university's Institutional Review Board was granted. The survey was distributed using Research Electronic Data Capture (REDCap), which is a secure web application for building and managing online surveys hosted by Indiana's Clinical and Translational Sciences Institute (Harris et al., 2009). The instrument included 126 fields and took approximately 20 minutes to complete.

The authors requested that the IUPUI's Office of Academic Affairs send the survey invitation to all faculty members. The Office sent an invitational email in September 2013 with a follow up reminder in October 2013 to the same list. The authors opted to send to the widest faculty list allowable by the university's Office of Academic Affairs and to rely on respondents' self-selection of demographic affiliations (such as: rank, tenure status, school, discipline) to identify faculty sets comparable to those at California and Toronto. A total of 338 responses were received. To replicate the inclusion criteria established by the University of California and University of Toronto surveys, 52 respondents were excluded from the results. Excluded respondents were from non-eligible faculty status profiles (specifically, the clinical, research, and visiting ranks) or failed to complete the demographic portion

of the survey. The remaining 286 responses from 1,582 eligible faculty members included 215 complete survey responses and 71 partial survey responses. Respondents could not skip questions and, as a result, later questions received fewer responses. This analysis includes responses from both complete and incomplete surveys. Readers will see varying totals in our analysis as they reflect the total number of completed responses for the specific question or set of questions being discussed. The achieved response rate (14% for completed surveys and 18% overall) aligns with the response rates of Toronto (16.3%) (Moore, 2011) and California (13%) (2007).

Following Toronto's demographic analysis strategy, respondents' disciplines were identified with four questions:

- In which department is your primary university appointment?
- What is your discipline, defined as the discipline of your highest degree?
- In which of the following areas do you publish or disseminate your work at the present time?
- If your work is not well described in terms of these general categories, please briefly describe your field, the focus of your work and the background of those participating.

The authors independently coded respondents' disciplines based on the responses to these four questions. Initial coding categories included: Health Science, Physical & Technical Sciences, Humanities, and Social Sciences. Coding differences were discussed and the final disciplinary categories were determined by consensus. These four disciplinary categories, however, reflected an unbalanced response rate. As a result the authors chose to collapse respondents' disciplines into two categories: health sciences (176) and all others (110); this approach shifted the analysis from examining differences in all disciplines to focusing on the uniqueness of the health sciences. As a result of the coding responses to the four questions mentioned above, the Health Science respondents included those who selected "Health or Medical Sciences" as the "area" in which they disseminate their work and those who have their primary appointments in one of the campus's health science schools (e.g., Medicine, Dentistry, and Nursing).

RESULTS

Publishing Practices

In examining factors considered when selecting a venue for publication, respondents were offered a three-point scale, ranging from "Not Important (1)" to "Very Important (3)".

For analysis we grouped these factors in two categories, “reputational factors” and “access factors.” The former reflect the perceived value of publishing in a well-known or trusted venue—with reputation serving as a proxy or indicator for quality. On the other hand, the “access factors,” while not in opposition to “reputational factors,” reflect values that are supplemental to assessments of quality. Access factors reward authors by increasing readership, speeding communication, and, as reported in a majority of bibliometric studies on the topic (SPARC Europe, 2015), increasing citation rates (see Table 1).

	Health Sciences (n=147)		Non-Health Sciences (n=99)		95% CI for Mean Difference	t	df	p
	M	SD	M	SD				
*Reputational Factors	2.34	.682	2.23	.723	.014, .192	2.261	982	.026
Reputation of the journal title	2.69	.480	2.59	.572	-.032, .234	1.501	244	.135
Reputation of the book or journal publisher	2.32	.702	2.27	.697	-.132, .226	.516	244	.606
*Journal impact factor	2.26	.663	1.98	.742	.101, .457	3.081	244	.002
Weight of the publication venue in tenure and promotion considerations in my department	2.07	.713	2.09	.730	-.200, .168	-.172	244	.864
Access Factors	1.75	.686	1.84	.705	-.174, .003	-1.904	982	.057
Speed of publication	1.97	.619	1.94	.620	-.125, .192	.415	244	.679
The full-text is accessible online to anyone who finds it	1.86	.658	1.73	.712	-.038, .311	1.545	244	.124
*The ability to self-archive my work (i.e., to upload to a personal or institutional website)	1.63	.714	1.85	.747	-.409, -.036	-2.345	244	.019
*My ability to retain some of the rights (i.e. copyright)	1.54	.665	1.83	.729	-.468, -.144	-3.236	244	.001
Other Factors								
*Readership or audience	2.64	.536	2.47	.595	.021, .308	2.261	244	.025
*Quality of peer review	2.48	.566	2.32	.620	.009, .310	2.090	244	.038
A digital version is available	1.97	.730	1.89	.768	-.107, .275	.865	244	.388
*Being able to submit my manuscript online	2.04	.748	1.75	.690	.108, .479	3.110	244	.002
A paper issue or print volume is produced	1.43	.619	1.43	.609	-.163, .152	-.072	244	.943

Table 1. Factors considered when selecting a venue for publication.

Results of t-test and descriptive statistics. Scale: Not Important 1, Important 2, Very Important 3.

*Statistically significant ($p < .05$)

We found no significant differences in how the disciplinary groups valued reputational factors and access factors when selecting a venue for publication. Both groups emphasized the importance of reputational factors. While we found no significant differences between the disciplines on the grouped factors, we found a clear, statistically significant difference in disciplinary reliance on individual factors. Regarding the “reputational” factors respondents differed in their value of (colloquially understood, with no specific reference to the branded product) “journal impact factors” ($p = .002$). Regarding the “access” factors respondents differed in how much they valued the ability to self-archive ($p = .019$) and the ability to retain some rights ($p = .001$). The health science respondents rated journal impact factors as more important to their publishing choices ($M=2.26$) than did respondents from the other disciplines ($M=1.98$). Only 12% (18/147) of the health science respondents reported that journal impact factors were “not important” in selecting a venue for publication; in contrast, nearly a third of the respondents from other disciplines (28%, 28/99) reported that journal impact factors were “not important.”

REFORMING THE CULTURE OF SCHOLARLY COMMUNICATION

Promotion and Tenure

We found no significant differences between the attitudes of the disciplinary groups with regard to the influence of promotion and tenure (P&T) on change in scholarly communications; we did, however, find a mix of attitudes and a degree of uncertainty. Respondents were offered a four-point scale from “Strongly Disagree” (1) to “Strongly Agree” (4); respondents could also select “I don’t know” (see Table 2). When asked if P&T encouraged “new forms of dissemination” and if P&T processes were “keeping up” with changes in scholarly communications, all respondents lean toward agreement ($M=2.47$)--on this question 24% of all respondents reported “I don’t know.” However, when asked if current P&T processes cause them “to forego using alternative forms of dissemination,” respondents also lean toward agreement ($M=2.48$) and fewer respondents reported uncertainty (“I don’t know” = 16%). On this question, the health sciences were a little less likely to agree ($M=2.41$) when compared to their peers in the other disciplines ($M=2.58$).

Authors’ Rights

Studies by Charbonneau and McGlone (2013), Smith et al. (2006), and Kim (2010) have found a low degree of knowledge regarding copyright policies and authors’ rights. Rather than focusing on respondents’ understanding of copyright, we focused on what activities related to authors’ rights our respondents would be willing to undertake (see Figure 1). We found little difference between the disciplines in their willingness to advocate for authors’ rights. The health science respondents, however, were significantly less willing to modify copyright transfer agreements ($X^2 (N = 228) = 4.014, p = .045$). While only 30%

(41/137) of health science respondents were willing to modify copyright agreements, 43% (39/91) of the other respondents were willing.

	All Respondents	Health Sciences			Non-Health Sciences			95% CI for Mean Difference	t	df	p
	"I don't know"	M	SD	N	M	SD	N				
Encourage new forms of dissemination	24% (n=54)	2.42	.815	106	2.32	.804	76	-.141, .340	.815	180	.416
Are keeping up with the evolution of scholarly communication	25% (n=59)	2.47	.859	104	2.47	.808	76	-.252, .247	-.020	178	.984
Cause me to forego using alternative forms of communication	16% (n=37)	2.41	.858	119	2.58	.857	83	-.408, .075	-1.358	200	.176

Table 2. To what extent do you agree or disagree that the existing tenure, merit and promotion processes in your department or faculty...

Results of t-test and descriptive statistics. Scale: Strongly disagree 1, Disagree 2, Agree 3, Strongly Agree 4. Means exclude "I don't know."

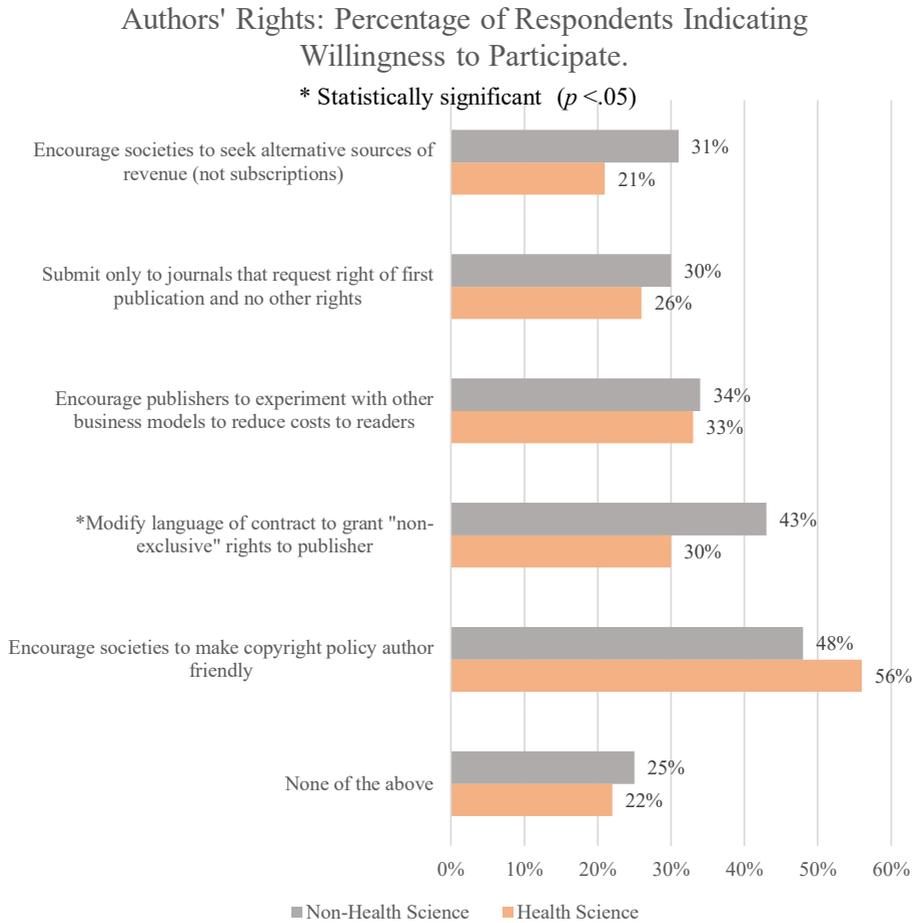


Figure 1. Authors' Rights: Willingness to Participate

Financing Scholarly Communication

We asked respondents to express their level of agreement with five statements pertaining to approaches to financially supporting scholarly publishing. Respondents were offered a four-point scale from “Strongly Disagree” (1) to “Strongly Agree” (4); respondents could also select “I don’t know” (see Table 3). The disciplinary groups showed no significant differences in their responses to all but one question. When it comes to reforming the scholarly communication system, respondents from the health sciences were significantly less likely to endorse this idea ($M=3.02$) than their colleagues in the other disciplines ($M=3.28$) ($p = .015$). On this last question, however, nearly a third of the respondents reported “I don’t know” (29%, 63/218). For the other four questions, an overwhelming ma-

majority (greater than 80%) of respondents from both disciplinary groups, agreed or strongly agreed that there were opportunities to reduce costs while increasing access (M=3.28), that there was a need for more transparency about publishing expenses (M=3.33), that new business models should be explored (M=3.32), and that scholars need to play a greater role in shaping the future (M=3.28).

	All Respondents	Health Sciences			Non-Health Sciences			95% CI for Mean Difference	t	df	p
		M	SD	N	M	SD	N				
Digital era provides opportunity to reduce costs and increase access	16% (n=35)	3.28	.577	108	3.28	.583	75	-.174, .170	-.026	181	.980
Need transparency regarding costs of publishing	13% (n=29)	3.33	.527	112	3.32	.571	76	-.145, .174	.180	186	.857
New business models should be explored	13% (n=29)	3.33	.508	113	3.32	.571	76	-.145, .168	.147	187	.883
Scholars need to play a greater role in shaping future of scholarly communications	8% (n=17)	3.23	.513	121	3.36	.557	80	-.282, .020	-1.715	199	.088
*There is a need to reform the scholarly communications system	29% (n=63)	3.02	.664	87	3.28	.619	68	-.256, .104	-2.456	153	.015

Table 3. Money and Reforming the Scholarly Communication System: To what extent do you agree with the following statements?

Results of t-test and descriptive statistics. Scale: Strongly disagree 1, Disagree 2, Agree 3, Strongly Agree 4. Means exclude “I don’t know.”

*Statistically significant (p < .05).

State of Change

When asked to reflect on the general state of scholarly communication in their fields, we found no significant differences in disciplinary attitudes. More respondents from the health sciences selected “the system works fine as it is” (27%, 34/124) than did other respondents (18%, 15/82). However, when grouped with the other two response options, this difference disappeared. More than a third of each disciplinary group identified “resistance to change,” while also noting that their field is “experimenting” with new approaches to scholarly communication (see Table 4).

	All Respondents (n=206)	Health Sciences (n=124)	Non-Health Sciences (n=82)
We are experimenting with a number of new ideas and forms	36% (74)	32% (40)	42% (34)
There is resistance to change	40% (83)	40% (50)	40% (33)
The system works fine as it is	24% (49)	27% (34)	18% (15)

Table 4. State of Change: Overall, how would you characterize the general state of scholarly communications in the fields in which you publish?

Results of chi-square test (2 x 3) and descriptive statistics.

$\chi^2 = 3.765$, $df = 3$, $p = .288$. Numbers in parentheses indicate count of respondents selecting item.

OPEN ACCESS

Open Access Participation and Attitudes

In one form or another, open access is now a familiar concept. After reading a common definition of the term (Suber, 2004), a large majority, 89% (196/221), reported that they had previously heard of OA. When looking, however, at the motivations for and methods of participation in OA, differences are more common. The health science respondents were a little more likely to have published an article in an OA journal (health sciences, 44%, 58/133; non-health sciences, 32%, 28/88). However, even though many health science respondents have published in an OA journal (where copyright agreements are generally favorable for self-archiving), health science respondents were significantly less likely to have knowingly self-archived an article ($X^2 (N = 221) = 11.270$, $p = .001$). In contrast to the health science respondents, twice as many respondents from the other disciplines report having self-archived at least one item (36%, 32/88 versus 17%, 22/133). Nonetheless, when self-archiving and publishing in an OA journal are lumped together, disciplinary differences in OA participation disappear—with 51% of all respondents reporting some form of OA participation (see Figure 2).

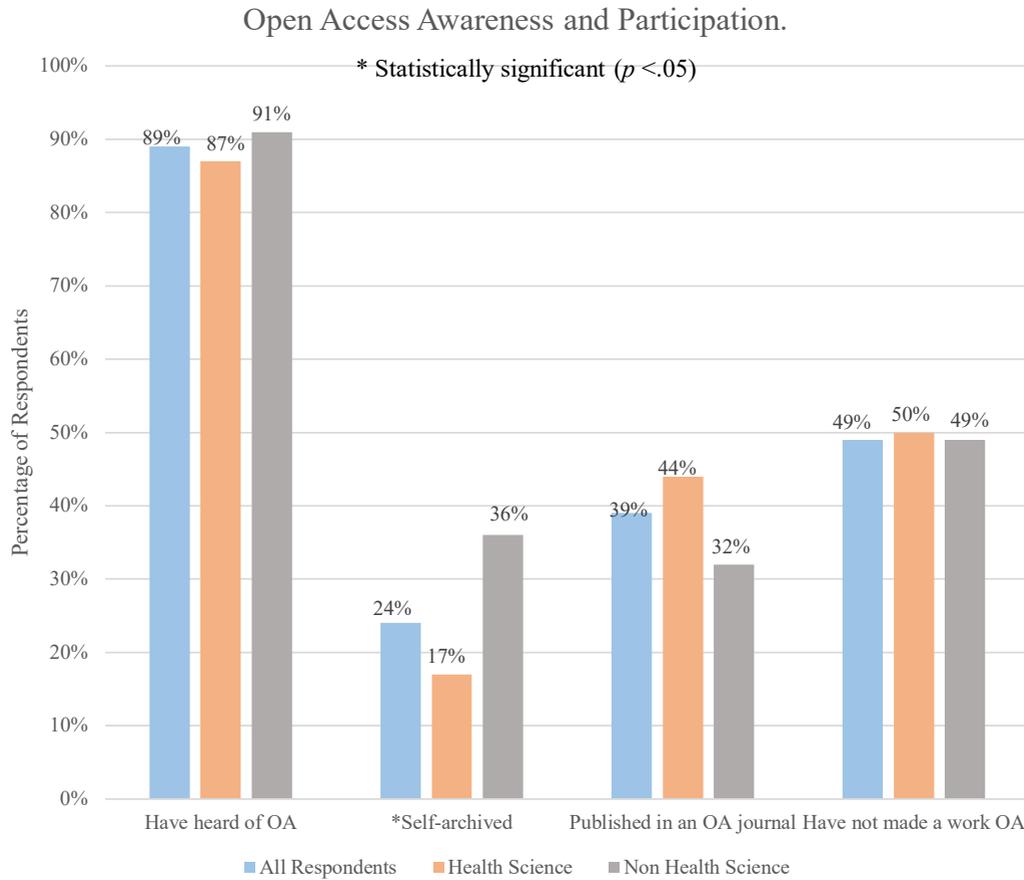


Figure 2. Open access awareness and participation.

When looking at attitudes that might motivate respondents to participate in OA, there was strong support for public access to scholarship and a strong belief in the personal benefits of OA to authors across both disciplinary groups. However, respondents from the health sciences reported significantly less trust in the personal benefits of open access—including reported increases in citation rates. On a four-point scale, respondents from the other disciplines more strongly agreed with the expected benefits of OA ($M=3.38$) than did the health sciences ($M=3.14$) ($p = .027$). The two groups reported the greatest difference in their agreement that OA would lead to citation increases (non-health sciences, $M=3.39$; health sciences, $M=3.03$, $p = .001$). The disciplines showed no significant difference in their concerns for how OA impacts the future sustainability of the scholarly communication system (see Table 5).

	All Respondents	Health Sciences			Non-Health Sciences			95% CI for Mean Difference	t	df	p
	"I don't know"	M	SD	N	M	SD	N				
Public access to federally funded work is important to me	13% (29)	3.21	.707	115	3.31	.757	74	-.316, .112	-.942	187	.347
*Making my work OA to everyone is a benefit to me	18% (40)	3.14	.726	105	3.38	.680	73	-.454, -.028	-2.232	176	.027
*OA is likely to lead to an increase in citations to my work	18% (39)	3.03	.746	107	3.39	.683	72	-.578, -.144	-3.283	177	.001
Library subscriptions are a critical source of revenue for societies	39% (86)	3.11	.649	75	3.07	.651	57	-.189, .262	.320	130	.750
OA threatens commercial publishers in my field	28% (62)	2.75	.765	92	2.95	.677	64	-.438, .032	-1.709	154	.089
OA will dramatically change scholarly communication in my discipline within two years	27% (59)	2.73	.778	94	2.57	.809	65	-.807, .417	1.291	157	.199
OA threatens survival of my societies	33% (73)	2.22	.788	86	2.27	.784	59	-.313, .213	-.378	143	.706

Table 5. Motivations for Open Access Participation.

Results of t-test and descriptive statistics. (Scale: Strongly disagree 1, Disagree 2, Agree 3, Strongly Agree 4. Means exclude "I don't know").

*Statistically significant ($p < .05$).

Self-Archiving in IUPUI ScholarWorks

IUPUI maintains an institutional repository, IUPUI ScholarWorks. The repository is available to all faculty members for self-archiving. Respondents' awareness, participation rates, and attitudes toward this repository were queried. Most respondents had not heard of IUPUI ScholarWorks; only 45% (98/218) responded affirmatively. Even fewer respondents reported that one or more of their works were in ScholarWorks, with only 14% (30/218) responding affirmatively. Only 27% (36/131) of the health science respondents had heard of IUPUI ScholarWorks and only 5% (7/131) reported that one or more of their works were in the repository. In contrast, 71% (62/87) of the respondents from other disciplines were aware of the repository and 26% (23/87) reported works included on the site.

When asked to select up to three items from a list of factors (see Table 6) that would motivate authors to submit works to IUPUI ScholarWorks, a majority of the respondents selected increased exposure for their previously published work (63%, 138/218) and increased dissemination of academic research generally (62%, 135/218). However, there were no significant differences between the disciplinary groups when asked what factors would motivate them to participate in IUPUI ScholarWorks.

	All Respondents (n=218)	Health Sci- ence (n=131)	Non-Health Science (n=87)	χ^2	p
If it increases exposure to my previously published work (post prints)	63% (138)	63% (83)	63% (55)	.000	0.983
If it broadens the dissemination of academic research generally	62% (135)	62% (81)	62% (54)	.001	0.972
If it is the norm in my academic unit	40% (88)	39% (51)	43% (37)	.281	0.596
If it increases my promotion and tenure prospects	40% (87)	42% (55)	37% (32)	.590	0.442
If it provides exposure for work not previously published (working papers, etc.)	37% (81)	35% (46)	40% (35)	.586	0.444
If it increases an academic institution's ability to negotiate with commercial publishers	21% (45)	21% (28)	20% (17)	.107	0.743
If it increases my own commercial publishing opportunities	15% (33)	14% (18)	17% (15)	.499	0.480

Table 6. IUPUI ScholarWorks and Self-archiving: What does or would motivate you to have your scholarly works included in IUPUI ScholarWorks?

Results of chi-square test and descriptive statistics.

df = 1; Numbers in parentheses indicate count of respondents selecting activity.

Open Access Policies

After reading a brief description of OA policies at other universities, the respondents reported their familiarity with OA policies and interest in implementing a policy at IUPUI. In large part, the respondents were unaware of OA policies. On a four-point scale from “Not aware” (1) to “Actively involved” (4), the disciplinary groups showed a significant difference in their awareness of OA policies ($p = .000005$). An overwhelming majority of the respondents from the health sciences reported being “unaware” of OA policies (82% “unaware”, 108/131, $M=1.20$). However, while the respondents from the other disciplines were also mostly unaware of OA policies, they were so to a lesser degree (58% “unaware”, 50/87, $M=1.62$) (see Table 7).

	All Respondents	Health Sciences			Non-Health Sciences			95% CI for Mean Difference	t	df	p
	M	SD	N	M	SD	N					
*To what extent are you aware of OA policies? (Scale: Not aware 1, Aware but not knowledgeable 2, Knowledgeable 3, Actively involved 4)	1.20	.454	131	1.62	.866	87	-.599, -.245	-4.695	216	.000	
	“I don’t know”	M	SD	N	M	SD	N	95% CI for Mean Difference	t	df	p
Should IUPUI consider implementing an OA policy? (Scale: Strongly disagree 1, Disagree 2, Agree 3, Strongly agree 4) (Means exclude “I don’t know”)	50% (109)	2.96	.740	52	2.93	.961	57	-.296, .360	.192	107	.848

Table 7. Open Access Policies: Awareness and Support.

Results of t-test and descriptive statistics.

*Statistically significant, ($p < .05$).

When asked if IUPUI should consider implementing an OA policy, respondents were offered a four-point scale from “Strongly Disagree” (1) to “Strongly Agree” (4); respondents could also select “I don’t know.” The disciplines did not significantly differ in their level of support for the idea—both the health science respondents and the respondents from other disciplines leaned toward agreeing that IUPUI should consider an OA policy (health science, $M=2.96$; non-health science, $M=2.93$). However, a greater percentage (a majority) of the health science respondents reported “I don’t know” (60%, 79/131) than did respondents from the other disciplines (35%, 30/87). While half of all the respondents reported uncertainty about the idea of an OA policy at IUPUI, 40% (88/218) were in agreement and only 10% (21/218) were opposed to the idea (see Table 7).

DISCUSSION

A Knowledge Gap in the Health Sciences

These results clarify the findings of other studies that have found knowledge gaps and uncertainty in the health sciences regarding open access and scholarly communication, including those by: Spezi (2013), Charbonneau and McGlone (2013), Cullen and Chawner (2011), Creaser et al. (2010), Dawson (2014), and Fry et al. (2009). The results reported here reveal significant disciplinary differences with regard to specific aspects and elements of the scholarly communication environment. Notably, when compared with respondents from other disciplines, the health science respondents were less familiar with the institutional repository. They were also more likely to report that they had not thought about how their copyright agreements limit their self-archiving options, even when these agreements would impact their compliance with the NIH Public Access policy. Likewise, they were less aware of faculty-driven OA policies and were more likely to be indecisive when asked if faculty governance should consider adopting an OA policy—a majority (60%) of the health science respondents reported “I don’t know” while only 35% of the respondents from other disciplines reported indecision.

In addition to being less informed, the health science respondents were also less supportive of change and more supportive of the status quo in scholarly communication. They were more likely to rely on journal impact factors when deciding where to publish and were less concerned about self-archiving policies. Only 17% of the health science respondents reported having self-archived even while many health science journals deposit the accepted or final version of NIH-funded research articles in PubMed Central, an OA disciplinary repository and a leading source for “self-archived” articles by authors from our campus. At the same time, the health science respondents (30%) were less willing to modify copyright transfer agreements than their peers in the other disciplines (43%). Likewise, the health sciences were less likely to agree that the scholarly communication system is need of reform—only 15% agreed, while 29% of the respondents from other

disciplines agreed. The discrepancy between the rate of archiving at PubMed Central and the knowledge of and support for self-archiving and scholarly communications reform among the health science respondents may reveal how strong mediated-deposit services (while increasing access to scholarship) have limited impact on the attitudes of authors.

The results of this study also differ from two previous uses of the same instrument at different universities, the University of California and the University of Toronto. Notably, IUPUI respondents (in all disciplines) appear to be more cautious and somewhat more resistant to change. At the same time, although California and Toronto did find that their health science respondents were the least aware of their institutions' OA repositories—a finding that aligns with our own results—they did not find the attitudes of the health science respondents to be noticeably different from the other disciplines.

The differences between IUPUI's results and the prior campus-wide studies might be the result of local cultures or aspects of institutional structure that were not the subject of our instrument. For example, while IUPUI is mostly a health science campus, its four libraries (Dental, Law, Medical and University) serve different populations. Librarians from each campus library have participated in the development of the institutional repository, but University Library has been largely responsible for the ongoing support of the software and the related services. In the same way, although the Medical Library has taken the lead on services related to the NIH Public Access Policy, University Library has led efforts to support the adoption of OA services and policies on the campus.

Ultimately, despite campus cultural considerations, this study's findings may reflect the differences in both the research ecosystem and the cultural values of the health sciences. Dissemination in the health sciences has been largely journal-based and, as such, health science scholars may be more likely to know of and participate in OA journal publishing (rather than institutional or discipline repository archiving). Our results reveal that health science scholars are less informed when it comes to key scholarly communication topics, particularly authors' rights and self-archiving—even when journal policies grant them these rights. While this knowledge gap may reflect an outreach problem at IUPUI, it may also be the case that scholars in the health sciences are simply disengaged from these issues. As the PEER study indicates, health science scholars are more likely to have had assistance with self-archiving (Fry, Proberts, & White, 2009)—the journal does it for them or, perhaps, a staff member in their research lab or department. It may also be the case that authors in the health sciences see scholarly publishing and dissemination as a necessary, but ancillary, product of their scholarly endeavors. In other words, publishing is but a means of communicating the outcomes of research; it is but one step in an iterative cycle of seeking funding, conducting studies and verifying results. In

contrast, published work in the humanities is more often both the means of communicating the outcome of a scholar's research and the outcome itself.

Limitations

We adapted the University Toronto/University of California survey instrument for our study. This instrument was designed as a broad assessment of attitudes relevant to issues in scholarly communication at a university. The instrument is useful for librarians and others seeking to develop or improve scholarly communication services. Because the instrument was designed for specific campuses or faculty units, generalizations about attitudes should be made in the context of findings from other interdisciplinary attitudinal research on scholarly communication such as those already referenced by Creaser, Cullen and Chawner, Kim, Spezi, and Xia. Furthermore, as with much survey research, it is possible that potential respondents with no interest or no knowledge of our subject simply ignored the invitation to participate. Likewise, given that IUPUI is largely a health science campus, we did not have the response rate among any one non-health science disciplinary group to justify generalizations about specific attitudes in the humanities, social sciences, or engineering. Finally, the results provide a snapshot of how attitudes are impacted by a lack of knowledge on a campus. As our results indicate, lack of awareness of scholarly communication services in the health sciences is a barrier to their uptake on the campus; a sustained or targeted outreach program, therefore, might shift attitudes in this survey population.

CONCLUSION

While our results reveal knowledge gaps about key elements of scholarly communication that extend across disciplines at IUPUI, these knowledge gaps were most substantial among the health science respondents. The health science respondents were less aware of relevant library-supported services, less interested in supporting changes in the scholarly communication system, and more likely to express uncertainty and a lack of knowledge concerning key issues. At first glance these results seem incongruous with current practices—health science articles, after all, are more likely to be published in OA journals (e.g., PLOS and BioMed Central) and more likely to be deposited in open access repositories (e.g. PubMed Central) than are most articles in the social sciences, engineering and the humanities. The health science respondents at our campus appear to be disengaged from the post-publication dissemination process. This conclusion aligns with the findings of prior attitudinal research regarding disciplinary differences in scholarly communication. Given that awareness of local services appears to be a leading factor in participation, our results support a re-evaluation of institutional outreach regarding common issues in scholarly communication topics, specifically as they relate to IUPUI's health science authors.

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