



Deeper insight

Canadian Researchers' Publishing Attitudes and Behaviours

A Phase 5 Report for Canadian Science Publishing

March 7, 2014

phase⁵research

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Introduction

In recent years, scholarly publishing has seen significant change. Notably, the emergence of open access and hybrid journals has presented authors with new decision criteria for evaluating research, and for selecting a journal for research dissemination.

As a not-for-profit scholarly publisher best known for its flagship suite of journals under NRC Research Press, Canadian Science Publishing is committed to meeting researchers' needs and providing a viable, long-term Canadian science publishing option. To help fulfill this commitment in a changing publishing environment, Canadian Science Publishing commissioned Phase 5, an independent research agency, to conduct a survey of Canadian researchers during February 2014. A total of 540 researchers completed the survey. The final sample was geographically representative and covered several scientific and technical fields. These were: Biology and Life Sciences, Chemistry, Environmental and Earth Sciences, Technology and Engineering, and Physics and Astronomy.

The survey was designed to examine Canadian researchers' attitudes and behaviours as consumers and authors of research. As consumers, researchers were asked questions related to their process for literature searches and how they assess the quality of articles used. As authors, researchers were asked questions to understand the decisions that they make around publishing methods and journal selection.

The results present an objective snapshot of how scientific and technical researchers are reacting to changes in the scholarly publishing environment, and highlight some opportunities to better address their needs going forward.

Glossary of Terms

Article Processing Charge (APC):	publishing fee charged to an author in order to publish an article in open access format.
Hybrid Journal:	a traditional subscription journal that offers an open access publishing option.
Open Access:	immediate, free, online access to published journal articles via a publisher's website.
Open Access Journal:	a journal that provides immediate, free, online access to all of its published articles.
Repository:	an online archive that hosts accepted manuscripts, typically free of charge to the author.
Tri-Agency:	group of three Canadian federal granting agencies. Namely, the Canadian Institutes of Health Research (CIHR), the Natural Sciences and Engineering Research Council (NSERC), and the Social Sciences and Humanities Research Council (SSHRC).

Summary of Key Findings

General search engines and databases such as Scopus, Web of Science or Google Scholar dominate as the most frequently used method for literature searches, reported by 81% of researchers. In order to access specific articles, nearly all (97%) of researchers indicated that they use an institutional subscription to a database, and 88% reported doing so frequently. Relatively few are willing to use a pay per view option to access articles, with close to three-quarters indicating that they never use this method. Once accessed, researchers typically look for a proper interpretation of results (98%), methodological soundness (95%) and a clear presentation style (80%) to evaluate the quality of the article.

In publishing their research, the journal features and services most valued by researchers are consistent, to a degree, with their preferences as consumers of research. For instance, 97% of researchers reported that peer review (e.g., ensuring methodological soundness, proper interpretation of results etc.) is important. Furthermore, discoverability with major indexers was an important feature of journal publishing for 92% of researchers.

Some publishing behaviours have changed over the last two years. Online tools such as websites and social media, for instance, are now more frequently used to disseminate research findings for 36% of respondents. Twenty-three percent of researchers are depositing manuscripts in free online repositories more frequently. There is also evidence of a trend to publish more in open access format. Relative to two years ago, close to 40% of researchers are now more inclined to submit to journals with the intention of publishing in open access format.

The survey suggests however, that there is a disconnect between researchers' apparent agreement with the principle of open access (i.e., that research should be freely available to everyone) and their publishing decision criteria. Although the vast majority of researchers (83%) agree with the principle of open access, the availability of open access as a publishing option was not an important decision criterion when selecting a journal in which to publish. In this regard, availability of open access ranked 6th out of 18 possibility criteria. It was eight times less important than impact factor and thirteen times less important than journal reputation when selecting a journal.

A similar disconnect appeared between researchers' support of the principle of open access and their publishing behaviour. Although 83% of respondents agree in principle with open access publishing, only 25% of research was published in open access or hybrid journals in the last 2 years (43% of respondents indicated that 57% of their work was published in open access format). Many (38%) who do not publish in open access and hybrid journals cited economic factors as a reason for their behavior. However, it does not appear to be the case that researchers are simply electing to make their accepted manuscripts available through free online repositories. Only 28% of research was, on average, deposited in a free online repository.

Finally, the data suggest that many researchers are not particularly well informed as to where they might receive support for publishing in open access and hybrid journals. Although this was particularly true for researchers who do not receive funding from a tri-agency member, this was also true of those who do receive agency funding. Just over one-third of NSERC recipients and 20% of CIHR recipients did not know whether Canadian granting agencies support researchers in publishing open access. Lack of awareness was even higher in relation to agency support for depositing in free repositories.

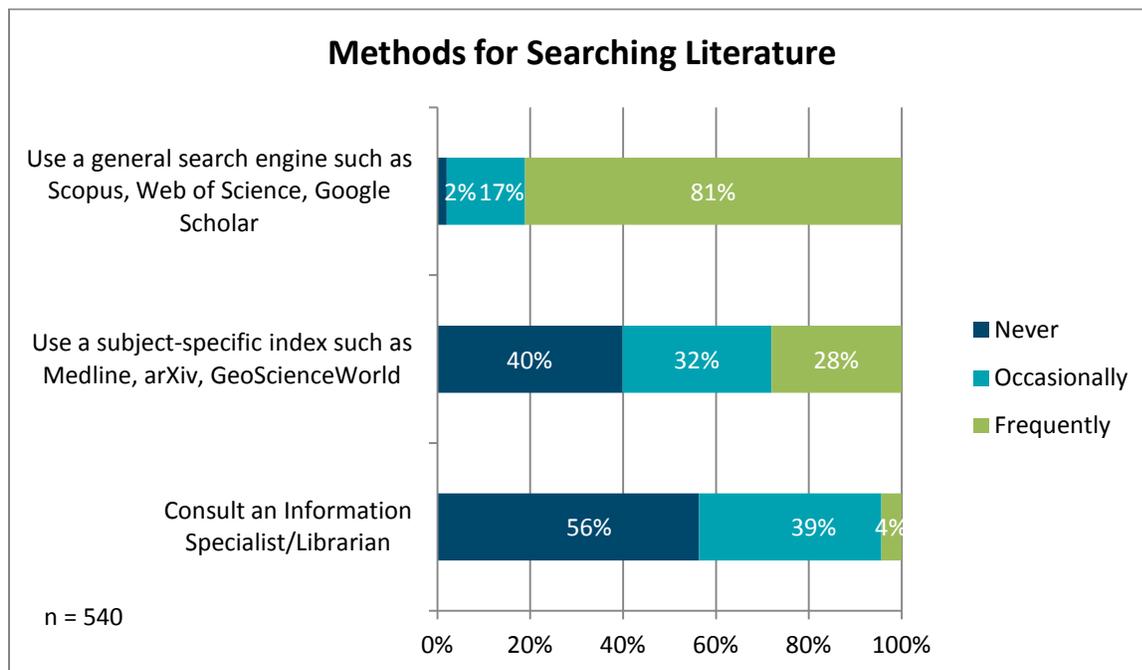
Searching and
Using Research
Literature

Searching and Using Research Literature

Many tools and services are available to researchers when conducting literature reviews. Which are used, and the frequency with which they are used may depend on personal preferences or the availability of discipline specific resources. As an example, some disciplines have a long history of access to subject-specific online archives and citation indices (e.g., arXiv for Physics and more recently Biology; PubMed Central for Biomedical research, including Biology and Life Sciences and Chemistry) and may be accustomed to using these as a primary tool for literature searches. The extent to which researchers are using these and other paths to review and access research literature are examined in this section of the report, along with the criteria used to assess article quality.

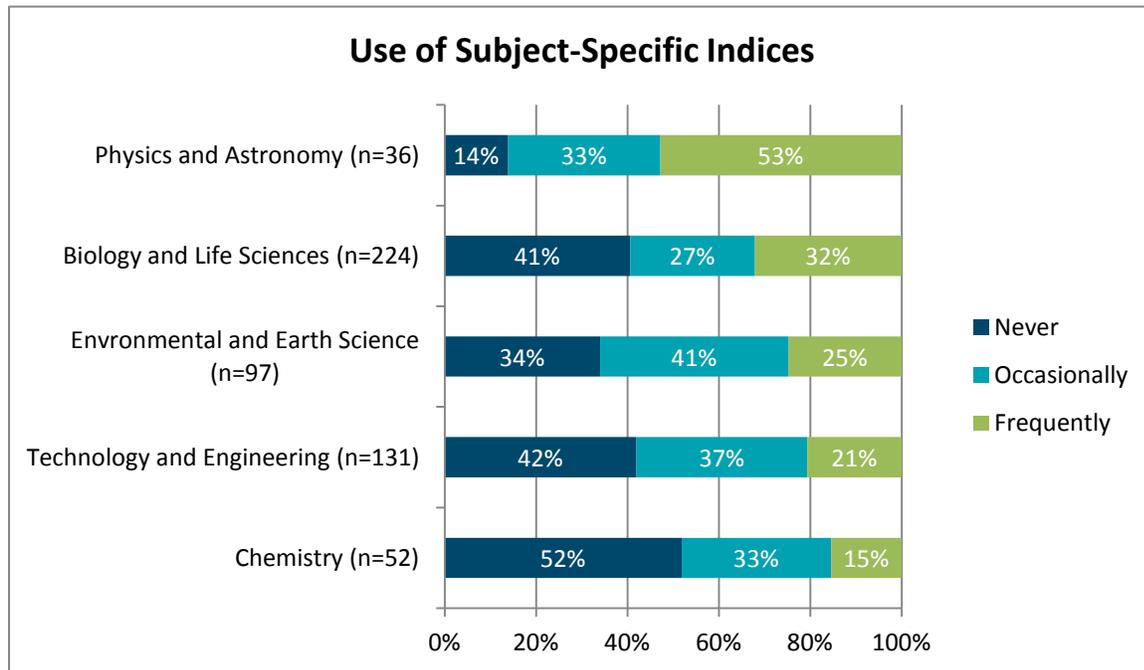
General Search Engines are the Primary Tool for Searching Literature

General search engines are the go-to tool for literature searches among researchers surveyed. Eighty-one percent of respondents indicated that they frequently use general search engines such as Scopus, Web of Science or Google Scholar when conducting a literature search. Sixty percent also use a subject-specific index at least occasionally.

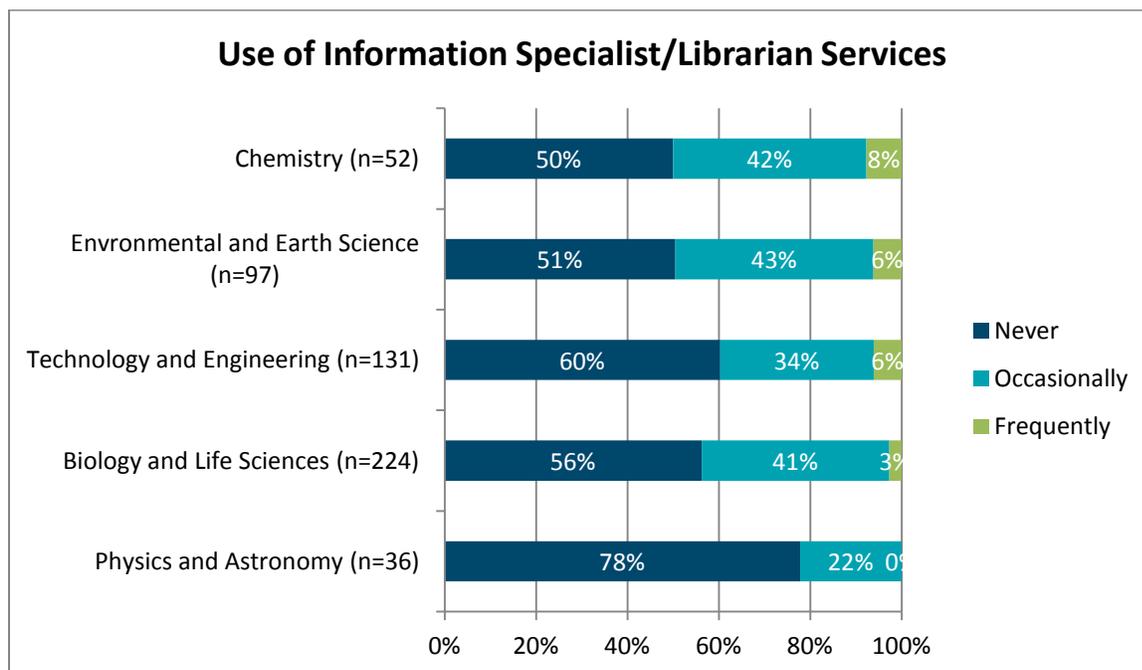


Differences in How Researchers Search Literature across Disciplines

The data show some differences in the use of subject specific indices and information specialists/librarians across disciplines. Researchers in Physics and Astronomy are significantly more likely than any other discipline to refer to subject-specific indices. Fifty-five percent of this group indicated that they frequently use subject-specific indices in their searches.



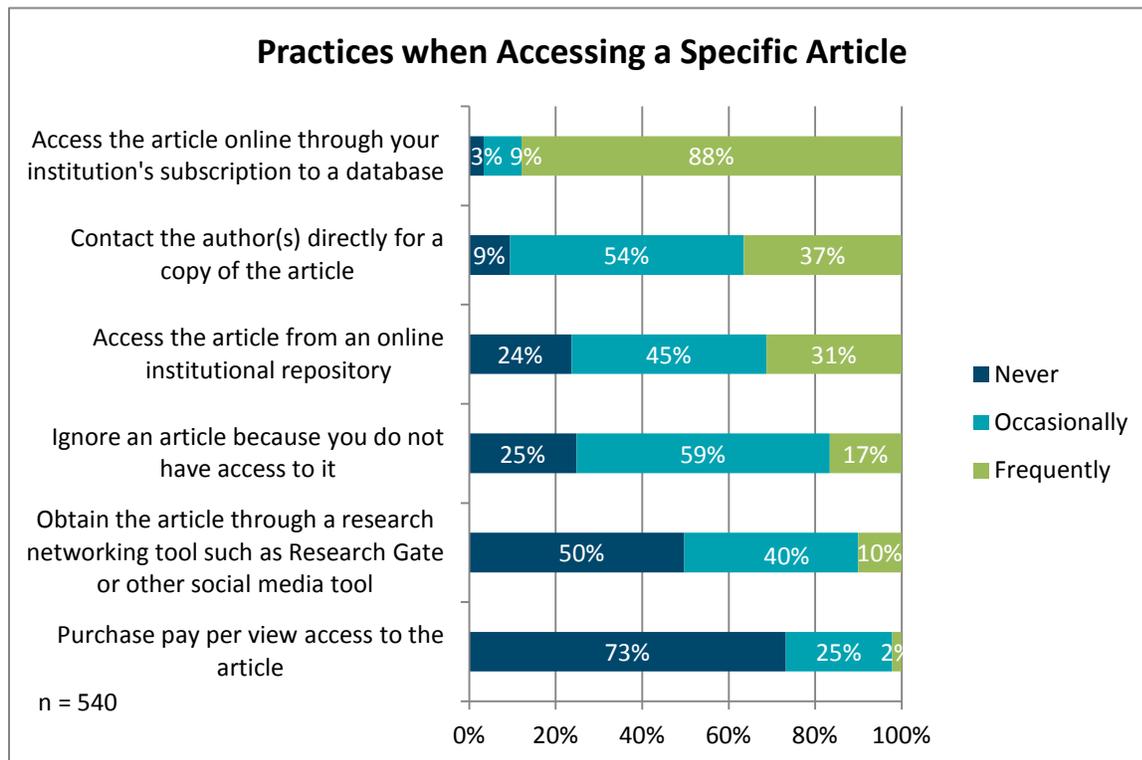
Researchers from Physics and Astronomy are also less likely than most (though statistically similar to those from Technology and Engineering) to use information specialist/librarian services. Seventy-eight percent of this group answered that they never consult these resources, compared to approximately one-half of those in other disciplines.



Institutional Database Subscriptions are used Most Often to Access Articles

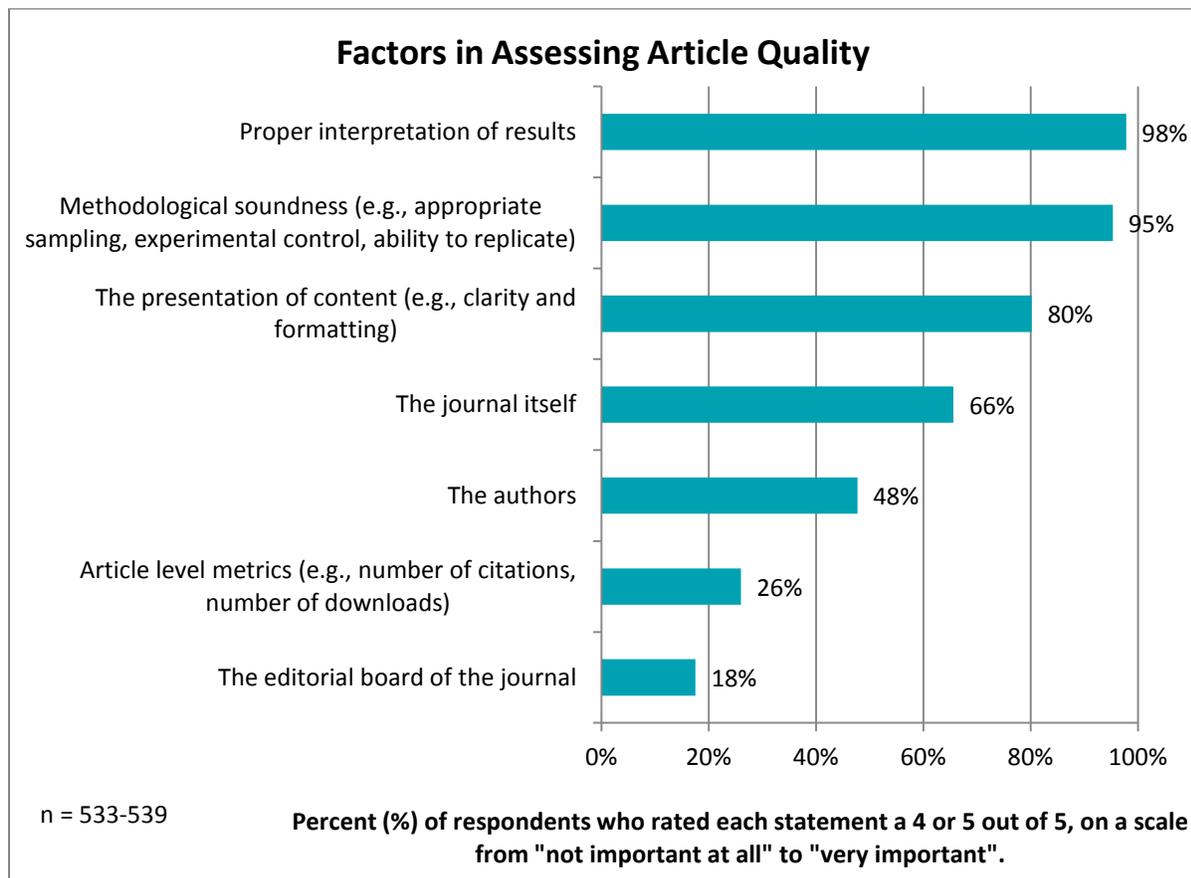
Nearly all researchers (97%) reported accessing articles using an online institutional database at least occasionally and 88% reported doing so frequently. The second most common method for accessing articles is to contact an author directly.

Researchers do not frequently pay to access specific articles. Indeed, seventy-three percent of those surveyed had never purchased pay per view article access. When faced with an article that is not accessible, 76% of researchers indicated that they ignore the article at least occasionally.



Methods, Interpretation and Presentation are Most Important when Judging Article Quality

Researchers rate proper interpretation of results and methodological soundness as the most important factors when judging the quality of a published paper. Ninety-eight percent of respondents rated proper interpretation of results and 95% rated methodological soundness as important. Presentation of content also emerges as important to researchers in evaluating the quality of published work, with 80% of researchers reporting this as an important factor. Few researchers (18%) indicated that the editorial board of a given journal influences their perceptions of quality.



Similar themes emerge with respect to other factors considered when judging the quality of a published article. Of the researchers who listed other considerations (n=109), 20% mentioned factors related to writing clarity, including cohesive flow and thorough copy editing. Thirteen percent reiterated the importance of methodological soundness (e.g., replicable work) and 14% cited factors related to the proper interpretation of results (e.g., proper use of statistics, non-exaggerated findings) in judging article quality. Less frequently mentioned themes include: a strong literature review (18%), the novelty (16%) of the work, and relevance (16%) of the research within one's field.

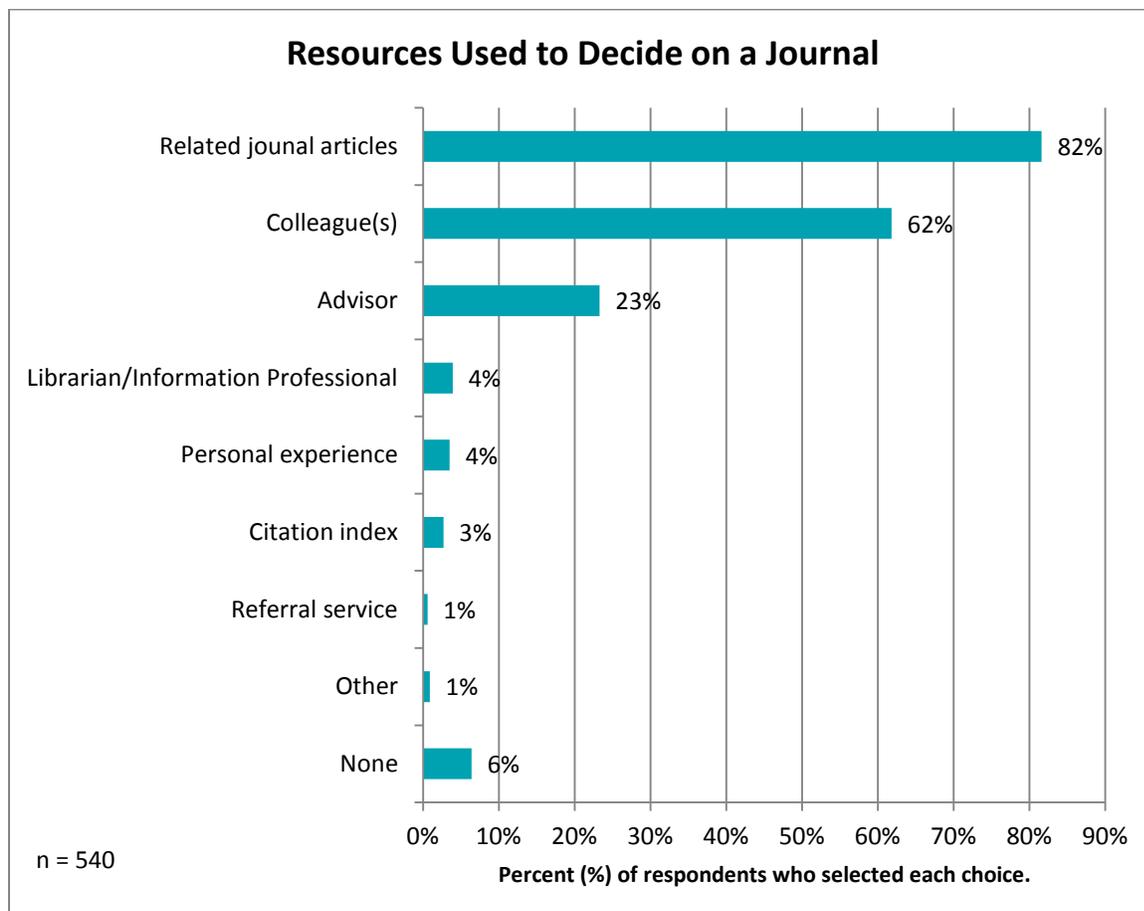
Preferences and
Practices When
Publishing
Scholarly Work

Preferences and Practices when Publishing Scholarly Work

Researchers are presented with a myriad of decisions in the process of disseminating their work, including: where to publish, what format to publish in, and whether and how to provide free access to the published article. Furthermore, social media presents opportunities to disseminate research results outside of the publication process. In this section, publishing preferences and practices are explored in detail.

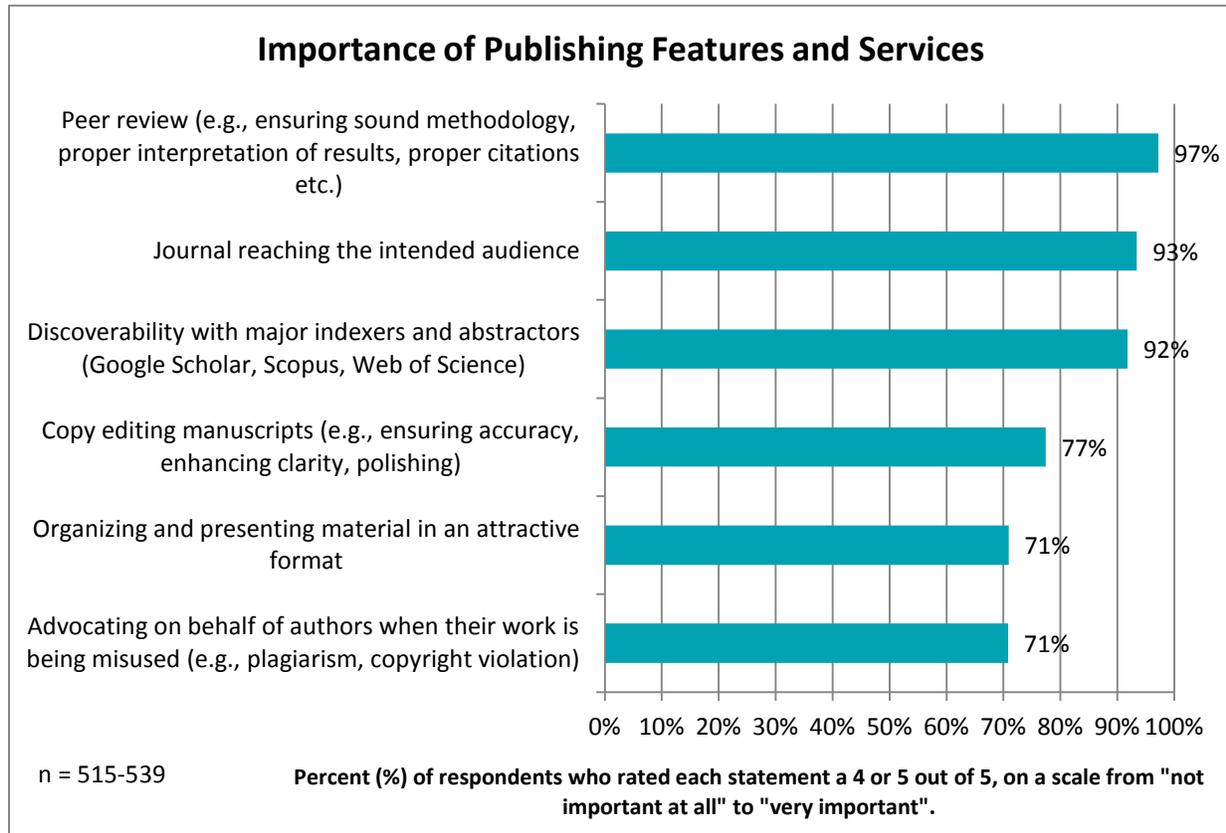
Related Journal Articles and Colleagues help Researchers Choose a Journal for Publication

When researchers are looking for a place to publish their work, they typically refer to related journal articles. Related journal articles were listed as a resource when deciding where to publish for 82% of those surveyed. Colleagues were also reported by many as resource when selecting a journal for publication, with 62% of researchers turning to colleagues to inform their decision.



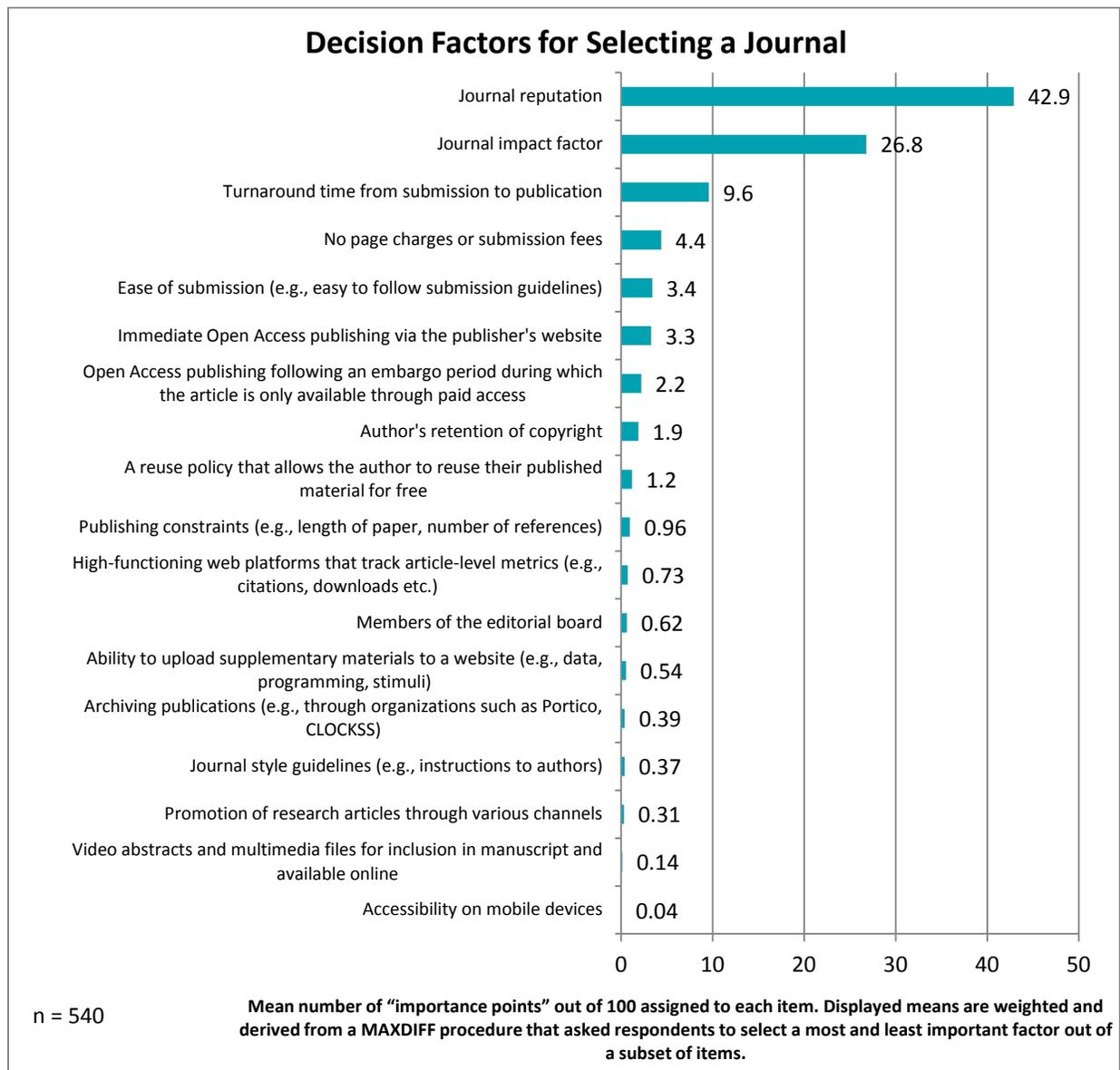
Peer Review, Reach, and Discoverability are Most Important Journal Features

Researchers were asked to rate the importance of several common features and services offered by publishers. Ninety-seven percent of researchers indicated that peer review is important when publishing their work. Other important features cited are related to visibility. These included the journal reaching the intended audience, rated as important by 93% of researchers, and discoverability with major indexers, rated as important by 92% of researchers.



Journal Reputation and Impact Factor are Deciding Factors

Journal reputation and impact factor outranked other factors by far when selecting a journal for publication. Turnaround time from submission to publication was ranked third in importance overall. However, journal impact factor is nearly three times as important and journal reputation is more than four times as important as turnaround time. This demonstrates the relative weighting of journal impact factor and reputation as deciding factors when researchers select a journal for publication.



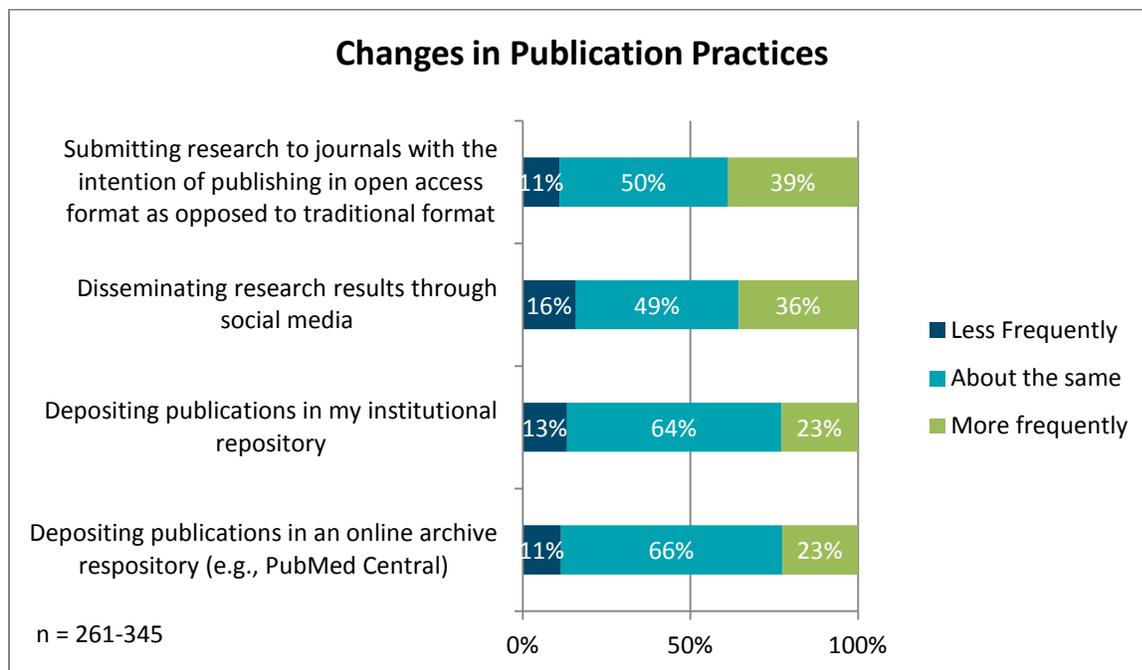
Efficiency and Fairness of Manuscript Evaluation

Many researchers also indicated that the editorial process, as it relates to manuscript acceptance, influences where they choose to publish. Of the 122 researchers who commented on additional factors influencing their publishing decisions, 22% mentioned the importance of a high quality peer review process – namely, one that is both quick and fair. Related to this, 11% mentioned that they evaluated the likelihood of acceptance when selecting a journal.

“Assessing likelihood of being accepted...this can be tricky, but being rejected from a journal can cost a lot of time and energy. I have learned this especially from trying to submit to higher profile journals.”

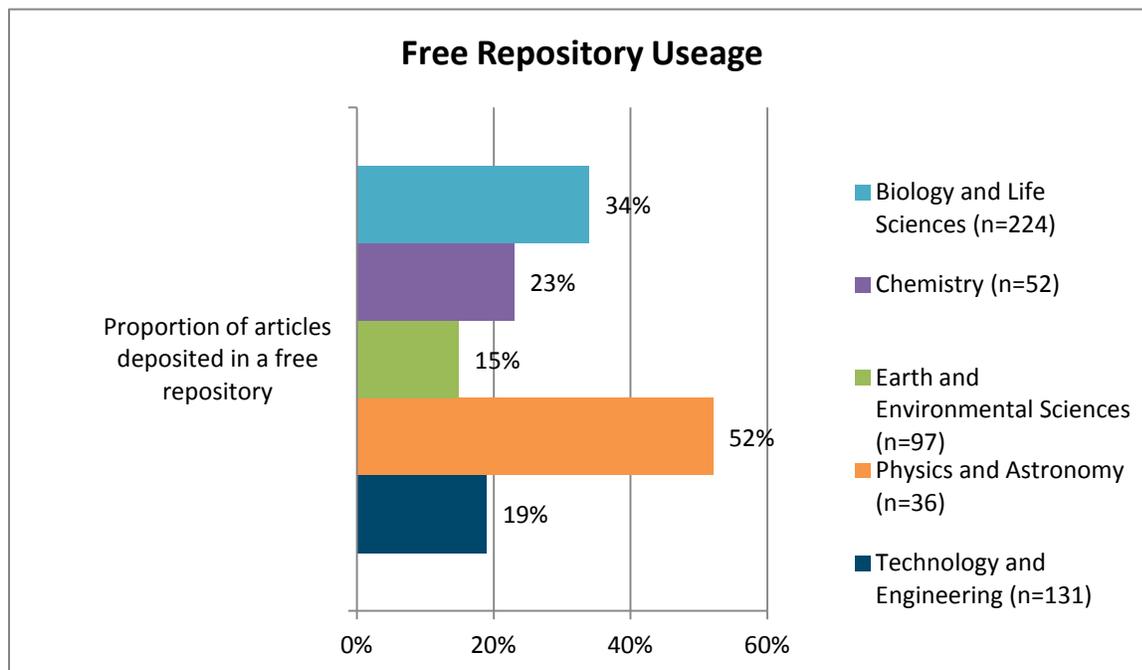
Changes in Publishing Behaviour

The graph below indicates changes in researchers’ publishing practices over the last two years. More than one-third of researchers indicated that they are more inclined to submit with the intent to publish in open access and to use social media tools to disseminate their work relative to two years ago. Twenty-three percent of researchers reported depositing publications in an institutional repository more frequently. Similarly, 23% of researchers responded that they are depositing publications in an online archive more frequently.



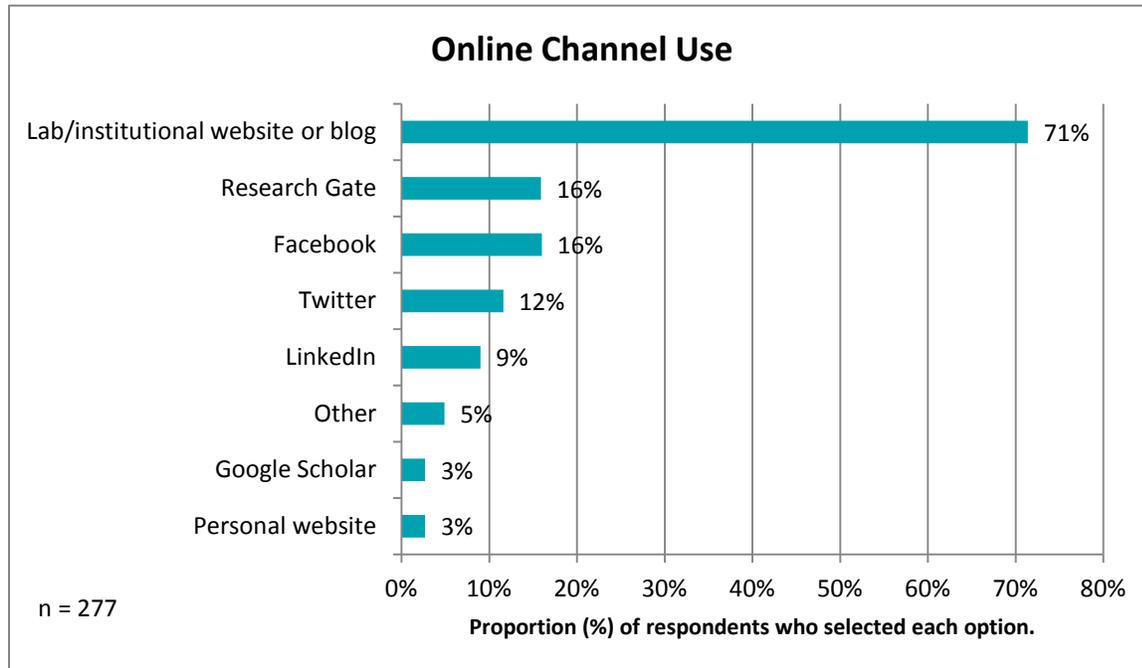
Differences in Use of Repositories Across Disciplines

Certain disciplines have a long history of access to online repositories. For example, arXiv has been available to those publishing physics-related articles since 1991, and has opened up to those from several other disciplines over the last two decades. Since then, new repositories have been developed to host articles from other disciplines. For example, in 2000, PubMed Central began serving the biomedical and life sciences community. Perhaps due to differences in the availability of online archives geared towards specific disciplines, certain groups of researchers in this study indicated that they are more inclined to deposit articles in free repositories. Researchers from Physics and Astronomy had deposited significantly more of their work than researchers from Biology and Life Sciences. Both of these groups had deposited, on average, a greater proportion of their work in free repositories than the other disciplines.



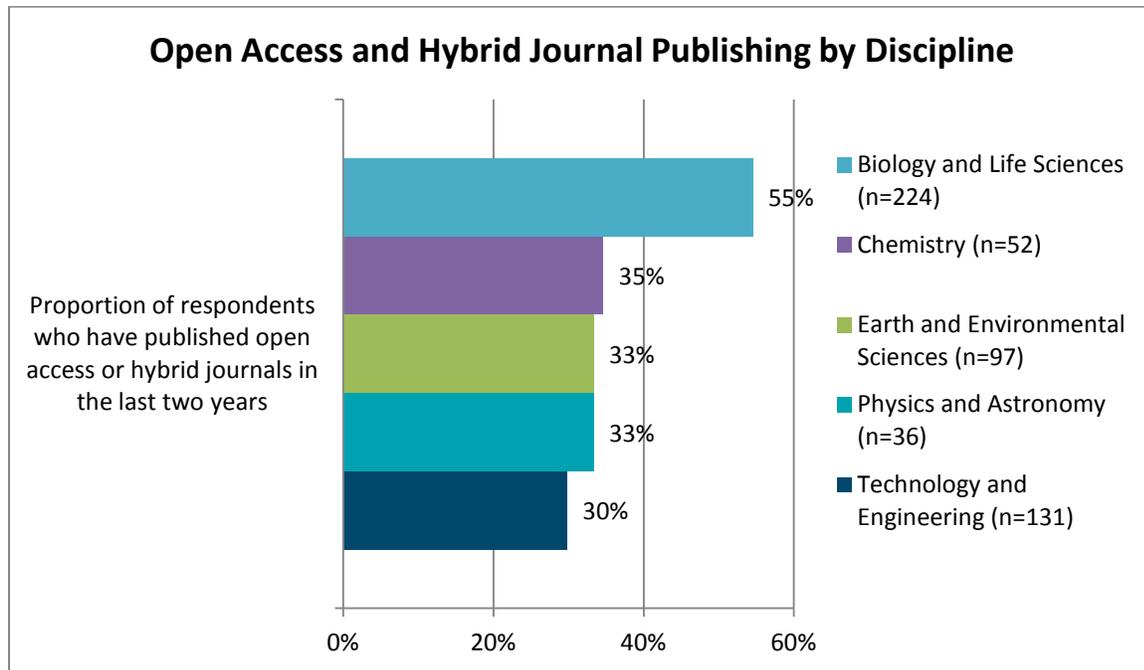
Laboratory and Institutional Websites are Tools for Research Dissemination

Social media and other non-traditional channels present researchers with the opportunity to draw attention their work and attract a larger, perhaps broader audience. More than one-half (51%) of the researchers surveyed are using at least one social media tool to disseminate their work. Of those who do, 71% percent of respondents indicated that they use laboratory or institutional websites to disseminate their work, making them the most frequently used tools.



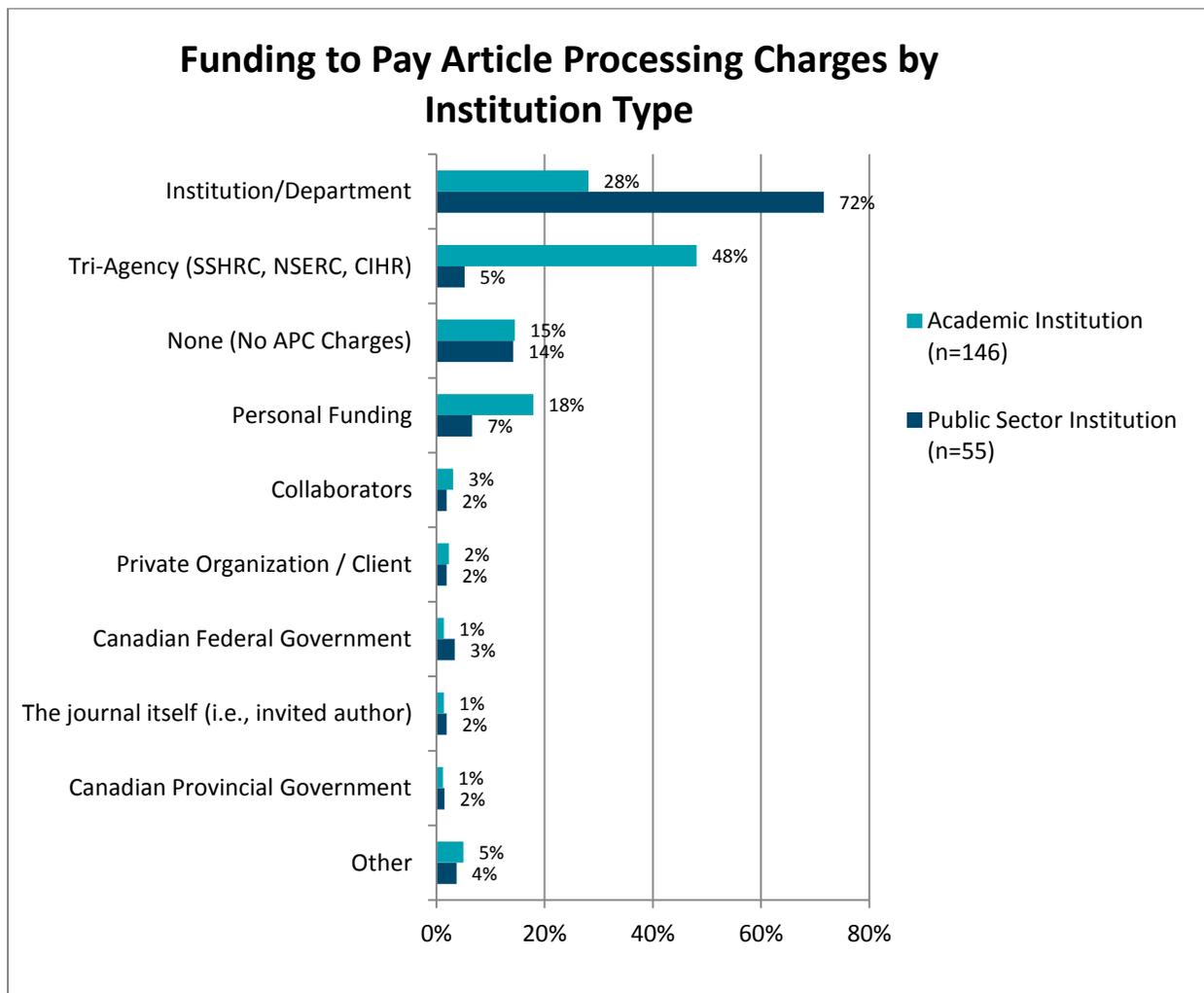
Many Researchers Publish in Open Access or Hybrid Journals

Overall, 43% of survey respondents reported publishing in an open access or hybrid journal during the last two years. Those who did indicated that 57% of their work, on average, was published in such a manner. Respondents from Biology and Life Sciences were more likely than any other discipline (55%) to report having published in an open access or hybrid journal.



Institutions and Tri-Agency Members Provide the Means for Publishing in Open Access format

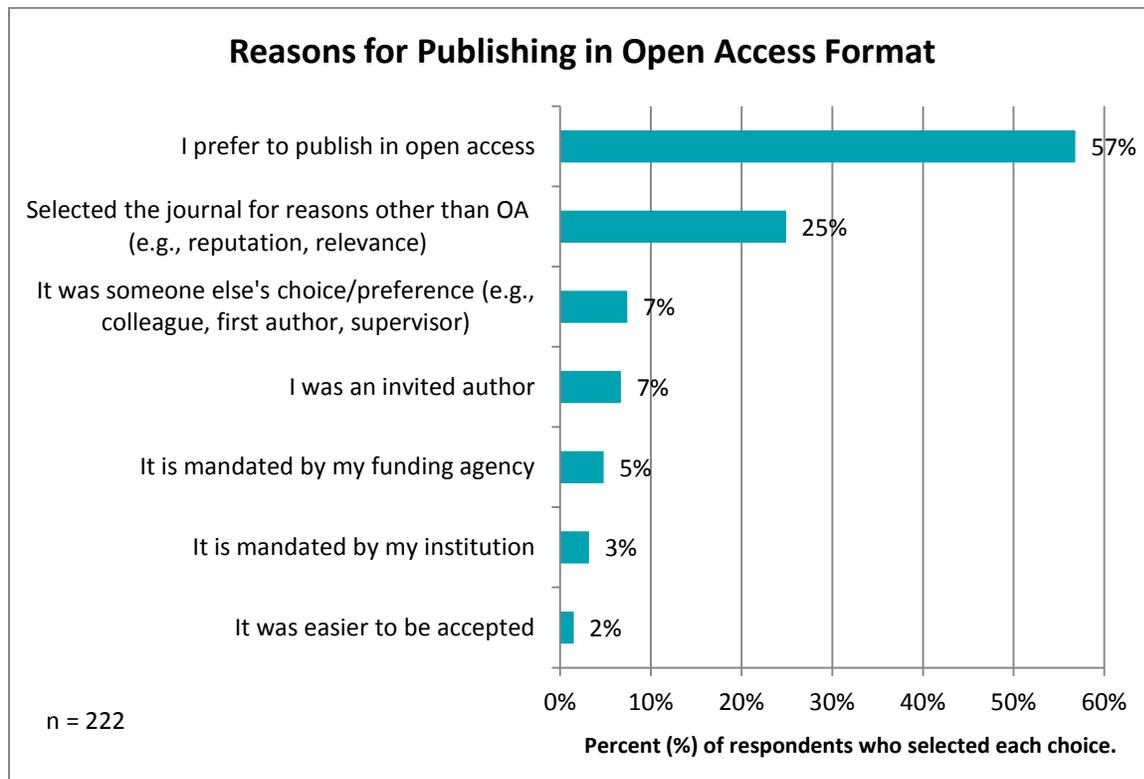
Researchers draw from a variety of funding sources to pay article processing charges associated with publishing in open access and hybrid journals. The most frequently mentioned sources were the institution or department to which the researcher belongs and funding from a Tri-Agency member. Academic researchers (48%) most frequently used funding from a Tri-agency member to pay article processing charges. Researchers from public sector institutions (72%) most frequently reported that their institution itself funded the payment.¹



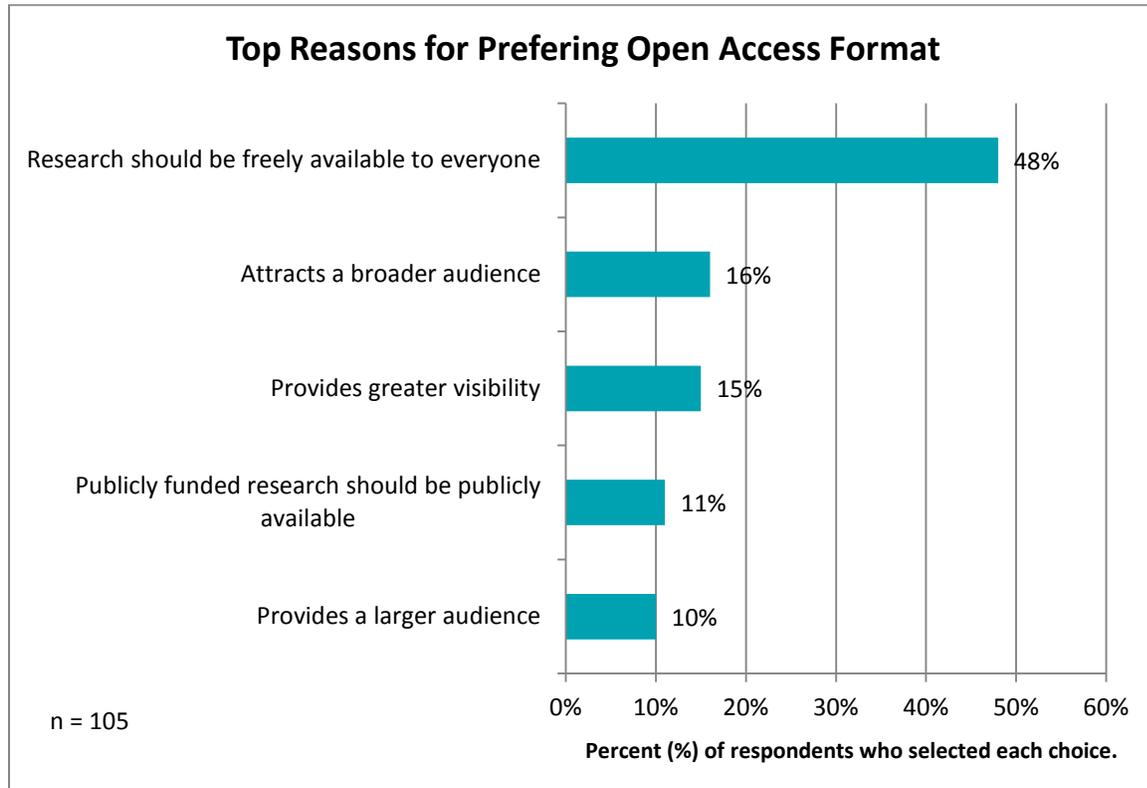
¹ The sample size for private sector institutions (n=14) was too small allow for analysis of this group.

Researchers Who Publish Open Access Do So Out of Personal Preference

Fifty-seven percent of researchers who publish in open access and hybrid journals reported that they do so out of personal preference. That said, many researchers (25%) continue to be influenced strongly by journal scope and reputation and seek out the appropriate journal for their work regardless of its publishing format.

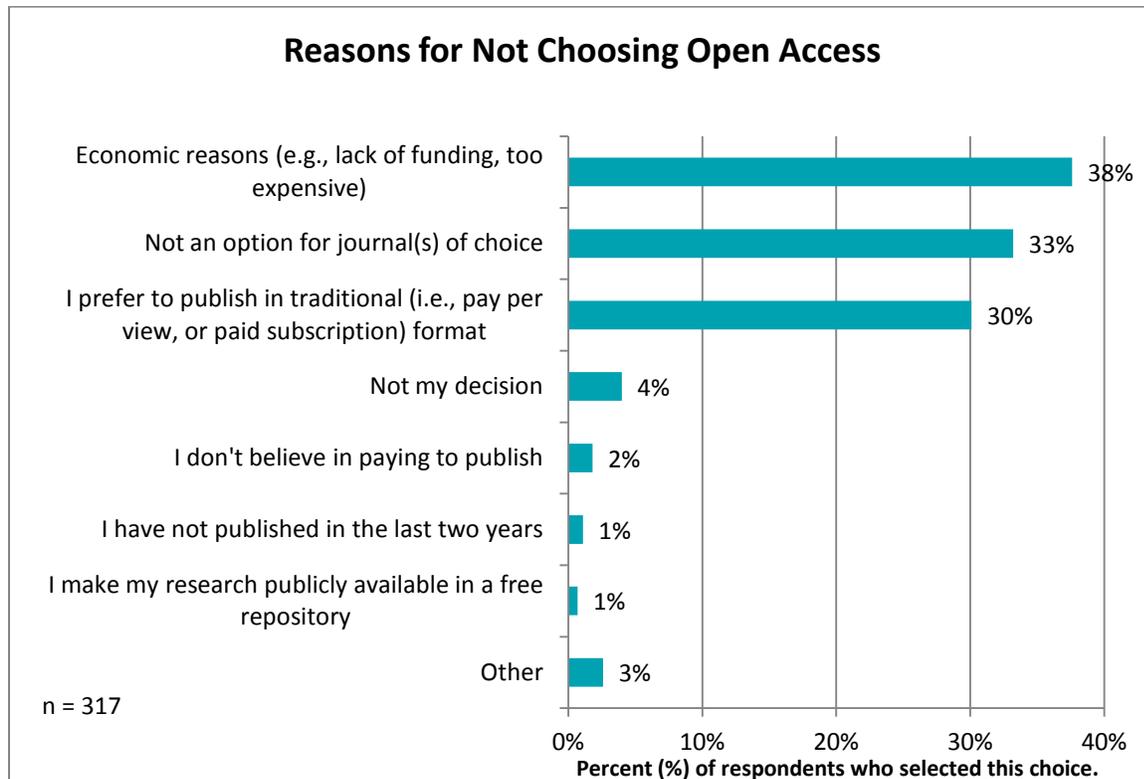


The majority of those who prefer publishing in open access format explained their preference by deferring to the guiding principle of open access. The predominant theme, articulated by 48% of respondents, was that research results should be freely available to everyone. Other themes included the propensity for open access to attract a broader audience and to allow greater visibility, as well as the desire for research funded by tax-dollars to be publicly available.

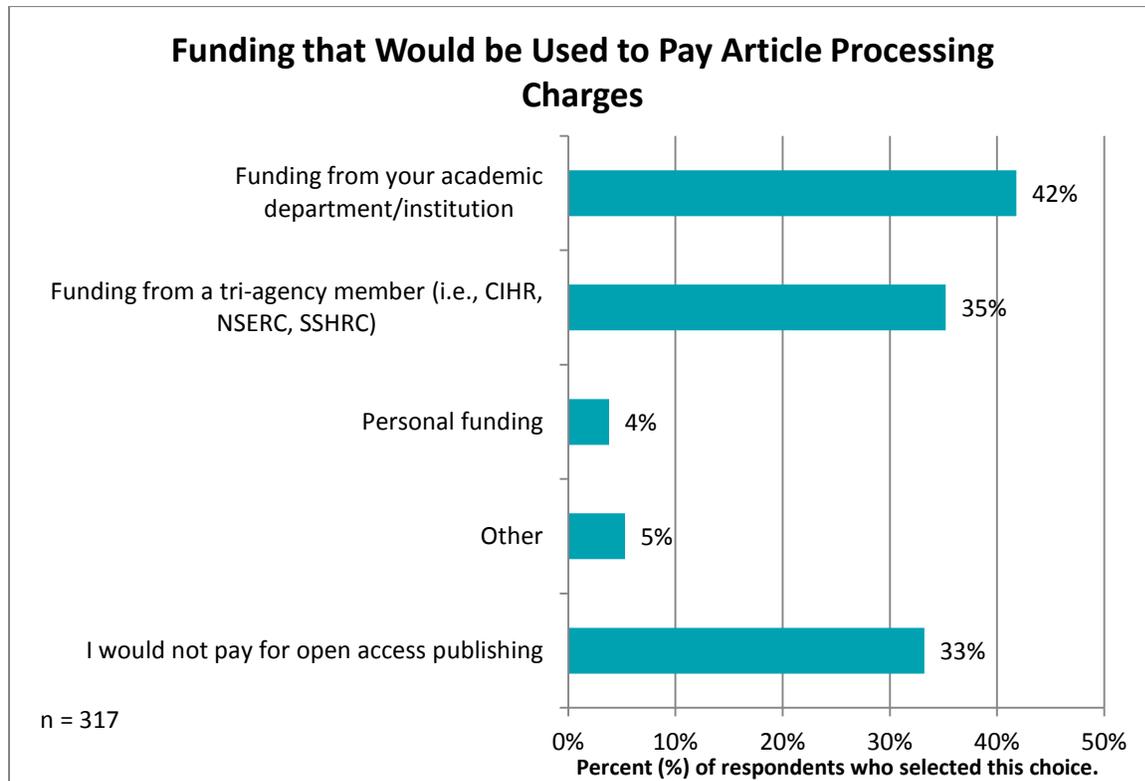


Reasons for Not publishing in Open Access format are Diverse

Economic reasons were cited most frequently as the impetus for not publishing in open access format over the last two years. Thirty-eight percent of respondents selected this option as a reason for their publishing behaviour. Not being a publishing option for the journal of choice was the second most frequently mentioned reason, followed by a preference for publishing in traditional journals.

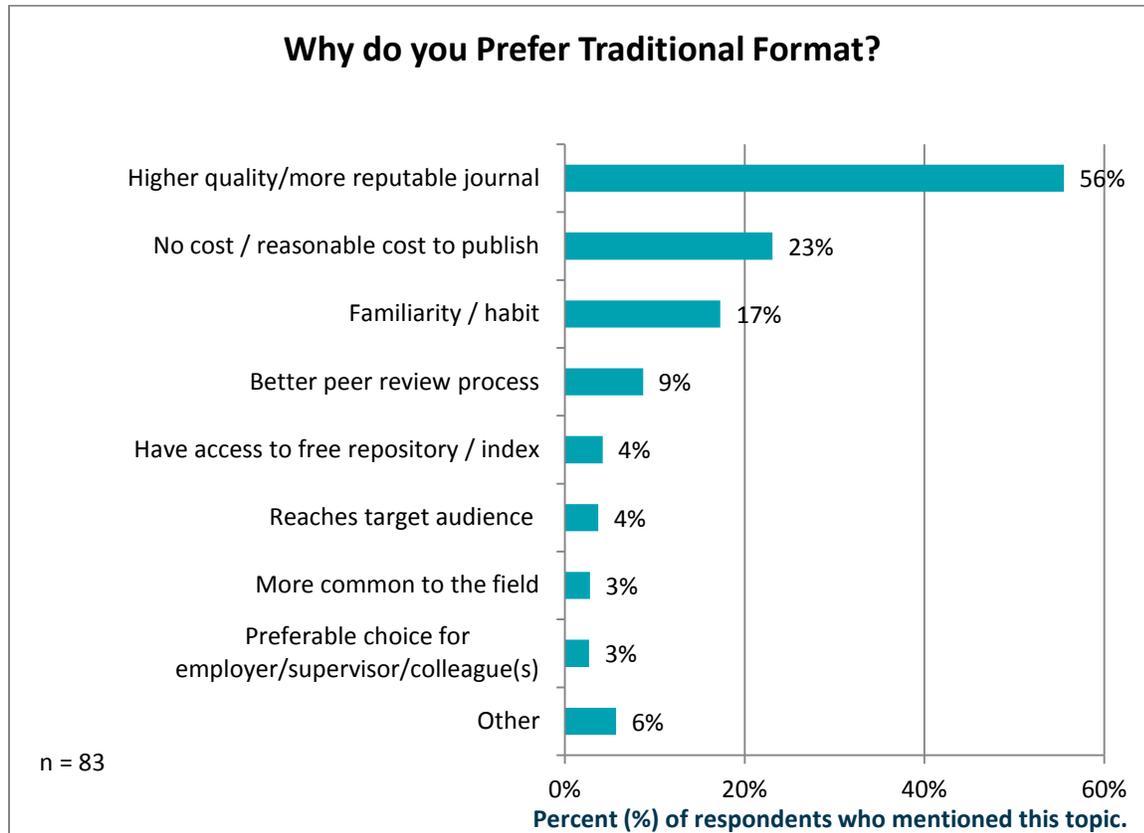


Many researchers cited economic factors as a reason for not publishing in open access or hybrid journals. However, 33% of researchers indicated that they would not pay even if funding were available.



Confidence in Quality Drives Preference for Traditional Formats

More than one-half (56%) of researchers who prefer publishing in traditional formats cited perceptions of quality as a reason for their preference. Twenty-three percent prefer to publishing in traditional format because it is either free of charge, or reasonably priced. The third most common theme, mentioned by 17% of those who indicated that they prefer traditional formats, was greater familiarity with traditional publishing methods.



Attitudes and
Behaviours in a
Changing
Publishing
Environment

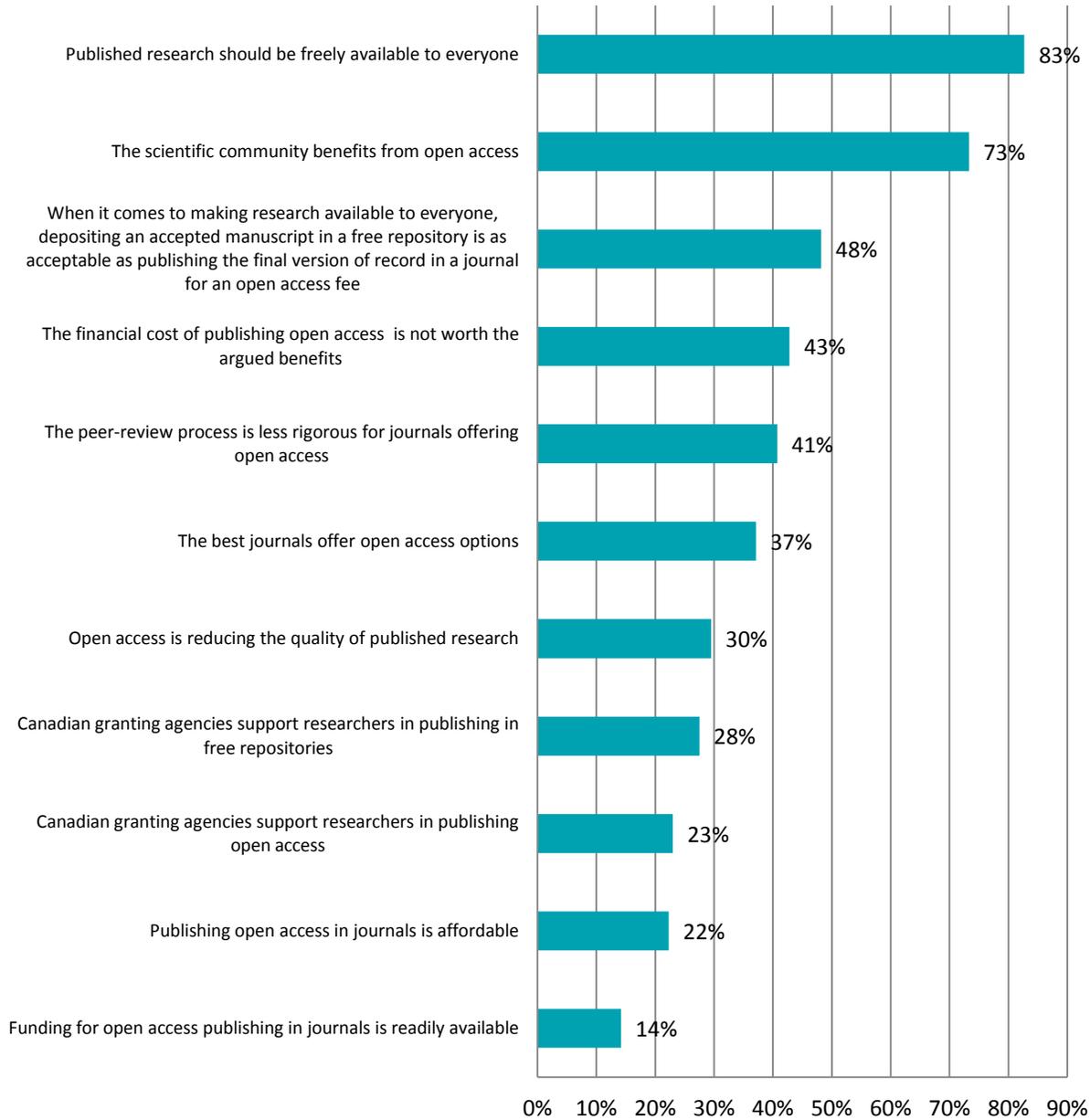
Attitudes and Behaviours in a Changing Publishing Environment

The survey reveals some evidence of changes in publishing behaviour. Just over 20% of researchers indicate that they are depositing manuscripts in free online repositories more frequently now than they were two years ago. Moreover, 40% of researchers are submitting to journals more frequently with the intent of publishing in open access format. In this section, publishing attitudes are placed in the context of a changing publishing environment that includes options for making published work freely available.

Researchers Agree with Principle, not Cost, of Open Access

Researchers agree with the fundamental principle guiding the open access movement – that published research should be freely available to everyone. When asked a series of attitudinal questions about publishing in open access format, 83% of researchers either agreed or strongly agreed with this statement. Seventy-three percent also agreed that the scientific community benefits from open access. Despite favourable responses to statements related to open access principles, the data suggest some reservation in terms of associated costs. Forty-three percent of researchers agreed that the financial cost of open access is not worth the argued benefits. Only 14% of those surveyed agreed with the statement that funding for publishing in open access or hybrid journals is readily available, and only 22% agreed that publishing in open access or hybrid journals is affordable. Forty-eight percent of respondents felt that depositing an accepted manuscript in a free repository is an acceptable alternative.

Attitudes towards Open Access Publishing



n = 274 - 532

Percent (%) of respondents who rated each statement a 4 or 5 out of 5, on a scale from strongly disagree to strongly agree.

Attitudes Vary by Discipline in Some Areas

In terms of attitudes towards open access publishing, there are several strong points of consensus across disciplines. Researchers tended to agree that research publications should be available to everyone, and that this is beneficial to the scientific community. They were also inclined not to agree that funding for publishing in open access or hybrid journals is readily available, or that the “best” journals offer open access as a publishing option.

On the other hand, some significant differences do emerge between groups in terms of receptivity to open access and free repositories. Seventy-seven percent of researchers whose primary discipline is Physics and Astronomy agreed that depositing an accepted manuscript in a free repository is as acceptable as publishing in an open access or hybrid journal, compared to approximately one-half or fewer of respondents from other disciplines. Respondents from Physics and Astronomy were also least likely to agree that open access is reducing the quality of published research. In contrast, researchers from Chemistry were significantly more likely than others to agree that open access is reducing the quality of published research.

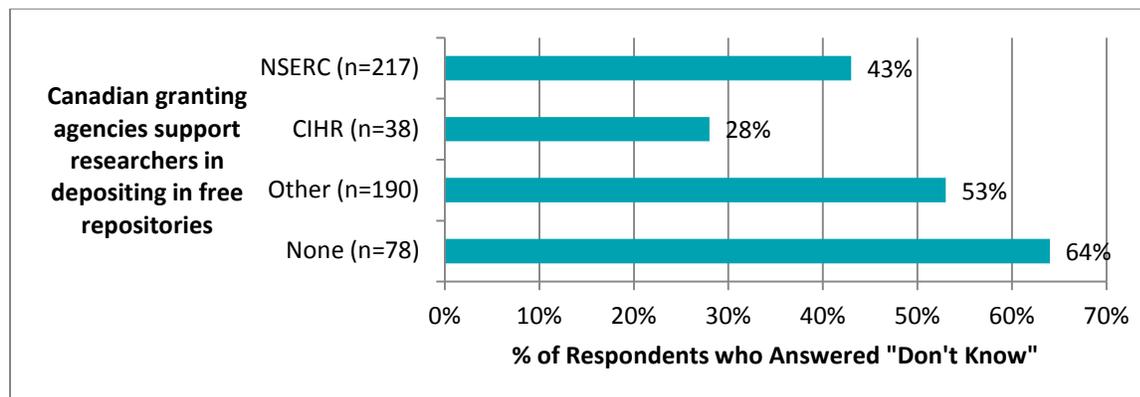
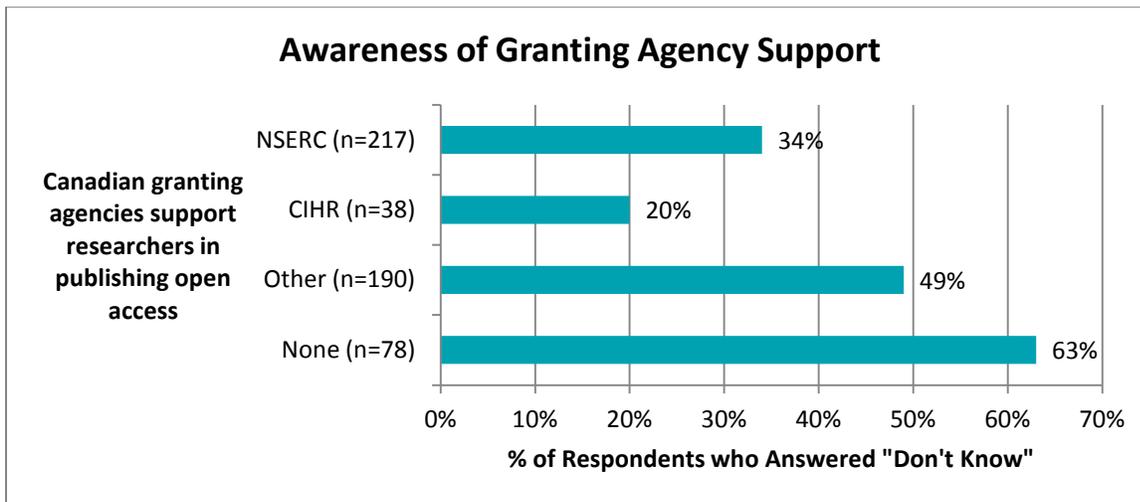
There are also differences in terms of perceived affordability of open access publishing. Although most researchers generally disagreed that publishing in open access or hybrid journals is affordable, researchers from Biology and Life Sciences were least likely to agree with this statement.

Statement	Biology and Life Sciences (n=201-205)	Chemistry (n=44-48)	Environmental and Earth Sciences (n=78-80)	Physics and Astronomy (n=30-34)	Technology and Engineering (n=103-114)
When it comes to making research available to everyone, depositing an accepted manuscript in a free repository is as acceptable as publishing the final version of record in an open access journal	47%	43%	39%	77%	54%
Open access is reducing the quality of published research	24%	50%	26%	10%	35%
Publishing open access in journals is affordable	17%	22 %	33%	27%	29%

Percent (%) of respondents who rated each statement a 4 or 5 out of 5, on a scale from strongly disagree to strongly agree.

Findings May Reflect a Need for Education

A substantial proportion of researchers provided a “don’t know” response when asked to rate statements related to granting agency policies. Although this was particularly true for researchers who do not receive funding from a tri-agency member, this was also true of those who do receive agency funding.² Just over one-third of NSERC recipients and 20% of CIHR recipients did not know whether Canadian granting agencies support researchers in publishing open access. Lack of awareness was even higher in relation to agency support for depositing in free repositories.

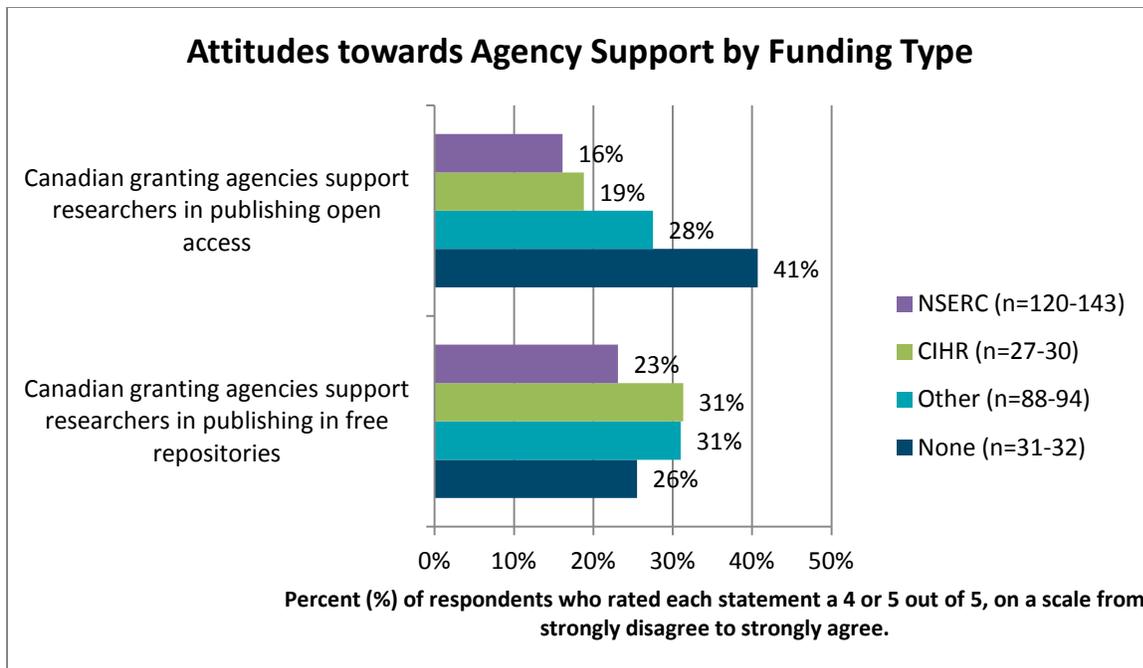


² Only 3 respondents listed SSHRC, and 14 respondents listed a Quebec granting agency as their primary source of funding; these groups were not included in the analysis. Many non-agency sources were identified (see Appendix A) as providing funding. These sources were classified as “other”.

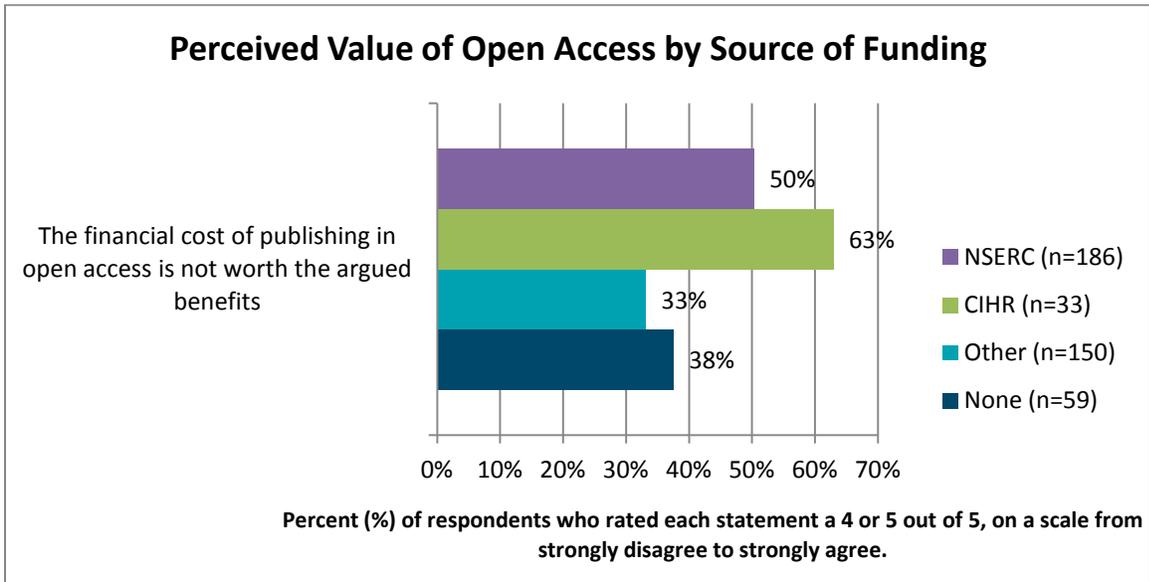
Perceived Lack of Support for Some Researchers

Among those who did answer questions related to agency funding, there is little agreement with the statement that funding agencies provide researchers with support for publishing in open access or hybrid journals or for depositing manuscripts in free repositories.

Those primarily receiving funding from NSERC were significantly less likely than those receiving funds from other sources, or no funding at all, to agree that Canadian granting agencies support researchers in publishing in open access journals. Only 16% of this group agreed with the statement that Canadian granting agencies support publishing in open access journals, compared to 28% of those with non-agency or no funding. Responses from those receiving funding from CIHR did not differ significantly from other groups. They were consistent, however, with a general trend indicating that those receiving funding from a tri-agency member are less likely to agree that Canadian granting agencies provide support for publishing in open access or hybrid journals. Lack of agreement that the agencies support publishing in repositories was statistically comparable across funding groups.



Researchers with CIHR as a primary source of funding are most skeptical of the value of open access in relation to financial cost, significantly more so than those primarily receiving “other” sources of funding, or no funding at all. Sixty-three percent of those whose research is primarily funded by CIHR agreed that the financial cost of publishing in open access is not worth the argued benefits, compared to 33% receiving “other” funding and 38% of those receiving no funding.



Appendix A: Survey Methodology

Overall Approach

An online survey was conducted with 540 published Canadian researchers in 5 broad areas of research in the natural sciences and engineering. The survey covered a range of attitudes and behaviours associated with scholarly publishing, with focus on those related to open access publishing.

Sampling

The population of interest for this survey was Canadian researchers who had published in one of the following domains within the last 5 years:

- Biology and Life Sciences
- Environmental and Earth Sciences
- Chemistry
- Physics and Astronomy
- Technology and Engineering

The sample for this survey was drawn from two databases maintained by Thomson Reuters: BIOSIS and Web of Science. BIOSIS contains the names of authors who have published journals in Biology and related disciplines. Web of Science span a broader spectrum of disciplines and served as a reasonable proxy for this population. The database contains the email addresses of authors who have published in journals included in Thomson Reuters' Web of Science citation index. This index comprises 12, 000 of the world's top journals as defined by the Web of Science selection committee. In accordance with the goals of this study, the research team at Thomson Reuters included only Canadian authors that had published in at least one of the selected disciplines of interest within the sample frame.

A stratified random sampling method was used in order to ensure adequate coverage for comparisons across disciplines. In order to compensate for over and under representation within each discipline, cases were assigned weights. Weights were calculated by dividing each discipline's proportion in the population by the proportion in the obtained sample. These proportions are available in the table below. Weighted data were used to describe overall measures, whereas unweighted data were used in analyses that make comparisons across disciplines.

Proportion of Respondents by Discipline

Discipline	Sample n	Sample %	Population %
Biology and Life Sciences	224	41%	43%
Environmental and Earth Sciences	97	18%	15%
Chemistry	52	10%	15%
Physics and Astronomy	36	7%	6%
Technology and Engineering	131	24%	14%

A total of 6004 unique records received an initial email. Those who did not respond were sent up to two reminder emails. The response rate was 9%.

With 540 responses, the overall results of this survey are considered valid with a margin of error of +/- 4.2%, 19 times out of 20. The margin of error increases as sample size decreases in the analysis of sub-samples.

Geographic Profile

The sample was geographically similar to the population of authors from which it was drawn. There was some degree of under-representation by Ontarian researchers. The population of researchers comprised 37% respondents from Ontario, compared to 30% in the obtained sample.

Region	Sample n	Weighted Sample %	Population of Authors %
Alberta	34	6.6%	7.0%
British Columbia	87	16.7%	14.1%
Manitoba	16	3.0%	2.0%
New Brunswick	7	1.2%	2.0%
Newfoundland and Labrador	14	2.5%	2.0%
Nova Scotia	24	4.7%	3.0%
Nunavut	N/A	N/A	.02%
Ontario	165	29.8%	37.2%

Region	Sample n	Weighted Sample %	Population of Authors %
Quebec	168	31.0%	28.4%
Saskatchewan	23	4.1%	4.0%
Yukon	2	.4%	.05%
Total	540	100%	

Type of Research Institution

The sample consisted mainly of researchers working in the public sector or at an academic institution.

