LMU Librarian Publications & Presentations   William H. Hannon Library

2022

Complex and Varied: Factors Related to the Research Productivity of Academic Librarians in the United States

Kristin Hoffman
University of Western Ontario, khoffma8@uwo.ca

Selinda Adelle Berg
University of Windsor, sberg@uwindsor.ca

Kristine R. Brancolini
Loyola Marymount University, kristine.brancolini@lmu.edu

Marie Kennedy
Loyola Marymount University, marie.kennedy@lmu.edu

Follow this and additional works at: https://digitalcommons.lmu.edu/librarian_pubs

Part of the Library and Information Science Commons

Complex and Varied: Factors Related to the Research Productivity of Academic Librarians in the United States

Kristin Hoffmann, Research and Scholarly Communication Librarian, University of Western Ontario, khoffma8@uwo.ca

Selinda Adelle Berg, University Librarian, University of Windsor, sberg@uwindsor.ca

Kristine R. Brancolini, Dean of the Library, Loyola Marymount University, kristine.brancolini@lmu.edu

Marie R. Kennedy, Serials and Electronic Resources Librarian, Loyola Marymount University, marie.kennedy@lmu.edu

Abstract

Academic librarians face multiple barriers in conducting the research that is expected in their work, yet they still manage to successfully complete it. This study aimed to identify the factors that contribute to their success. Through an online survey sent via email to a random sample of academic librarians in the United States, we gathered and analyzed quantitative data about education and experience, demographics, success factor statements, and research productivity to determine which factors are related to increased research output. We found that three categories of factors—Individual Attributes, Peers and Community, and Institutional Structures and Supports—contribute positively to overall research output. We identified several elements that academic librarians may want to pursue to increase research productivity, with Peers and Community identified as a category for exploration. Overall, we found that academic librarians are highly motivated to conduct research, yet the factors leading to their success are complex and varied.

Introduction

Academic librarians conduct and share results of their research for many reasons: to develop and thrive as professionals, to improve services and collections, to document the value of their work for students' and faculty academic success, and to contribute to the body of knowledge in library and information science (LIS). Librarians and their academic institutions benefit from librarianship that is informed by research, which has been influenced by the development of evidence-based practice. Academic librarians derive well-established benefits from librarians conducting research: progress toward gaining promotion, tenure, and higher salaries; advancement in the profession and recognition; receptivity to change; increased skill in managing complex library operations through systematic study; and better service to and empathy with faculty researchers. Librarians who have some form of faculty status are required to produce scholarship for promotion or tenure and, regardless of faculty status, most librarians employed by academic research libraries are expected to conduct and communicate the results of their research.

More than two decades of LIS research reveals that academic librarians struggle to overcome major barriers to research success, frequently identified as lack of knowledge and time to conduct and report the results of their research. However, despite barriers and challenges, many academic librarians achieve research success, which is generally associated with productivity—that is, conducting research that culminates in sharing results and findings. This study addresses the factors that contribute to that success, with an emphasis on identifying the most important factors.

Literature Review

The current study builds on the work of several researchers, primarily in the United States and Canada, who have been studying research productivity among academic librarians for decades. Early on, researchers tended to focus on barriers to research productivity,[1] but more recently, there has been a shift in focus to research success factors.[2] Most of this research has been carried out by librarian-researchers, who are likely motivated to encourage and support their fellow academic librarians and themselves to be successful and productive researchers.

Time has been one of the most cited barriers to research success.[3] Supports that provide or protect time, such as sabbaticals, research leaves, and scheduling time for research, have been cited as among the most beneficial for research success.[4] Unlike teaching faculty, most librarians do not have protected time in the summer to work on their research.[5] This work schedule means that it is critical to find time for research during the year. Sassen and Wahl surveyed Association of Research Libraries (ARL) deans and directors and found that 98% of libraries where research is required also have flexible policies on devoting work time to research and publication.[6] However, it is understood that full-time teaching faculty have time during the academic year to work on research between classes and while working from home. Librarians typically lack this flexibility.

Much has also been written about faculty status and research, since the conditions of faculty status usually include tenure and/or promotion, which are earned in part through research. Estimates of how many academic librarians have some form of faculty status vary, but it is believed to be between 40% and 50%.[7] Tenure-track librarians have produced more research than librarians at similar institutions,[8] and "conducting research can contribute to career advancement for librarians, especially academic librarians on tenure track".[9] Sassen and Wahl's 2014 study found that 85% of ARL members grant tenure and/or continuing appointments; nearly all require publication for tenure or continuing appointment and expectations for productivity are increasing.[10] Walters confirmed that "the relationship between faculty status and librarians' [research] productivity is strong and consistent across all sizes of institutions".[11] Not only is there a link between faculty status and research productivity, but "faculty status may actually encourage publication in the most respected journals".[12]

There is evidence that the research requirements of faculty status call for strong institutional support.[13] In a recent study of occupational stress and tenure-track librarians, Cameron, Pierce, and Conroy found that factors related to research support produced the most stress, but these stressors could be alleviated by research training and mentoring.[14] Other researchers confirm that the need for research training and institutional support is especially acute for early-career librarians on the tenure track, including librarians of color.[15] However, Hollister found that 50% of academic libraries with faculty status for librarians also have a post-

tenure review policy with a research requirement, suggesting that post-tenure librarians may need ongoing institutional support.[16] Couture, Gerke, and Knievel affirmed that tenured librarians benefit from mentoring and other institutional supports to achieve promotion to the highest ranks.[17]

Most academic librarians enter the profession with scant knowledge of research methods and incomplete information about research expectations in academic libraries. Faculty who have completed a Ph.D. program begin preparing for a research career early in their graduate programs, but students in an MLIS program do not receive the same research preparation. Consequently, most librarians enter the profession feeling unprepared to conduct research.[18] Although more than 63% of LIS degree programs require a research methods course,[19] one research course is likely insufficient preparation. Studies over nearly twenty years show a declining belief that LIS master's programs have prepared librarians to conduct research, from 30% to 17%.[20] To develop research skills and knowledge, librarians have turned to self-education, formal research courses, and continuing education. In response to demand for more research training,[21] the Institute for Museum and Library Services (IMLS) has funded three research institutes for librarians since 2013: the Institute for Research Design in Librarianship (IRDL), the Research Institute for Public Libraries (RIPL), and the Research Training Institute (RTI) for Health Sciences Librarians.

Research output takes numerous forms—posters, conference presentations, articles, book chapters, and more. These forms of output may have different weights for the purposes of promotion, tenure, and annual merit increases, depending on institutional priorities. According to Hollister's survey of tenured and tenure-track librarians in all types of academic libraries, the forms of research output that were most important for professional advancement were: peer-reviewed articles (89% choosing Important or Very Important), conference presentations (78%), book chapters (68%), and books (59%).[22] In their survey of ARL library deans and directors, Sassen and Wahl found that the forms of research output most valued for promotion, tenure, and continuing appointment were books and peer-reviewed journal articles, followed closely by conference presentations, workshops, panels, and posters; however, respondents rated a wide range of research output as "acceptable".[23]

Recent studies have examined the role that peers and community play in research success. This includes mentoring, collaboration, and peer support. Studies have found research mentoring to be beneficial to both early-career and tenured librarians.[24] Sassen and Brannon found that research collaboration is associated with productivity.[25] This may account for the increase in co-authorship among librarians; for the past twenty-five years, between 40% and 50% of research published in LIS journals has been co-authored, and the trend is increasing.[26] In a study of co-authorship in seven LIS research journals from 2005 to 2014, 54% of the articles were co-authored and the co-authored articles received on average more citations than the single-authored articles.[27]

Many forms of peer support have contributed to research productivity. Writing groups and writing retreats have numerous benefits, resulting in networking opportunities, writing feedback, and publications. Tysick and Babb's case study of a writing group for untenured librarians described how the group helped librarians meet publication goals and created "a foundation for new librarians to comfortably and productively assimilate into the academic

culture".[28] Writing retreats can help librarians by providing "protected time" for their writing and a peer support network for feedback on their writing.[29] Yet another form of peer support is a library research and publishing group, which begins earlier in the research process, creating a research community as a catalyst for writing and publication.[30]

Researchers have been unable to identify the single most important support category or one or two most important research success factors. Comprehensive studies that have examined numerous previously identified success factors suggest that an integrated suite of factors contributes to research success for librarian-researchers.[31]

Aims

This study's purposes were to identify what factors contribute to the research success of academic librarians in the United States and compare those findings with a 2016 study of academic librarians in Canada.[32] Research success is generally aligned with productivity and output. As such, we used research outputs as a proxy for research success and examined the relationships between research outputs and an array of factors that may influence productivity. The factors we examined were drawn from Hoffmann, Berg, and Koufogiannakis's extensive literature review across disciplines,[33] which identified three categories of factors that influence research productivity, shown in table 1.

Table 1
Factors influencing research productivity across the disciplines

Individual Attributes	Peers and Community	Institutional Structures and Supports
Demographics	Collaboration	Extrinsic Motivations
Education and Experience	Community	Institutional Supports
Intrinsic Motivations	Mentoring	
Personal Commitment to Research	Peer Support	
Personality Traits		

A follow-up study by Hoffmann, Berg, and Koufogiannakis in 2016 found that factors in the three major categories of Individual Attributes, Peers and Community, and Institutional Structures and Supports all had a positive effect on the research productivity of academic librarians in Canada.[34]

This current study is a partnership between Hoffmann and Berg and researchers conducting similar studies in the United States,[35] merging the interests of the two groups and placing the 2016 study in an American setting.

The research questions for the current study are:

1. What factors have a positive effect on research productivity?
2. Which of three categories of factors identified by Hoffmann, Berg, and Koufogiannakis —Peers and Community, Individual Attributes, and Institutional Structures and Supports—are most influential for librarians' research productivity?[36]
3. How do the results of this study compare to the findings from Hoffmann, Berg, and Koufogiannakis's study of academic librarians' research productivity?[37]

The aim was not to describe the research environment of academic librarians in the United States, but rather to identify relationships between their research output and the factors that may influence their productivity.

Methods

This quantitative study used an online survey to collect data from a random sample of academic research librarians working in the United States. It replicates the 2016 Canadian study in the United States and examines additional variables from Kennedy and Brancolini.[38]

Study Population

The original study surveyed librarians working in 75 academic libraries in Canada, which included the vast majority of academic librarians in the country. In an effort to identify a comparably broad study population, we drew our sample from the three categories of doctoral-granting institutions in the U.S., as listed by The Carnegie Classification of Institutions of Higher Education: R1: Doctoral Universities – Very high research activity; R2: Doctoral Universities – High research activity; D/PU: Doctoral/Professional Universities.

Potential participants were academic librarians and archivists employed at 198 American institutions randomly selected from the list of Carnegie R1, R2, and Doctoral/Professional institutions. We randomly selected half the institutions on each list and excluded two institutions for which we could not find a library. The institutions included in this study are listed in appendix B. To identify the librarians at each institution, two of us and a research assistant visited each library's online directory and recorded in a spreadsheet the 6,416 email addresses of all employees we could identify as librarians or archivists. This sampling method raised a challenge in that it was difficult to verify that the recruitment email recipients met the study criteria, so we can only estimate the number of potential participants.

Recruitment and Survey Dissemination

Recruitment began after receiving clearance from our institutions' Ethics Review Boards. In October 2020, we sent each participant an initial email invitation and two follow-up reminders to participate in the study, each with an attached Letter of Information for Consent to Participate in Research and a link to the online survey. We emailed the study invitation to 6,416 potential participants.

Survey Design and Measures

As noted above, our study's goal was to capture the factors that may influence productivity. Questions about the factors were designed with bivariate variables, Yes or No, that could easily be used to calculate statistical measures. We revised the original data collection tool, designed for Canadian academic librarians, to reflect the American context. Our changes were to alter language, expand response options, and add questions of interest. The survey again followed four areas of interest.

Education and Experience

Expanding on the survey tool from the Canadian study, we added four questions related to professional training and research environment. We added a question about the delivery mechanism of the respondent's MLIS program, whether in person, online, or a combination of in person and online; two questions about the respondent's belief about whether their LIS master's program had prepared them to read and understand research-based literature or had prepared them to conduct original research; and a question about whether the respondent's current position is in library administration. The latter three questions had response options of Yes or No.

We also changed response options for three questions in this section. For the question about years since completing the MLIS degree, we expanded the response field to include month of completion. For the question about formal research training since completing the MLIS, we revised response options to give more general training mechanisms. For the question about promotion and tenure, we changed the response options to reflect the types of positions held by academic librarians in the United States.

Demographics

We posed a series of demographic questions to identify whether there is a relationship between those variables and research productivity. We revised the response options to the question about gender identity.

Success Factor Statements

We presented 53 statements, requesting that the participant consider whether each statement applied to them and reply Yes or No. The statements focused on attitudes or beliefs about the research process ("I do research for my personal interest") as well as the respondent's research practice ("I have participated in a writing group"). Each statement expresses an element of one of the factors identified in table 1.

Research Productivity

We asked the participant to think over the last five years (January 2015-December 2019) and indicate how many times they had shared their LIS-related research using a range of mechanisms. A drop-down arrow permitted responses between 0 to 30 for each mechanism.

We concluded the survey with two questions for open-ended comments. One question asked participants to add other factors that they felt we had not addressed, since we anticipated that the Yes or No answers might leave participants feeling that the complexities of their situations were not captured. The other question invited participants to share other ways in which they had distributed their research.

The survey instrument is in appendix A.

Analysis

We calculated descriptive statistics (counts and percentages for categorical/nominal responses, means and standard deviations for continuous measures) for survey items. We also calculated a

weighted output score for each participant, based on the data from the Research Productivity section of the survey. Because different research outputs vary in perceived value and effort, and each participant reported different kinds of output, the weighted output score allowed us to represent all of a participant's research output with one number.

In the 2016 Canadian study, the authors used a paired comparison analysis to arrive at a weight for each type of output, shown in table 2. Paired Comparison Analysis is a simple and direct way to quantify attributes of items in comparison to one another. For this pairwise comparison, we created a table where each researcher compared the perceived value of each publication type to the other publication types and assigned the higher valued item a score from zero to three. Our scale was: no difference in value = 0, slightly more value = 1, moderately more value = 2, a lot more value = 3. We then consolidated the results and each publication type was assigned a final score.

We used the same weighting as in the Canadian study, to allow for comparison between the two studies' findings. We added book reviews as a type of output and conducted a paired comparison analysis to arrive at a weighting of zero for book reviews.

Table 2
Weights for each type of research output

Output type	Weight
Book review	0
Poster	0.5
Presentation	1
Conference proceeding	1
Non-peer-reviewed article	3
Book chapter	5
Edited book	6
Peer-reviewed article	9
Authored book	10

To determine how to analyze the survey results, we examined the distribution of weighted output scores for all participants, which is shown in figure 1. The mean weighted output over five years was 30.0 and 68 participants reported no research output during that period.
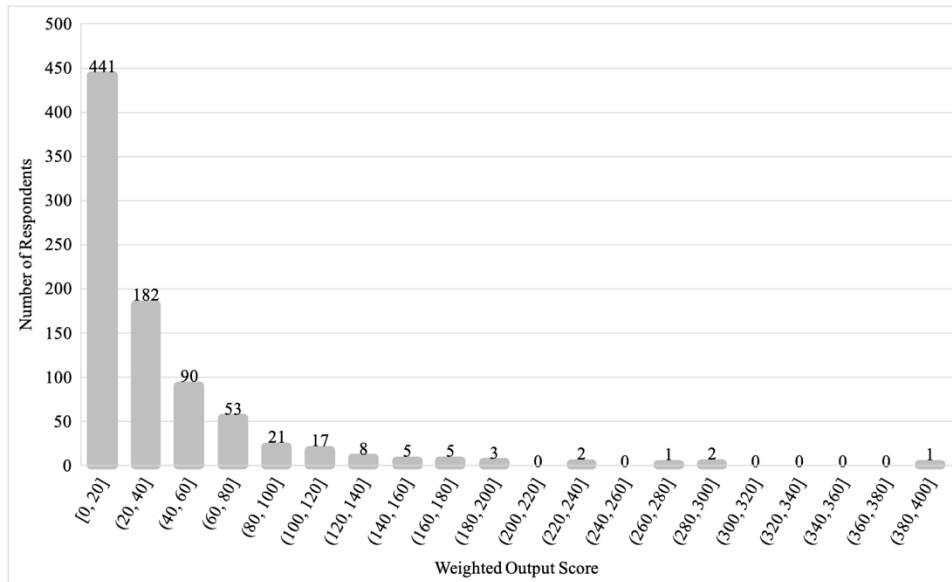
Figure 1
Histogram of participants' weighted output scores ($n = 831$)

Since the weighted output scores do not approximate a normal distribution, we used non-parametric statistical tests to examine the relationship between weighted output score and the identified factors. For variables with two nominal groups, we used the Mann-Whitney U test. For variables with more than two groups, we used the Kruskal-Wallis ANOVA. For both tests, the null hypothesis is that there is no difference between the distributions; when the null hypothesis is rejected, the difference in the distributions is significant at the .05 level.

We used a stem and leaf plot in SPSS to identify extreme values. All weighted output scores above 95 were outliers and therefore removed from analysis. We also decided to focus our analysis on participants who had demonstrated some regular engagement with research, so we set a lower limit of three for weighted output score. We therefore analyzed the subset of responses where the weighted output score was between three and 95, inclusive. To ensure that we were not omitting a homogenous subset of participants (e.g., all those who are new to the profession) by excluding those with a weighted output score below three, we examined that set of participants and their responses to the variables for demographics, education, and work experience. There were some differences in the distribution of some variables (e.g., the ratio of participants with tenure was lower), but we are confident that all variables were well represented in the subset of responses with weighted output scores between three and 95.

The survey questions addressed eleven factors that are grouped into three overarching categories—Individual Attributes, Peers and Community, and Institutional Structures and Supports—as shown in table 1. Each question mapped to one of the factors, as shown in appendix A. To determine whether the factors had an effect on research productivity, we tested variables at three levels: the three overarching categories, the factors within those categories[i],

---

[i] We could not test Demographics or Education & Experience as factors, because the forms of these questions did not lend themselves to being combined in aggregate. We could only test the individual questions within these two factors.

and the individual statements or questions that formed the components of each factor. At all three levels, we tested against three measures of research productivity: weighted output score, number of peer-reviewed journal articles, and number of conference presentations. While the weighted output score is a single value that represents all a librarian's output, and peer-reviewed articles are widely recognized as a standard of quality for scholarly output, our experience as professionals is that conference presentations are a common type of output for academic librarians.

Coding of Open-ended Questions

One of the final questions in the survey was, "Can you think of other factors that were not fully captured in the previous questions that have affected your research productivity?" We coded each response to identify the unique factors described. We then mapped the factors mentioned in the comments to the eleven factors we had already determined to see how respondents elaborated on those factors or if they described new factors. Finally, we reviewed and confirmed each other's assigned codes.

Results

We received 125 "mail undeliverable" messages, so 6,291 potential participants received the invitation. We received 1,125 survey responses for an 18% response rate, with respondents self-reporting their eligibility to meet our selection criteria. After removing incomplete responses, we had 831 responses for a usable response rate of 13%. As described in the Analysis section, we analyzed the subset of responses where the weighted output score was between three and 95, inclusive; there were 637 responses in this subset.

We reviewed four measures to see if our participants formed a representative sample of academic librarians: workplace category, gender, age, and years since completion of MLIS degree. Appendix C shows tables and charts of these measures. At 72% of respondents, women are likely over-represented in our sample, but on measures of workplace category, age, and years since MLIS, we are confident that our participants comprise a representative sample.

Research Productivity

Participants reported a range of output mechanisms, both in type and amount. They reported producing over ten thousand items; some participants reported no research output and others reported distributing several dozen items. Conference presentations were 43.5% of the total reported output, followed by peer-reviewed articles (14.1%) and posters (12.9%), as shown in table 3. These three output types comprised 70.5% of the total reported output. This is similar to the Canadian study, where presentations were 48% of output and the top three types of output accounted for 72% of all reported publications. However, in that study, non-peer-reviewed articles were the second-most reported type of output and peer-reviewed articles were third. Authoring or editing a book was the least frequently reported type of output.

In response to the open-ended question inviting participants to tell us other ways they shared research results, they mentioned mechanisms such as blogs, exhibitions, self-publication, social media, technical reports, and webinars or workshops.

Table 3
Participants' reported research output over the past five years (January 2015 – December 2019)

Output type	N	Min	Max	Mean	Median	St. dev.	Total number reported	% of output reported
Presentation	821	0	30	5.4	4	6.1	4,415	43.5
Peer-reviewed article	802	0	30	1.8	1	3.1	1,426	14.1
Poster	810	0	20	1.6	1	2.4	1,312	12.9
Book review	789	0	30	1.2	0	3.8	938	9.3
Non-peer-reviewed article	776	0	30	.9	0	2.3	723	7.1
Book chapter	789	0	12	.7	0	1.2	575	5.7
Conference proceeding	785	0	13	.7	0	1.4	565	5.6
Edited book	771	0	30	.2	0	1.2	112	1.1
Authored book	771	0	4	.1	0	.4	77	0.8
Totals							10,143	100

Education and Experience

Within the factor of Education and Experience, six elements were significant: workplace category, tenure status, additional advanced degrees, years since MLIS (or equivalent), and whether respondents believed that their MLIS program prepared them to read research-based literature or prepared them to do research. The other elements of Education and Experience—delivery format of MLIS program, research training received either during or after their MLIS program, working on an additional advanced degree, and being in library administration—were not significantly related to research output.

Workplace category was significant in that participants at D/PU institutions produced significantly less weighted output or peer-reviewed articles than those at R1 or R2 institutions and reported significantly fewer conference presentations than those at R1 institutions, as shown in table 4. For tenure status, shown in table 5, those who have tenure or are eligible for tenure produced significantly more weighted output and peer-reviewed articles than those who are only eligible for promotion or who aren't eligible for either. Tenure status was not significant for conference presentations.

Table 4
Mean research productivity for workplace category

Workplace category	N	Weighted output score			Peer-reviewed articles			Conference presentations		
		Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.	Mean
R1	403	3	93	28.5	0	8	1.5	0	30	6.0
R2	143	3	94.5	31.5	0	7	1.7	0	30	5.6
D/PU	85	3	82	18.9	0	5	0.9	0	25	4.3

Table 5

Mean research productivity for tenure status

Tenure status	N	Weighted output score			Peer-reviewed articles			Conference presentations		
		Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.	Mean
Tenured or eligible for tenure	310	3	94.5	31.3	0	8	1.8	0	30	5.8
Eligible for promotion only	206	3	92	25.4	0	8	1.2	0	30	5.5
Eligible for neither	120	3	87	23.6	0	7	1.1	0	30	5.4

Having an additional advanced thesis-based degree is positively significant for all three output variables tested ($n = 635$, weighted output $p = 0.000$, peer-reviewed articles $p = 0.018$, conference presentations $p = 0.007$). Having any additional advanced degree, thesis-based or not, is positively significant only for weighted output ($n = 635$, weighted output $p = 0.008$).[ii]

In terms of years since MLIS, shown in table 6, participants who completed their MLIS between 10–14 years ago had significantly higher weighted output scores than participants who completed their MLIS 0–4 years ago, and significantly higher scores than those who completed their degree 15–19 years ago. Time since MLIS was not significant for peer-reviewed articles or conference presentations.

Table 6
Mean research productivity for years since MLIS

Years since MLIS	N	Weighted output score			Peer-reviewed articles			Conference presentations		
		Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.	Mean
0 – 4	75	3	86.5	24.5	0	8	1.4	0	25	5.2
5 – 9	143	3	94.5	28.1	0	7	1.5	0	30	6.1
10 – 14	130	3	93	34.8	0	8	1.9	0	30	6.6
15 – 19	97	3	84	23.3	0	6	1.2	0	24	4.7
20 – 24	64	3	88.5	30.5	0	6	1.8	0	30	6.4
25 – 29	44	3.5	63	23.6	0	4	1.3	0	22	4.3
30 – 34	42	3	88	28.1	0	4	1.1	0	30	6.0
35 – 39	18	4	87	23.5	0	7	1.4	0	7	3.7
40 – 44	9	4	55	16.2	0	2	0.3	0	9	3.6
45 +	6	6	85	30.3	0	5	1.2	0	15	5.5

Participants' belief that their MLIS degree prepared them to read research-based literature was positively significant only for peer-reviewed articles ($n = 636$, $p = 0.048$). Participants' belief that their degree prepared them to do research was positively significant only for conference presentations ($n = 637$, $p = 0.031$).

[ii] The complete statistical details are in appendix D.

Demographics

Within the factor of Demographics, two elements were significantly related to research productivity: marital status and whether a respondent cared for dependents. Marital status was significant both for weighted output score and peer-reviewed articles, but not for conference presentations, as shown in table 7. Caring for dependents was positively significant for weighted output ($n = 611$, $p = 0.046$) and number of peer-reviewed articles ($n = 611$, $p = 0.017$); participants who cared for dependents produced more research. Caring for dependents was not significant for number of conference presentations ($n = 611$, $p = 0.616$).

Table 7
Mean research productivity for marital status

Marital status	*N*	Weighted output score			Peer-reviewed articles			Conference presentations		
		Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.	Mean
Unpartnered	171	3	89	25.0	0	7	1.2	0	30	5.7
Partnered	436	3	94.5	29.6	0	8	1.6	0	30	5.7
Prefer not to answer	28	3	51	18.3	0	4	1.0	0	11	4.1

Success Factor Statements

At the level of the three overarching categories, we found that all three categories were significant for weighted output score and peer-reviewed articles; however, only the Peers and Community category was significant for conference presentations.

The nine factors other than Education and Experience and Demographics were comprised of the Yes or No questions, and so we could test both the factors and the individual components. When we tested the factors against the weighted output score and number of peer-reviewed articles, all were significant and almost all of the individual components were significant. However, when we tested the factors against the number of conference presentations, three factors were not significant: Extrinsic Motivations, Institutional Supports, and Personality Traits. As well, many more individual components were not significant on their own.

Tables 8, 9, and 10 show the significant components for the factors within the categories of Individual Attributes, Peers and Community, and Institutional Structures and Supports, respectively. These tables also show how many participants responded Yes to each component. Detailed results of the Mann-Whitney tests are in appendix D.

Within the Individual Attributes category, all three factors were significant for weighted output score and number of peer-reviewed articles. All individual components were significant for weighted output score, but three of 29 statements were not significant for peer-reviewed articles. For conference presentations, Personality Traits was not a significant factor and fewer than half of that factor's individual components were significant. On average, 69% of participants responded Yes to the statements in this category, ranging from 42% for "I schedule dedicated time for research" to 88% for "I do research for professional growth."

Table 8

Components of the Individual Attributes category, their significance as determined by the Mann-Whitney U test, significant at the .05 level, and the percentage of respondents answering Yes to each component

Factors and components	Weighted output score	Number of peer-reviewed articles	Number of conference presentations	Percent answering Yes
Intrinsic Motivations				
I do research to contribute to more informed decision making in librarianship.	significant	significant	significant	77
I do research to contribute to better library services.	significant	significant	significant	79
I do research for my personal interest.	significant	–	significant	77
I do research for professional growth.	significant	significant	significant	88
I do research to contribute to greater library visibility on campus.	significant	significant	–	56
I do research to advance my career.	significant	significant	significant	76
I do research to build stronger relationships with faculty members.	significant	significant	–	45
I do research to build a professional reputation for myself.	significant	significant	significant	74
I do research to contribute to a stronger profession.	significant	significant	significant	79
Personal Commitment to Research				
I always have a research project that I'm working on.	significant	significant	significant	46
I schedule dedicated time for research.	significant	significant	significant	42
I am currently working on a research project.	significant	significant	significant	64
I have participated in activities that support LIS research (e.g. peer review, editor of a journal, providing writing assistance to a colleague, etc.).	significant	significant	–	76
I do research that is meaningful to my practice.	significant	significant	significant	84
I consider research to be a priority.	significant	significant	significant	49
I believe it is important for librarians to contribute to the profession via research.	significant	significant	significant	88
I read research literature on a regular basis.	significant	significant	–	56
I work on research outside of regular work hours.	significant	significant	significant	68
I have used personal funds to support my research and dissemination (e.g.: personal professional development funds or self-funded).	significant	significant	significant	52
Personality Traits				
I can achieve my research goals.	significant	significant	–	67
I am confident about my research abilities	significant	significant	–	62
I finish the research projects that I start.	significant	significant	–	59
I can easily identify questions that could be answered through research.	significant	significant	significant	68
I enjoy speaking with colleagues about my research.	significant	significant	significant	87
I enjoy presenting at conferences.	significant	–	significant	81
I do research to satisfy my curiosity.	significant	–	–	81
Publishing gives me a personal sense of satisfaction.	significant	significant	–	86
I enjoy doing research.	significant	significant	significant	80
I enjoy writing for publication.	significant	significant	–	59

Within the Peers and Community category, all four factors were significant for all three types of research output variables, and only a few individual components were not significant. On average, 55% of participants responded Yes to the statements in this category, ranging from 16% who said they had participated in a journal club to 85% who said they had done research on their own.

Table 9

Components of the Peers and Community category and their significance as determined by the Mann-Whitney U test, significant at the .05 level, and the percentage of respondents answering Yes to each component

Factors and components	Weighted output score	Number of peer-reviewed articles	Number of conference presentations	Percent answering Yes
Collaboration				
I have done research with other people (co-researchers) at my institution.	significant	significant	significant	69
I have done research on my own.	significant	significant	significant	85
Community				
I feel like I belong to a research community.	significant	significant	significant	46
I have consulted with an expert to get help on a specific aspect of my research.	significant	significant	significant	49
I have a network of peers at my institution with whom I talk about research.	significant	significant	–	59
I know people who have similar research interests to mine.	significant	significant	significant	79
I attend conferences in order to connect with others who have similar research interests.	significant	–	significant	78
I have a network of peers from other institutions with whom I talk about research.	significant	significant	significant	58
Professional associations are a source of research community for me.	–	–	significant	64
Mentoring				
I have been mentored in relation to research activities.	significant	significant	–	35
I have mentored others in relation to their research activities.	significant	significant	significant	44
Peer Support				
I have participated in a peer support group related to research.	significant	significant	significant	42
I ask my colleagues for feedback on my research.	significant	significant	significant	71
I have participated in a journal club.	significant	significant	–	16
I have participated in a writing group.	significant	significant	significant	32

In the Institutional Structures and Supports category, both Extrinsic Motivations and Institutional Supports were significant for weighted output score and number of peer-reviewed articles, but neither factor was significant for number of conference presentations. For all three output variables, the component "I do research only because it is a requirement of my job" was not significant; this was the only component that was not significant for any of the three output variables. On average, 43% of participants responded Yes to the statements in this category, ranging from only 10% who have hired a research assistant to 76% who said they are formally or informally expected to participate in research.

Table 10
Components of the Institutional Structures and Supports category and their significance as determined by the Mann-Whitney U test, significant at the .05 level, and the percentage of respondents answering Yes to each component

Factors and components	Weighted output score	Number of peer-reviewed articles	Number of conference presentations	Percent answering Yes
Extrinsic Motivations				
I have received merit increments or promotion due to my research activities.	significant	significant	significant	39
I am (formally or informally) expected to participate in research and scholarship.	significant	significant	–	76
I do research only because it is a requirement of my job.	–	–	–	23
Institutional Supports				
I have received funding for my research.	significant	significant	significant	33
I have hired a research assistant to help with research tasks.	significant	significant	significant	10
I have taken a sabbatical or other kind of leave to work on a research project.	significant	significant	–	17
I have space where I am able to work effectively on my research.	significant	significant	–	69
I have time to do research within my job.	significant	significant	–	52
I am encouraged and supported by my library to do research.	significant	significant	–	69

Open-Ended Comments

In an open-ended question, we asked participants to describe other factors that had affected their research productivity and 476 participants provided comments. Unlike the statistical analysis, which we conducted only for the subset of participants with weighted output between three and 95, we analyzed all comments, independent of weighted output score. Most comments elaborated on an element of one of the eleven factors we had identified. The Institutional Supports factor received the most comments of the eleven factors and, unsurprisingly, many of these comments elaborated on time and workload, which are well-documented impediments to research productivity.

Respondents also commented on how changes in personal circumstances and professional context (including the COVID-19 pandemic, as we have described elsewhere[39]) affected their research productivity. Two other noteworthy themes in the comments were concern about the quality of research from academic librarians and the ambiguity of the definition of research in academic librarianship. Additional exploration of these concepts and their potential impact on research productivity may be helpful.

Discussion
Significance of Overall Categories

Our primary research question was: What factors and elements have a positive effect on librarians' research productivity? Our analysis shows that all three categories of factors—Individual Attributes, Peers and Community, and Institutional Structures and Supports—contribute positively to overall research output, as measured by the weighted output score and number of peer-reviewed journal articles.

However, an interesting difference appeared when we tested the factors and elements against number of conference presentations—for this measure of research output, only the category of Peers and Community was significant. Within the Individual Attributes category, the factors of Intrinsic Motivations and Personal Commitment to Research were significant, but the overall category was not. Neither of the factors in the Institutional Structures and Supports category was significant. It is perhaps unsurprising that the Peers and Community category was significant, since conferences are a communal aspect of the profession; however, this finding raises additional questions about the nature and value of librarians' research output. What kinds of research outputs do librarians, administrators, and associations want to encourage, and do we need to emphasize different success factors for different research outputs?

In both the original Canadian study and this study of librarians in the United States, all three broad categories were significant when looking at weighted output and number of peer-reviewed articles. The Canadian study did not specifically examine conference presentation output, so we cannot compare those findings. In the current study, all nine factors were significant for weighted output and number of peer-reviewed articles, whereas in the Canadian study, Intrinsic Motivation was not significant for number of peer-reviewed articles. As well, more elements within the Demographics and Education & Experience factors were significant in the current study. The fact that more factors and elements were significant may be due to this study's larger sample size, which had 831 responses compared to 556 responses to the Canadian survey.

Regardless of the type of output, no single main factor contributes to research productivity. Nuance and individual situations are important. Individual situations vary widely and so do the factors that help any one individual to be a successful researcher.

Implications for Increasing Research Productivity

It is also instructive to examine how many participants responded Yes to the individual elements that comprise the factors we tested. When we tested the elements against weighted output scores and number of peer-reviewed articles, most of them were significantly related to research output, but there was much variation in how many participants responded Yes to each element, from 10% who said they had hired a research assistant to 88% who said they believe it is important for librarians to contribute to the profession via research.

One of our motivations for doing this study was to provide librarians and library administrators with data regarding how to better support librarians' research. Statements that were significant *and* where fewer participants answered Yes may point to changes in behavior, policy, or practice that could have a positive impact.

More participants answered Yes to the statements in the Individual Attributes category than in the other categories. This suggests that individual librarians already exhibit many behaviors and traits that contribute to research success. Indeed, the Intrinsic Motivations factor had the highest percentage of Yes responses to the individual elements. This is a positive sign that academic librarians are highly motivated to do research. Nevertheless, the elements that were significant for all output types and where fewer than half of respondents answered Yes may point to things that individuals can do to help themselves be productive researchers:

- I schedule dedicated time for research. (42%)
- I always have a research project that I'm working on. (46%)
- I consider research to be a priority. (49%)

The statements in the Institutional Structures and Supports category had, on average, the fewest participants answering Yes. We call on library administrators and others in positions of power in libraries or associations to consider how they could provide supports that would allow more librarians to answer Yes to elements such as these:

- I have hired a research assistant to help with research tasks. (10%)
- I have received funding for my research. (33%)
- I have received merit increments or promotion due to my research activities. (39%)

The third category, Peers and Community, was the only category that was significant for all output types. Again, in this category it is likely not within an individual's power to effect change, but rather we need collective efforts as a profession and a community of researchers. Collective efforts addressing the following elements may hold the most potential for positively affecting librarians' research endeavors:

- I have participated in a writing group. (32%)
- I have participated in a peer support group related to research. (42%)
- I have mentored others in relation to their research activities. (44%)
- I feel like I belong to a research community. (46%)
- I have consulted with an expert to get help on a specific aspect of my research. (49%)

Limitations

Participants received the survey invitations in October 2020, during the COVID-19 pandemic. This may have lowered our response rate and may have also affected the way people answered the survey. It was evident from comments in open-ended questions that people were experiencing significant professional and personal impacts due to the pandemic.[40]

Our study reflects a self-selection bias; those who are engaged and interested in doing research may have been more likely to participate. Respondents also self-reported their eligibility to meet our selection criteria.

Using bivariate variables (Yes or No answers) facilitated our analysis, but also limited individuals' ability to express detail and variance in their responses and restricted the scope of statistical tests we could run.

Finally, quantitative research cannot fully represent individuals' experiences and environments. Respondents were asked to choose the *best* answer; however, standardized and pre-selected responses mean that surveys cannot capture the subtleties of an individual's situation.[41] We received comments that contradicted some of our quantitative findings; however, the nature of this study means that those comments are not sufficient to help us explore those contradictions. As such, this study is unable to reflect the complexity of the environment and the experiences of academic librarian researchers.

Conclusions

This quantitative research reaffirms the importance of all three categories of factors evaluated: Peers and Community, Individual Attributes, and Institutional Structures and Supports. Academic librarians' success in research requires personal commitment and action as well as organizational, institutional, and community support. It is noteworthy that many librarians have achieved high research productivity making use of various available supports at individual, community, and institutional levels. As such, librarians need practices, supports, and administrative policies that meet their individual needs.

Additional qualitative research is needed to better understand the experiences of librarian-researchers, since a quantitative approach is not able to capture the complexity of individual situations and environments. In particular, our findings point to the need to investigate the impact of institutional culture and climate, the value placed on and the respect held for research within the profession, and ambiguities about the definition and role of research in academic librarianship. Overall, we find that many academic librarians are highly motivated to conduct research, yet the factors leading to their success are complex and varied.

Data availability: Hoffmann, Kristin, Selinda Adelle Berg, Kristine R. Brancolini, and Marie R. Kennedy. "Factors Related to Research Productivity for Academic Librarians - Survey Instrument and Data." Scholars Portal Dataverse, V1, 2022. https://doi.org/10.5683/SP3/U5JAW8

---

[1] Jane E. Klobas and Laurel A. Clyde, "Beliefs, Attitudes, and Perceptions about Research and Practice in a Professional Field," Library and Information Science Research 32 (2010): 237-45; Denise Koufogiannakis and Ellen Crumley, "Research in Librarianship: Issues to Consider," Library Hi Tech 24 (2006): 324-40; Ronald R. Powell, Lynda M. Baker, and Joseph J. Mika, "Library and Information Science Practitioners and Research," Library and Information Science Research 24 (2002): 49-72.

[2] Kristin Hoffmann, Selinda Adelle Berg, and Denise Koufogiannakis, "Examining Success: Identifying Factors that Contribute to Research Productivity across Librarianship and Other Disciplines," Library and Information Research 38 (2014): 13-28; Kristin Hoffmann, Selinda Berg, and Denise Koufogiannakis, "Understanding Factors that Encourage Research Productivity in Academic Librarians," Evidence Based Library and Information Practice 12 (2017): 102-28; Catherine Sassen and Diane Wahl, "Fostering Research and Publication in Academic Libraries," College & Research Libraries, 75 (2014): 458-91.

[3] For example: Janet Clapton, "Library and Information Science Practitioners Writing for Publication: Motivations, Barriers, and Supports," Library and Information Research 34 (2010): 7-21; Sarah McNicol, "Practitioner Research in Libraries: A Cross-Sectoral Comparison," Library and Information Research 28 (2004): 34-41.

[4] Shelley Arlen and Nedria Santizo, "Administrative Support for Research: A Survey of Library Faculty," Library Administration & Management 4 (1990): 209-12; Camielle Crampsie, Tina Neville, and Deborah Henry, "Academic Librarian Publishing Productivity: An Analysis of Skills and Behaviors Leading to Success," College & Research Libraries 81 (2020): 248-71; Amy J. Vilz and Molly Dahl Poremski, "Perceptions of Support Systems for Tenure-Track Librarians," College & Undergraduate Libraries 22 (2015): 149-66.

[5] William H. Walters, "Faculty Status of Librarians at U.S. Research Universities," The Journal of Academic Librarianship 42 (2016), 161-71; Crampsie, Neville, and Henry, "Publishing Productivity," 248-71.

[6] Sassen and Wahl, "Fostering Research," 469.

[7] Rachel A. Fleming-May and Kimberly Douglass, "Framing Librarianship in the Academy: An Analysis Using Bolman and Deal's Model of Organizations," College & Research Libraries 75 (2014): 385-415; Walters, "Faculty Status of Librarians," 161-71.

[8] Deborah B. Henry and Tina M. Neville, "Research, Publication, and Service Patterns of Florida Academic Librarians," The Journal of Academic Librarianship 30 (2004): 435-51; William H. Walters, "The Faculty Subculture, the Librarian Subculture, and Librarians' Scholarly Productivity," portal: Libraries and the Academy 16 (2016): 817-43.

[9] Powell, Baker, and Mika, "LIS Practitioners and Research," 49.

[10] Sassen and Wahl, "Fostering Research," 467.

[11] Walters, "Faculty Subculture," 832.

[12] Quinn Galbraith et al., "Who Publishes in Top-Tier Library Science Journals? An Analysis by Faculty Status and Tenure," College & Research Libraries 75 (2014): 724-35.

[13] Sassen and Wahl, "Fostering Research"; Elizabeth M. Smigielski, Melissa A. Laning, and Caroline M. Daniels, "Funding, Time, and Mentoring: A Study of Research and Publication Support Practices of ARL Member Libraries," Journal of Library Administration 54 (2014): 261-76.

[14] Laura Cameron, Stephanie Pierce, and Julia Conroy, "Occupational Stress Measures of Tenure-Track Librarians," Journal of Librarianship and Information Science 53 (2021): 551-558.

[15] Erin Ackerman, Jennifer Hunter, and Zara T. Wilkinson, "The Availability and Effectiveness of Research Supports for Early Career Academic Librarians," The Journal of Academic Librarianship 44 (2018): 553-68; Amy J. Vilz and Molly Dahl Poremski, "Perceptions of Support Systems for Tenure-Track Librarians," College & Undergraduate Libraries 22 (2015): 149-66; Ione T. Damasco and Dracine Hodges, "Tenure and Promotion Experiences of Academic Librarians of Color," College & Research Libraries 73 (2012): 279-301.

[16] Christopher V. Hollister, "An Exploratory Study of Post-Tenure Research Productivity among Academic Librarians," The Journal of Academic Librarianship 42 (2016): 368-81.

[17] Juliann Couture, Jennie Gerke, and Jennifer Knievel, "Getting into the Club: Existence and Availability of Mentoring for Tenured Librarians in Academic Libraries," College & Research Libraries 81 (2020): 676-700.

[18] Lili Luo, "Fusing Research into Practice: The Role of Research Methods Education," Library and Information Science Research 33 (2011): 191-201; Vilz and Poremski, "Perceptions of Support Systems".

[19] Lili Luo, "Diversified Research Methods Education in LIS: Thinking Outside the Box," Journal of Education for Library and Information Science 58 (2017): 49-63.

[20] Powell, Baker, and Mika, "LIS Practitioners and Research," 70; Marie R. Kennedy and Kristine R. Brancolini, "Academic Librarian Research: An Update to a Survey of Attitudes, Involvement, and Perceived Capabilities," College & Research Libraries 79 (2018): 834.

[21] Marie R. Kennedy and Kristine R. Brancolini, "Academic Librarian Research: A Survey of Attitudes, Involvement, and Perceived Capabilities," College & Research Libraries 73 (2012): 431-48; Kennedy and Brancolini, "Academic Librarian Research: An Update"; Susan Lessick et al., "Research Engagement of Health Science Librarians: A Survey of Research-Related Activities and Attitudes," Journal of the Medical Library Association 104 (2016): 166-73.

[22] Hollister, "An Exploratory Study," 371.

[23] Sassen and Wahl, "Fostering Research," 468.

[24] Ackerman, Hunter, and Wilkinson, "Availability of Supports," 553-68; Couture, Gerke, and Knievel, "Getting into the Club," 676-700.

[25] Catherine Sassen and Sian Brannon, "Collaborating on Scholarship: Best Practices for Team Research Projects," College & Undergraduate Libraries (2021): 1-13.

[26] Deborah D. Blecic et al., "Publication Patterns of US Academic Librarians and Libraries from 2003 to 2012," College & Research Libraries 78 (2017): 442-58.

[27] Yu-Wei Chang, "Academic Impact of Articles by Practitioners in the Field of Library and Information Science," College & Research Libraries 82 (2021): 59-74.

[28] Cynthia Tysick and Nancy Babb, "Perspectives on... Writing Support for Junior Faculty Librarians: A Case Study," The Journal of Academic Librarianship 32 (2006): 99.

[29] John W. Bullion and Stewart M. Brower, "Enhancing the Research and Publication Efforts of Health Sciences Librarians via an Academic Writing Retreat," Journal of the Medical Library Association 105 (2017): 394-9.

[30] LeEtta Schmidt et al., "Increasing Scholarly Productivity: Developing an In-House Library Support Network," The Journal of Academic Librarianship 47 (2021): 102385; Doreen Sullivan et al., "Getting Published: Group Support for Academic Librarians," Library Management 3 (2013): 690-704.

[31] Crampsie, Neville, and Henry, "Publishing Productivity," 248-71; Joseph Fennewald, "Research Productivity among Librarians: Factors Leading to Publications at Penn State," College & Research Libraries 69 (2008): 104-16; Hoffmann, Berg, and Koufogiannakis, "Understanding Factors"; Sassen and Wahl, "Fostering Research".

[32] Hoffmann, Berg, and Koufogiannakis, "Understanding Factors".

[33] Hoffmann, Berg, and Koufogiannakis, "Examining Success".

[34] Hoffmann, Berg, and Koufogiannakis, "Understanding Factors".

[35] Kennedy and Brancolini, "Academic Librarian Research"; Kennedy and Brancolini, "Academic Librarian Research: An Update"

[36] Hoffmann, Berg, and Koufogiannakis, "Examining Success".

[37] Hoffmann, Berg, and Koufogiannakis, "Understanding Factors".

[38] Kennedy and Brancolini, "Academic Librarian Research: An Update".

[39] Selinda Adelle Berg et al., "'I Mean, Pandemic': How COVID-19 Has Disrupted Librarians' Research," College & Research Libraries News 82 (2021): 272-3.

[40] Berg et al, "I Mean, Pandemic".

[41] James Cheng and Starr Hoffman, "Librarians and Administrators on Academic Library Impact Research: Characteristics and Perspectives," College & Research Libraries 81 (2020): 538-69; Kristin Hoffmann and Selinda Berg, "Survey Research: Useful, Valuable Findings Require Hard Work," in *Reflections on Practitioner Research: A Guide for Information Professionals* (Chicago: ACRL, 2020), 59-70.