Citation Analysis to Assist Selection in Kinesiology

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This article presents a citation analysis of articles published in 2011 from 11 kinesiology journals. The results of the citation analysis of 11 kinesiology journals are compared to a citation analysis of articles published in 2011 by faculty in the School of Kinesiology, University of Michigan. Comparing the four areas of kinesiology, Movement Science, Athletic Training, Sports Management, and Physical Education, the results show that articles published in Movement Science and Athletic Training cited a higher percentage of journal articles than articles published in Sports Management and Physical Education. While some of the materials cited went as far back as 1874, the mean age ranged from 1996 to 2004. Human Kinetics was the most cited publisher and the American Journal of Sports Medicine was the most cited journal. The University of Michigan Library owns 75% of the materials cited in the publications cited by School of Kinesiology faculty. Faculty in the School of Kinesiology cited many textbooks, a format not actively collected by the library before this analysis.

KEYWORDS collection development, citation analysis, core journals, journal impact

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A citation analysis study is one useful way to gather data about the information needs of a particular subject area. We conducted such a study of the articles published in 2011 in eleven major journals used in kinesiology as well as the faculty publications at the University of Michigan’s School of Kinesiology. The faculty publications were all the journal articles that the Kinesiology faculty wrote in 2011. The University of Michigan is a public doctoral/research university with over 40,000 students. We chose to look at the School of Kinesiology because it is relatively new as a discrete area of study and because it is so interdisciplinary. The first physical education classes at the University of Michigan were offered in 1894. By 1911 such classes were a four year requirement. In 1921 the University Regents created the Department of Hygiene and Public Health, including Physical Education and Physical Education was placed within the School of Education. By 1931 there was a Master’s program in Physical Education. The physical education requirement for all students was abolished in 1970. In 1977 the Department of Physical Education created a Center for Physical Fitness and Sports Research and also developed a PhD program focused on exercise science. In 1984 the Division of Physical Education became an independent entity separate from the School of Education. A short lived leisure studies program was phased out and a new degree in Sports Management and Communication was created. Also the Movement Science area was renamed the Department of Kinesiology. In 1990 all the separate degrees and programs became the Division of Kinesiology. The Athletic Training degree was added in 1998. In 2008 the Division became the School of Kinesiology. The School of Kinesiology now includes four programs: Movement Science, Sports Management, Athletic Training and Physical Education. Physical Education is currently evolving into a new program—Health & Fitness. The Health & Fitness program includes a Health & Fitness Leadership track and a Physical Education track. The program is new as of the fall of 2013. The School of Kinesiology enrolls over 850 undergraduate and graduate students. There are 31 tenured faculty members as well as 25 lecturers, research scientists, and adjunct faculty. It is only since 1977 that the field has had a program at the University of Michigan covering anything beyond physical education and it is only since the 1990s that all four programs have been brought together into one entity.

Kinesiology is an interdisciplinary field. It covers areas such as health sciences, bioengineering, public health, sociology, psychology, business, economics, gender studies, and education.

While there have been studies of the information sources used in the various branches of kinesiology, including Delwiche and Hall’s citation analysis of athletic training journals, and Shilbury’s two citation analysis studies of literature in sports management, little to nothing has looked
specifically at kinesiology’s information sources from a collection development perspective. We wanted answers to questions that would help a kinesiology subject specialist who was starting or developing a collection. Which were the most common formats used? How old were the sources? Which publishers were cited most often? Which journals and books were cited most often? What differences were there between items cited in the kinesiology journals and items cited in the faculty publications? What differences were there in citation patterns among the four areas of study in kinesiology? Finally, we wanted to know what percentage of the cited books and journals we owned.

Obviously such a study would benefit those doing collection development for kinesiology at the University of Michigan but the results would also benefit other kinesiology subject specialists since there is very little literature on the subject. Until now we have been developing our collection here based on information gathered from the faculty at the School of Kinesiology. Our study would further clarify and add to that information. It would also help us to allocate kinesiology collection development funds most effectively. Interdisciplinary areas such as kinesiology often have to rely on subject specialists in a variety of other subject areas to purchase the information sources used in the field. It would be extremely useful to have concrete data about the use of those sources when coming to another subject specialist with hat in hand. If the patterns we found were similar in the articles cited in the kinesiology journals as well as in the faculty publications, then that would be strong evidence these patterns would apply to other academic institutions as well.

LITERATURE REVIEW

In his article “Practical Applications for Do-It-Yourself Citation Analysis” Steve Black describes the need for citation analysis over relying on impact factors. Black writes, “Published impact factors provide useful information, but the data from Scopus and Web of Knowledge reflect citations to journals from all disciplines. Custom analysis is needed to determine the highest impact journals within a specific sub-discipline or interdisciplinary area of study.” He continues to explain that impact factors provide “objective, quantified information” but observes that information is often flawed. Citation analysis can be time consuming, but has many advantages, including, “target[ing] a precise area” such as an “academic major or minor,” “yield[ing] data not otherwise available,” and serving as “an objective measure to balance out subjective judgments.” There are “weaknesses and cautions” to be taken into consideration as well. Black cautions, “a really robust ranking requires \( n > 20,000 \), and even that is not definitive . . . a final perfect list is not obtainable . . . what is cited is a moving target.” Additionally, citation analysis is “time consuming” and “what is cited may not be readily available.”
Several citation analysis projects in sub-disciplines of kinesiology have already been undertaken. David Shilbury’s article “A Bibliometric Study of Citations to Sports Management and Marketing Journals” explores “the influence of seven sports management and marketing journals on sport-related research published in 20 top tier generic management and marketing journals.” Shilbury investigates whether or not scholars publishing articles related to sports management are influenced by the literature in sports management journals. Among his findings, Shilbury discovered, “sports management scholars are more likely to cite work from journals within the field than scholars outside the field.”

Shilbury’s other article related to sports management, “A Bibliometric Analysis of Four Sport Management Journals,” investigated citations to four major sports management journals, the Journal of Sport Management, Sport Marketing Quarterly, Sport Management Review, and the European Sport Management Quarterly. Shilbury “was able to identify and quantify citations to all non-sport management journals cited in the four journals under investigation.” Most notably, Shilbury’s extensive citation analysis investigates in-field and out-of-field citations. He found most of the articles cited in the four major sports management journals he investigated were “out-of-field citations.”

Delwiche and Hall’s article “Mapping the Literature of Athletic Training” uses citation analysis to present the major journals in the field of athletic training, the fringe journals, and indicates where these journals are indexed. Using citations from the athletic training journals the Journal of Athletic Training, Athletic Training Today, and the Journal of Sport Rehabilitation, authors collected the number of citations from journals outside of athletic training and ranked those to show the most used journals outside of the discipline by athletic trainers. They found the top journals in athletic training were the American Journal of Sports Medicine, the Journal of Athletic Training, the Journal of Orthopedic and Physical Therapy, Medicine and Science in Sports and Exercise, Physical Therapy, and the Journal of Sport Rehabilitation.

Citation analysis has been used to determine if a library’s collection is meeting the research needs of its publishing faculty by studying faculty publications. Kellsey and Knievel set out to evaluate whether faculty in the humanities were citing monographs from the library’s collection in an effort to strategically plan for the library’s selection, weeding, approval plan, interlibrary loan, and storage decisions. They investigated the age of materials used. They found most of the books they owned that were cited were purchased on the library’s approval plan. Additionally, they looked at whether or not works outside a field were cited. In a citation analysis project undertaken at Texas A&M Libraries, Kimball et al analyzed publications by faculty from 2008–9 from Texas A&M’s Atmospheric Sciences Department. By analyzing the citations from the publications, the authors aimed to determine
“1) how well the TAMU Libraries collection meets the needs of faculty researchers in the TAMU Atmospheric Sciences Department by asking what sources were cited by these authors, and does TAMU Libraries own them in electronic or print format; 2) what types of publications are cited by the authors; and 3) the ages of the cited publications.” The authors of the study found the 80/20 rule to be fulfilled by just 8% of the journals; 8% of the journals accounted for 80% of the citations.

METHODOLOGY

We distinguished significant journals within the discipline of kinesiology by looking at the Journal Citation Reports (JCR) rankings, identifying the publications of major kinesiology associations, searching the relevant literature to identify what journals other studies had covered, and soliciting suggestions from the School of Kinesiology faculty. We chose eleven journals for this study because these titles figured prominently in all the methods listed above: the *American Journal of Sports Medicine*, the *European Sport Management Quarterly*, *Exercise and Sport Science Reviews*, *Human Movement Science*, the *Journal of Athletic Training*, the *Journal of Physical Education, Recreation, and Dance*, the *Journal of Sport Management*, the *Journal of Teaching in Physical Education*, *Medicine and Science in Sports and Exercise*, *Quest*, and *Sport Management Review*. When there was any question about which titles to include we leaned toward the titles suggested by the School of Kinesiology faculty.

These journals were divided into four areas of kinesiology (sports management, physical education, movement science, and athletic training) according to their content. While we identified three journals for the areas of sports management, physical education, and movement science, we only included two journals from athletic training because we were unable to identify a third major journal that focused on this area rather than more general aspects of medicine (see Table 1).

We did not initially notice the large difference in the number of citations in the eleven journals. This only became apparent later when we input the data from the journals. It was then we noticed that two journals, *Medicine and Science in Sports and Exercise* and *American Journal of Sports Medicine*, had a much larger number of citations than the other journals (see Table 1). We hoped to take this into account in our analysis but ran out of time to do so. This difference in the number of citations definitely skews our results and the reader should take this into account when reading about our results. Furthermore, some articles had more citations than other articles and this was another difference we did not take into account when analyzing our results.
TABLE 1 Journals Divided in the Four Areas of Kinesiology

| Sports management | Physical education | Movement science | Athletic training |
|-------------------|--------------------|------------------|-------------------|
| • Journal of Sport Management (2,912 citations) | • Journal of Teaching in Physical Education (941 citations) | • Medicine and Science in Sports and Exercise (11,692 citations) | • Journal of Athletic Training (3,171 citations) |
| • Sport Management Review (2,343 citations) | • Quest (1,201 citations) | • Exercise and Sport Sciences Reviews (265 citations) | • American Journal of Sports Medicine (11,207 citations) |
| • European Sport Management Quarterly (1,470 citations) | • Journal of Physical Education, Recreation and Dance (1,246 citations) | • Human Movement Science (3,934 citations) | |

Work on this project began the fall of 2012. As 2011 was the most recent year with complete data, we chose to use this year as our sample. One year provided enough citations for a robust analysis.

To collect citations from these journals, we used Scopus to import the citations found in article bibliographies. For journals found in Scopus, each article was viewed, references expanded and all selected, then imported to Refworks and put in the folder for the journal in which the citing article was published. Scopus includes most of our selected journals. The Journal of Physical Education, Recreation, and Dance and Quest are not indexed in Scopus, so citations for these articles were input individually. When available, journal citations were imported from other databases such as Web of Science and Ovid, or citations were copied and pasted from citing articles to Refworks’ import forms. Spot checking revealed that some articles indexed in Scopus did not include citations or were missing articles from the year 2011. References from missing articles were also imported by hand.

While choosing the database to use to import bibliographic citations, we found that both Scopus and Web of Science had problems importing citations to Refworks. For example, citations from Scopus were all classified as journal articles despite their actual format. This glitch required us to examine each citation, decide its reference type, and then manually reclassify and reformat the citation to include any missing information such as volume numbers, publication dates that included month or day, and book editors. This process was further complicated by the inconsistency and poor quality of the citations included in article bibliographies, which cited incorrect information and did not indicate the format of references.

Ultimately, we chose Scopus because Web of Science did not allow direct import of all citations in the bibliography.

Once citation imports to Refworks were completed, each journal’s folder was exported as a text delimited file and imported to Microsoft Excel.
In spreadsheet format, citations were further cleaned to improve the accuracy of data and future analysis. Cleaning involved many details such as removing unused or irrelevant fields, replacing the word “and” with an ampersand, removing “The” as the first word of journal and book titles, checking that each field contained the type of information indicated, adding years of publication when possible, and reformatting journal and book titles for consistency. To check whether journal titles were consistent, results in the “Periodical” column were filtered and checked against each other until each journal appeared only once.

In distinguishing between monographs and journals, we considered whether we had access to the resource through a journal package or a different source. Materials included in journal packages were classified as journals, while others were classified as monographs. In distinguishing between tests and books, we considered whether the cited information cited the test itself or the test manual. We added the classification “test” which is not included in Refworks. We assigned citations to this category if the citation was for the actual test itself, and the classification “book” if the citation was for the test’s manual. To distinguish between conference proceedings and journal articles, we had to rely on the title indicated in the citation. If the resource was mentioned as a conference proceeding in the title, we classified the citation as a conference proceeding. Abstracts or summaries of conference proceedings contained in journals were classified as journal articles.

Once collection and clean-up for journal article citations neared completion we began work on data collection for the citations contained in the 2011 journal publications of University of Michigan’s 25 kinesiology faculty. We used faculty’s curricula vitae (CVs) and the author search in Scopus to identify publications. If a faculty member did not publish any journal articles in 2011 they were not included in the analysis. To remain consistent in our analysis, we included only the references from faculty articles and did not include citations included in book chapters published by our faculty. In some of the kinesiology subfields, such as Physical Education, there were not many journal article citations to analyze since only one faculty member had published in that year. On the other hand, faculty in other subfields, such as Movement Science, published more articles and included a larger number of citations in their articles. Readers should keep this in mind when reading the results of the research.

We had separate folders within Refworks for each faculty member and collected citation data from Scopus in the same manner as described for journal articles. As before, for any articles not in Scopus we entered the citations in the reference list by hand. Once all collection was complete, we exported the folders to Excel, and cleaned the data in the same manner as described above for journal citations. We then combined all the faculty citations in one spreadsheet and added a new column that indicated which area of kinesiology cited the material.
In order to determine whether we owned the cited books, citations classified as “book, section,” “book, whole,” or “monograph” were copied into a Google doc spreadsheet. The Library’s Graduate Student Reference assistants checked book titles with the University of Michigan Libraries’ catalog, Mirlyn, and noted whether we owned the item. For items not found in Mirlyn we used WorldCat to check (1) that the title existed as cited and (2) whether the item was held in The University of Michigan Kresge Business or Law Library, which have their own catalog systems.

We counted items as in our collection if any of the libraries at the University of Michigan held the cited item. For items with multiple editions, we considered the item in our collection if we held any edition of the item. We also counted the item if an electronic version was available to the library. The list of books cited by faculty underwent the same process of checking Mirlyn for cited materials.

Given the very large number of cited journal articles we were unable to assess whether we had access to singular articles. Instead, we checked whether we had the most cited journals, noting whether the subscription was current and whether we had access to back issues.

RESULTS AND DISCUSSION

In total, we collected 40,380 citations from the kinesiology literature and 3,808 citations from kinesiology faculty. The journals *American Journal of Sports Medicine* and *Medicine and Science in Sports and Exercise* provided nearly half of the citations for our study of the kinesiology literature. As such, the disciplines Athletic Training and Movement Science contained significantly more citations than Physical Education and Sports Management. Faculty in Movement Science also cited significantly more than faculty in other disciplines (see Table 2). This imbalance limits our findings, particularly in the kinesiology literature.

**Does the Library Own the Item?**

Based on our analysis, in which we consider an item owned if our collection includes any edition of the item, the University of Michigan Library

| Area                 | Citations in literature | Citations from faculty |
|----------------------|-------------------------|------------------------|
| Sports management    | 6,725                   | 646                    |
| Athletic training    | 14,378                  | 562                    |
| Physical education   | 3,388                   | 80                     |
| Movement science     | 15,889                  | 2,520                  |
| Total                | 40,380                  | 3,808                  |

TABLE 2 Number of Citations Collected in Each Area of Kinesiology
owns many of the books and monographs cited in the kinesiology literature. We own 75% of the books and monographs cited in the kinesiology journals studied and 77% of those cited by our faculty (see Table 3). However, we do have access to all but one of the top cited journals in our study (Tables 7–12). For all but one of these journals we hold current subscriptions. As a major research university, the University of Michigan Library would expect to own a large proportion of the materials used in Kinesiology research. To assess whether our collection is sufficiently supportive of our kinesiology department, we familiarized ourselves with those titles not in our collection and considered whether those were items we should collect.

Of the items we do not have in our collection, the vast majority were only cited once. Further, many are materials that would not support our faculty research. For example, titles such as Om penger, ledelse og identitet i norsk fotball, a Norwegian book about money management and identity in Norwegian football (soccer) was cited in a sports management journal. As none of our faculty study this combination of topics, such a book is not essential for our collection.

We did identify areas in which we could improve the collection. For example, the library generally does not collect textbooks unless specifically requested by faculty. However, it turns out that textbooks are cited quite regularly in both the kinesiology journal citations and in the faculty journal article citations. Perhaps this is because kinesiology is still a fairly young distinct field and, therefore, the body of literature in kinesiology outside of textbooks is not as deep as it is in some other fields. Yet physical education has been a degree-granting program for a substantial period of time and still there are many textbooks cited in this field. Clearly the question of why textbooks are frequently cited in kinesiology is an interesting one and would merit future research. Whatever the reason, we should consider increasing the number of textbooks in our kinesiology collection. We also identified several other book titles we do not own that are cited fairly frequently, which we plan to purchase for our collection.

### TABLE 3 Cited Books Owned by the University of Michigan Library System

| Cited in                          | Total number cited | Total owned | Percentage owned | Total not owned | Percentage not owned |
|-----------------------------------|--------------------|-------------|------------------|-----------------|----------------------|
| Kinesiology journal articles      | 3,371              | 2,530       | 75               | 841             | 25                   |
| Faculty publications total        | 329                | 252         | 77               | 77              | 23                   |
| Faculty publications by discipline: |                    |             |                  |                 |                      |
| Athletic training                 | —                  | —           | —                | —               | —                    |
| Movement science                  | 124                | 98          | 79               | 26              | 21                   |
| Physical education                | 31                 | 21          | 68               | 10              | 32                   |
| Sports management                 | 150                | 116         | 77               | 34              | 23                   |
It would be wise for kinesiology subject selectors to be aware of their faculty’s specific research interests since this can strongly impact what sources they consult. In one case this meant that a faculty member cited many publications that dealt with preservation issues in some very specific locations such as “Historic preservation, downtown revitalization & sustainability,” which was about historic preservation in Vancouver, Washington and “Economic Impacts on Historic Preservation in Missouri.” These are not publications that would normally catch the eye of a subject selector at the University of Michigan.

This analysis also highlighted some of the most cited books in the field. By far, the most cited book is Statistical Power Analysis for the Behavioral Sciences. We feel this book could be a staple for kinesiology researchers. Other books of note include ACSM’s Guidelines for Exercise Testing and Prescription, Moving into the Future: National Standards for Physical Education, and Biomechanics and Motor Control of Human Movement.

Age

The dates on the materials cited in the journals ranged from 1874 to 2011 (see Tables 4 and 5). The majority of the citations in the journals were from the late 1990s to the early 2000s. The mean citations for all disciplines and journals ranged from 1997–2001; however, after calculating a 95% confidence interval this range expands. We can say little about the average age for Medicine and Science in Sports and Exercise citations, with a range of 2001–2011, but for most journals the average age falls within one or two years. There was little variance between the disciplines and the mean age of the material cited. Citations from books included many textbooks. Authors often didn’t cite the latest edition of the textbook. For instance, Biomechanics & Motor Control of Human Movement was cited three times in the faculty journal articles. Each time the second edition from 1990 was cited even though the fourth edition was published in 2009, well before the faculty journal articles were published. The University of Michigan Library owns the older as well as the newer editions of the title. Perhaps this is the case of a faculty member who owns the older edition of the textbook and who cites the older edition that is sitting on his/her bookshelf rather than consulting a later version of the title.

Format

Overall, citations in the kinesiology literature consist mainly of journal articles (86%), with a significant number of books (8.38%), and webpages (2.11%) (see Table 6). “Other” miscellaneous materials include newspaper and magazine articles, conference proceedings, court cases, and reports.
TABLE 4 Average Age of Cited Journal Articles in Kinesiology Literature Citations

| Source                                      | Items cited | Mean age | Range       | Std. deviation | Lower | Upper |
|---------------------------------------------|-------------|----------|-------------|----------------|-------|-------|
| American Journal of Sports Medicine         | 10,873      | 2001     | 1874–2011   | 10.091         | 2001  | 2001  |
| Journal of Athletic Training                | 2,800       | 2000     | 1927–2011   | 9.301          | 2000  | 2000  |
| Medicine and Science in Sports and Exercise | 11,017      | 2001     | 1910–2011   | 9.473          | 2001  | 2011  |
| Exercise and Sport Science Reviews          | 253         | 2004     | 1961–2011   | 7.741          | 2003  | 2005  |
| Human Movement Science                      | 3,488       | 1999     | 1899–2011   | 11.056         | 1999  | 1999  |
| Journal of Sport Management                 | 1,862       | 1999     | 1927–2011   | 9.745          | 1998  | 1999  |
| Sport Management Review                     | 1,572       | 1999     | 1928–2011   | 9.265          | 1999  | 2000  |
| European Sport Management Quarterly         | 890         | 2000     | 1943–2011   | 10.009         | 1999  | 2001  |
| Journal of Teaching in Physical Education   | 623         | 2000     | 1951–2011   | 8.593          | 1999  | 2001  |
| Quest                                       | 741         | 1996     | 1897–2010   | 21.204         | 1995  | 1998  |
| Journal of Physical Education, Recreation, and Dance | 673      | 2001     | 1959–2011   | 9.0703         | 2000  | 2001  |

While the athletic training and movement science disciplines cite journal articles almost exclusively, 95% and 93% respectively, sports management and physical education cited fewer journal articles (64% and 60%) and more books and book chapters (20% and 25%). These two disciplines are
| Format                  | Total all | Percent all | Total sports management | Percent sports management | Total athletic training | Percent athletic training | Total physical education | Percent physical education | Total movement science | Percent movement science |
|-------------------------|-----------|-------------|-------------------------|---------------------------|------------------------|--------------------------|--------------------------|---------------------------|-------------------------|--------------------------|
| Book                    | 3,383     | 8.38        | 1,366                   | 20.31                     | 440                    | 3.06                     | 851                      | 25.12                     | 726                     | 4.57                     |
| Journal article         | 3,4900    | 86.43       | 4,340                   | 64.54                     | 13,675                 | 95.11                    | 2,049                    | 60.48                     | 14,836                  | 93.37                    |
| Webpage                 | 854       | 2.11        | 378                     | 5.62                      | 149                    | 1.04                     | 220                      | 6.49                      | 107                     | 0.67                     |
| Court case              | 104       | 0.26        | 82                      | 1.22                      | 0                      | 0.00                     | 22                       | 0.65                      | 0                       | 0.00                     |
| Computer                | 8         | 0.02        | 3                       | 0.04                      | 1                      | 0.01                     | 3                        | 0.09                      | 1                       | 0.01                     |
| Conference proceedings  | 223       | 0.55        | 56                      | 0.83                      | 26                     | 0.18                     | 55                       | 1.62                      | 86                      | 0.54                     |
| Dissertation/thesis     | 81        | 0.20        | 41                      | 0.61                      | 18                     | 0.13                     | 9                        | 0.27                      | 13                      | 0.08                     |
| Generic                 | 333       | 0.82        | 210                     | 3.12                      | 29                     | 0.20                     | 66                       | 1.95                      | 28                      | 0.18                     |
| Grant                   | 4         | 0.01        | 2                       | 0.03                      | 0                      | 0.00                     | 0                        | 0.00                      | 2                       | 0.01                     |
| Law/statute             | 53        | 0.08        | 21                      | 0.31                      | 0                      | 0.00                     | 12                       | 0.35                      | 0                       | 0.00                     |
| Magazine article        | 128       | 0.32        | 87                      | 1.29                      | 19                     | 0.13                     | 21                       | 0.62                      | 1                       | 0.01                     |
| Monograph               | 6         | 0.01        | 1                       | 0.01                      | 0                      | 0.00                     | 3                        | 0.09                      | 2                       | 0.01                     |
| Motion picture          | 1         | 0.00        | 0                       | 0.00                      | 0                      | 0.00                     | 1                        | 0.03                      | 0                       | 0.00                     |
| Newspaper article       | 143       | 0.35        | 100                     | 1.49                      | 12                     | 0.08                     | 31                       | 0.91                      | 0                       | 0.00                     |
| Personal                | 1         | 0.00        | 0                       | 0.00                      | 0                      | 0.00                     | 1                        | 0.03                      | 0                       | 0.00                     |
| Patent                  | 2         | 0.00        | 0                       | 0.00                      | 1                      | 0.01                     | 0                        | 0.00                      | 1                       | 0.01                     |
| Report                  | 126       | 0.31        | 29                      | 0.43                      | 4                      | 0.03                     | 34                       | 1.00                      | 59                      | 0.37                     |
| Software                | 1         | 0.00        | 0                       | 0.00                      | 0                      | 0.00                     | 0                        | 0.00                      | 1                       | 0.01                     |
| Standard                | 1         | 0.00        | 0                       | 0.00                      | 1                      | 0.01                     | 0                        | 0.00                      | 0                       | 0.00                     |
| Test                    | 26        | 0.06        | 1                       | 0.01                      | 3                      | 0.02                     | 1                        | 0.03                      | 21                      | 0.13                     |
| Unpublished material     | 19        | 0.05        | 8                       | 0.12                      | 0                      | 0.00                     | 6                        | 0.18                      | 5                       | 0.03                     |
| Video/DVD               | 3         | 0.01        | 0                       | 0.00                      | 0                      | 0.00                     | 3                        | 0.09                      | 0                       | 0.00                     |
| Total                   | 40,380    | 100.00      | 6,725                   | 100.00                    | 14,378                 | 100.00                   | 3,388                    | 100.00                    | 15,889                  | 100.00                   |
| Total other*            | 1,243     | 3.08        | 641                     | 9.53                      | 114                    | 0.79                     | 268                      | 7.91                      | 220                     | 1.38                     |

*Other includes all citations except books, journal articles, and Web pages.
also more likely to cite other resources. Sports management and physical education citations consist of 15% and 14% “other” materials.

Our findings for the citations of University of Michigan School of Kinesiology faculty demonstrate a similar pattern. Faculty in Athletic Training and Movement Science were more likely to cite “other” materials than suggested by our analysis of journal citations.

The “other” category also includes “generic” citations—those from which we were unable to identify the resource being cited. Generally these citations did not contain enough information to locate the item or were electronic resources no longer available through the cited Uniform Resource Locator (URL). In addition to citations for items we could not assign to specific formats, we observed many incorrect citations, such as journals that do not appear to exist. The number of resources we could not identify from citations is troubling, especially considering that citations exist so that readers can find items that contain the information authors consult.

While the solutions for incorrect citations include opportunities for librarians to provide focused instruction in proper citation formatting, and for authors to recheck citations for accuracy, it is recognized that the ephemeral nature of the Internet makes citing Web resources difficult. The stability of the location of Web sources has already been discussed in other studies. However, especially considering the trend of citing Web resources, it is important that authors find methods of citing such resources that allow future readers to find the cited information. For instance, when citing constantly changing resources such as blogs or online news sources, authors may consider including URLs to the material stored in Web archive projects such as the Wayback Machine or WebCite. Authors citing their own Web-based content should store these items in stable locations such as digital repositories. For instance, faculty and students at the University of Michigan are encouraged to include their work in DeepBlue, the institution’s digital repository. Authors can choose between several privacy options, including open to the public so that anyone can access the material.

HOW BROAD IS THE FIELD

To get some conception of the breadth of kinesiology as an interdisciplinary field, we studied the subject areas assigned to the top journals cited in the kinesiology journal articles as well as the faculty journal articles. We used the subject headings assigned by Ulrichsweb Global Serials Directory since these subject headings provide more specificity than those generally found in Library of Congress subject headings for these same journals. Similarly, the Web of Science subject categories also tend to be broader. The majority of the subject headings for the top 54 journals cited in the kinesiology journal articles (see Table 7) are from some field within medical sciences.
Only nine of those journals are outside the medical sciences. Two factors contribute to this finding. Two of the sections of kinesiology that we studied—movement science and athletic training—have a strong medical sciences background so that means two of the four kinesiology sections lean toward the medical sciences. The factor having an even greater impact on the results is that two of the top kinesiology journals contributed close to half of the journal article citations in the study and these two journals are strong in the medical sciences: Medicine and Science in Sports and Exercise and American Journal of Sports Medicine. While there was not time for this in our initial analysis it would be interesting to study our data further to discover how interdisciplinary are the journals cited when this factor is removed or equalized.

The cited medical sciences journals covered many fields in medicine. Please note that within the medical sciences, there were assigned subcategories and, in some cases, a journal had more than one assigned subcategory. Understandably there were a good number (16) with the subcategory Sports Medicine. Twelve were from the Orthopedics and Traumatology subcategory. Five included some aspect of Physiology while three covered Physical Medicine and Rehabilitation.

The top ranked journal that did not cover the medical sciences was the Journal of Sport Management with the subject heading Business and Economics—Management as well as Sports and Games. There were three other journals in the top 54 from the Business and Economics category. One other journal covered management (Sport Management Review) while two others covered Marketing and Purchasing (Sport Marketing Quarterly and the Journal of Marketing). Six other journals were assigned the Sports and Games category. Seven journals were included in the Biology category. Four journals were in the Education category with the most common subheading being Teaching Methods and Curriculum.

Other than the heavy emphasis on medical sciences–related journals, which has already been explained by the large percentage of cited journals coming from two medical sciences journals there were no surprises among the top 54 journals cited in the kinesiology journal articles. The surprise, if there was one, came from noting which subject categories were not included as extensively on the list. Only four journals covered some aspect of Business and Economics and only four covered some aspect of Education. While the Journal of Sport Management was #16 in the ranking, the first two education journals (Research Quarterly for Exercise and Sport and the Journal of Teaching in Physical Education) came in at #34 and #35, respectively. Overall, it appears that the subject categories for the journals most cited in kinesiology literature indicate that kinesiology researchers do not stray far from subjects related to kinesiology when choosing journals that are of interest to them.
When looking at the top journals cited by the University of Michigan School of Kinesiology faculty, broken down into the four sections of kinesiology (Athletic Training, Movement Science, Physical Education, and Sports Management) it seems there are nuances within the four sections that do not appear in the analysis of the top journals cited within the kinesiology journals (see Tables 8–12). For instance, Athletic Training faculty cite journals categorized as Sports Medicine and Orthopedics and Traumatology much more than Movement Science faculty; Movement Science faculty turn more to Psychiatry and Neurology, Physiology, and Endocrinology journals. Some of this probably has to do with the areas these faculty choose to research, which underscores subject selectors must become familiar with these research areas so they will have a more accurate picture of what journals are most used by their faculty. Also these research areas change over time. The recent emphasis on concussions in athletes probably has an impact on how many Psychiatry and Neurology journals are cited by the faculty. It is also clear that kinesiology subject selectors must work closely with subject selectors from the medical fields since many of the top cited journals are from subject categories not necessarily associated with kinesiology such as some of the endocrinology journals—Diabetes, the Journal of Clinical Endocrinology and Metabolism, and Stroke.

While the Movement Science faculty cite psychology journals such as the Journal of Experimental Psychology and Psychology and Aging, it is the Sports Management faculty who cite psychology journals more often as they do journals from other social sciences fields. Seven percent of the sports management citations in the faculty publications are from psychology journals. Sociology journals also get cited regularly. The Physical Education faculty primarily cite education journals and some psychology journals. This seems to indicate that while the faculty from the four sections of kinesiology interact regularly and have offices close to each other, the literature they cite stays, to a certain extent, within the more narrow confines of their individual sections. Athletic Training faculty do not stray much outside the medical sciences. Movement Science faculty tend to cite journals in the medical and science fields. Sports Management faculty cite journals within the social sciences and the Physical Education faculty are most likely to cite education and psychology journals.

MOST CITED JOURNALS

The 34,900 journal article citations included citations for 3,519 journals. The most heavily cited journals (see Table 7) in the kinesiology journals we studied are from the two journals that provided nearly half the citations in the study—the American Journal of Sports Medicine and Medicine and Science in Sports and Exercise. This is not a surprise given that journal self-citations
TABLE 7 Citation Frequency of Journals in Kinesiology Literature (Top 50)

| Rank | Title                                      | Frequency | Percent | Subject area                                                                 |
|------|--------------------------------------------|-----------|---------|------------------------------------------------------------------------------|
| 1    | *American Journal of Sports Medicine*      | 2,612     | 6.5     | Medical Sciences—Sports Medicine                                              |
| 2    | *Medicine & Science in Sports & Exercise*  | 1,612     | 4.0     | Medical Sciences—Sports Medicine                                              |
| 3    | *Arthroscopy*                              | 1,112     | 2.8     | Medical Sciences—Orthopedics and Traumatology; Medical Sciences—Surgery       |
| 4    | *Journal of Applied Physiology*            | 1,037     | 2.6     | Medical Sciences; Bioiology—Physiology                                       |
| 5    | *Journal of Bone & Joint Surgery—Series A* | 948       | 2.3     | Medical Sciences—Orthopedics and Traumatology                                |
| 6    | *Clinical Orthopaedics & Related Research* | 631       | 1.6     | Medical Sciences—Orthopedics and Traumatology                                |
| 7    | *British Journal of Sports Medicine*       | 509       | 1.3     | Medical Sciences—Sports Medicine                                              |
| 8    | *Knee Surgery, Sports Traumatology, Arthroscopy* | 473   | 1.2     | Medical Sciences—Sports Medicine; Medical Sciences—Surgery                    |
| 9    | *Journal of Athletic Training*             | 405       | 1.0     | Medical Sciences—Sports Medicine                                              |
| 10   | *Sports Medicine*                          | 392       | 1.0     | Medical Sciences—Sports Medicine                                              |
| 11   | *Experimental Brain Research*              | 391       | 1.0     | Medical Sciences—Psychiatry and Neurology                                    |
| 12   | *Journal of Biomechanics*                 | 352       | .9      | Biology—Bioengineering; Medical Sciences                                      |
| 13   | *Journal of Sport Management*             | 332       | .8      | Business and Economics —Management; Sports and Games                         |
| 14   | *Journal of Bone & Joint Surgery—Series B* | 321       | .8      | Medical Sciences—Orthopedics and Traumatology                                |
| 15   | *Journal of Physiology*                   | 306       | .8      | Medical Sciences—Psychiatry and Neurology; Medical Sciences—Orthopedics and Traumatology; Biology—Physiology |
| 16   | *European Journal of Applied Physiology*  | 296       | .7      | Medical Sciences; Bioiology—Physiology                                        |
| 18   | *Journal of Orthopaedic Research*         | 284       | .7      | Medical Sciences—Orthopedics and Traumatology                                |
| 18   | *Journal of Shoulder & Elbow Surgery*      | 284       | .7      | Medical Sciences—Surgery                                                     |
| 19   | *Journal of Orthopaedic & Sports Physical Therapy* | 266 | .7      | Medical Sciences—Sports Medicine; Medical Sciences—Physical Medicine and Rehabilitation; Medical Sciences—Orthopedics and Traumatology |
| 20   | *International Journal of Sports Medicine* | 238       | .6      | Medical Sciences—Sports Medicine                                             |

(Continued)
TABLE 7 (Continued)

| Rank | Title                                           | Frequency | Percent | Subject area                                                                 |
|------|-------------------------------------------------|-----------|---------|----------------------------------------------------------------------------|
| 21   | Clinical Biomechanics                            | 218       | .5      | Medical Sciences—Orthopedics and Traumatology; Medical Sciences—Chiropractic, Homeopathy, Osteopathy |
| 22   | Journal of Sports Sciences                       | 202       | .5      | Medical Sciences—Sports Medicine; Sports and Games                           |
| 23   | Scandinavian Journal of Medicine & Science in Sports | 200       | .5      | Medical Sciences—Sports Medicine; Sciences—Comprehensive Works; Sports and Games |
| 24   | Journal of the American Medical Association     | 199       | .5      | Medical Sciences                                                             |
| 25   | Clinical Journal of Sport Medicine               | 190       | .5      | Medical Sciences—Sports Medicine; Orthopedics and Traumatology; Physical Fitness and Hygiene |
| 26   | Circulation                                     | 189       | .5      | Medical Sciences—Cardiovascular Diseases                                      |
| 27   | Journal of Neurophysiology                      | 179       | .4      | Medical Sciences—Psychiatry and Neurology; Biology—Physiology                |
| 28   | Sport Marketing Quarterly                        | 178       | .4      | Business and Economics—Marketing and Purchasing; Sports and Games             |
| 29   | American Journal of Physiology—Endocrinology & Metabolism | 177       | .4      | Medical Sciences—Endocrinology; Biology—Physiology                           |
|      | Top thirty                                      |           | 36.0    |                                                                                   |
| 30   | Research Quarterly for Exercise & Sport          | 171       | .4      | Sports and Games; Education—Teaching Methods and Curriculum; Physical Fitness and Hygiene |
| 31   | Journal of Teaching in Physical Education       | 170       | .4      | Sports and Games; Education—Teaching Methods and Curriculum                   |
| 32   | European Journal of Applied Physiology & Occupational Physiology | 156       | .4      |                                                                                   |
| 33   | Journal of Strength & Conditioning Research     | 154       | .4      | Medical Sciences—Sports Medicine; Physical Fitness and Hygiene                |
| 34   | Archives of Physical Medicine & Rehabilitation  | 149       | .4      | Medical Sciences—Physical Medicine and Rehabilitation                        |
| 36   | Clinics in Sports Medicine                      | 148       | .4      | Medical Sciences—Sports Medicine                                             |
| 36   | Physical Therapy                                | 148       | .4      | Medical Sciences—Physical Medicine and Rehabilitation                        |

(Continued)
can sometimes be a sizable percentage of many major journal citations. This is not to say that any of these journals self-cite so often that they meet the standards that Thomson Reuters sets for suppressing titles that have too many self-citations. Thomson Reuters clearly lays out the guidelines for suppressing a title from Journal Citation Reports. For instance, according to the Cited Journal statistics available in Journal Citation Reports, 18% of the articles published in 2011 in the *American Journal of Sports Medicine* cited another article in the same publication (218 out of 1,211 journals cited). *Medicine and Science in Sports and Exercise* statistics in Journal Citation Reports showed a

### Table 7 (Continued)

| Rank | Title                                           | Frequency | Percent | Subject area                                                                 |
|------|-------------------------------------------------|-----------|---------|------------------------------------------------------------------------------|
| 38   | *Human Movement Science*                        | 144       | .4      | Medical Sciences, Psychology; Physical Fitness and Hygiene                   |
| 38   | *Quest*                                         | 144       | .4      | Medical Sciences—Sports Medicine; Education—Teaching Methods and Curriculum  |
| 40   | *American Journal of Clinical Nutrition*        | 142       | .4      | Medical Sciences; Nutrition and Dietetics                                    |
| 40   | *Foot & Ankle International*                    | 142       | .4      | Medical Sciences—Sports Medicine; Medical Sciences—Orthopedics and Traumatology |
| 41   | *Journal of Physical Education, Recreation & Dance* | 131   | .3      | Education—Teaching Methods and Curriculum; Physical Fitness and Hygiene    |
| 42   | *Sport Management Review*                       | 119       | .3      | Business and Economics—Management; Sports and Games                         |
| 43   | *New England Journal of Medicine*               | 110       | .3      | Medical Sciences                                                             |
| 44   | *Journal of Science & Medicine in Sport*        | 109       | .3      | Medical Sciences—Sports Medicine                                             |
| 45   | *Arthritis & Rheumatism*                       | 104       | .3      | Medical Sciences—Rheumatology                                                |
| 46   | *Journal of Marketing*                          | 100       | .2      | Business and Economics—Marketing and Purchasing                             |
| 47   | *Gait & Posture*                                | 98        | .2      | Medical Sciences; Medical Sciences—Orthopedics and Traumatology             |
| 48   | *Osteoarthritis & Cartilage*                    | 96        | .2      | Medical Sciences—Orthopedics and Traumatology; Medical Sciences—Rheumatology |
| 50   | *Journal of Electromyography & Kinesiology*     | 95        | .2      | Biology—Biophysics                                                           |
| 50   | *Journal of Motor Behavior*                     | 95        | .2      | Psychology; Education                                                        |
|      | Top fifty (including tie for fiftieth)          | 95        | 42.7    |                                                                               |
much lower 8% rate for journal self citations in 2011 (95 out of 1,1600 journals cited). In comparison, the Journal of Athletic Training showed a 7% rate for journal self citations in 2011 (6 out of 83 journals cited) while Journal of Sport Management showed a 16% journal self citation rate but this was only two instances out of a total of 12 journals cited.

Looking specifically at the top kinesiology journals we included in this study, the American Journal of Sports Medicine was the most highly cited. Medicine and Science in Sports and Exercise was the second most highly cited. The Journal of Athletic Training was #12. The Journal of Sport Management was #16. The Journal of Teaching in Physical Education was #35. Human Movement Science was #40. Quest was #41. The Journal of Physical Education, Recreation and Dance was #45. Sport Management Review was #46. European Sport Management Quarterly and Exercise and Sport Sciences Reviews did not make it into the top 50 list.

There were many well known medical sciences journals in the top 50 list including the Journal of Applied Physiology (#7), the Journal of Bone and Joint Surgery Series A (#8) and Series B (#17), Experimental Brain Research (#14), the Journal of Physiology (#17), Circulation (#29) and some more general and well known medical journals such as JAMA (#27) and New England Journal of Medicine (#47). There were also journals focusing on narrow topics such as Arthroscopy, Knee Surgery, Sports Traumatology, and the Journal of Shoulder & Elbow Surgery.

Outside of the medical sciences, the Journal of Sport Management was the most highly ranked (#16) with Sport Marketing Quarterly coming in a distant second at #31. Since almost half of the journal article citations came from two medical sciences journals—the American Journal of Sports Medicine and Medicine and Science in Sports and Exercise, this is not a surprising finding. Also note that athletic training and movement science lean heavily toward the medical sciences. Taking this into account it is again not surprising that education journals such as Research Quarterly for Exercise and Sport (#34) and Journal of Teaching in Physical Education (#35) have lower rankings.

Looking at how these journal rankings compared to those cited in the faculty journal articles, there are some striking differences (see Table 8). Notably, there are not as many journals in the sports medicine category that are cited heavily by the faculty. While the American Journal of Sports Medicine is again the most highly cited in the sports medicine category with Medicine and Science in Sports and Exercise the second most highly cited in this category, the third journal, the Journal of Athletic Training does not appear until #11. After that the next sports medicine journal does not appear until #17—Clinical Neurophysiology. In contrast, the journal rankings in the previous table listed seven sports medicine journals by that point in the rankings.
| Rank | Title                                               | Frequency | Percent | Subject area                                      |
|------|-----------------------------------------------------|-----------|---------|--------------------------------------------------|
| 1    | Experimental Brain Research                        | 102       | 2.7     | Medical Sciences—Psychiatry and Neurology        |
| 2    | American Journal of Sports Medicine                | 88        | 2.3     | Medical Sciences—Sports Medicine                 |
| 3    | NeuroImage                                         | 77        | 2       | Medical Sciences—Psychiatry and Neurology        |
| 4    | Medicine & Science in Sports & Exercise            | 70        | 1.8     | Medical Sciences—Sports Medicine                 |
| 5    | American Journal of Physiology (all sections combined) | 67      | 1.8     | Medical Sciences; Biology—Physiology             |
| 6    | Journal of Biomechanics                            | 65        | 1.7     | Biology—Bioengineering; Medical Sciences         |
| 7    | Journal of Physiology                              | 61        | 1.6     | Medical Sciences—Psychiatry and Neurology        |
| 8    | Clinical Biomechanics                              | 58        | 1.5     | Medical Sciences—Orthopedics and Traumatology; Medical Sciences—Chiropractic, Homeopathy, Osteopathy |
| 9    | Journal of Applied Physiology (all variations of title) | 51      | 1.4     | Medical Sciences; Biology—Physiology             |
| 9    | Journal of Neurophysiology                         | 51        | 1.4     | Medical Sciences—Psychiatry and Neurology        |
| 10   | American Journal of Physiology– Endocrinology & Metabolism | 45      | 1.2     | Medical Sciences—Endocrinology; Biology—Physiology |
| 11   | Diabetes                                            | 44        | 1.1     | Medical Sciences—Endocrinology                   |
| 11   | Journal of Athletic Training                       | 44        | 1.1     | Medical Sciences—Sports Medicine                 |
| 12   | Brain                                               | 43        | 1.1     | Medical Sciences—Psychiatry and Neurology        |
| 13   | Journal of Biological Chemistry                    | 41        | 1       | Biology—Biochemistry                             |
| 14   | Journal of Neuroscience                            | 38        | 1       | Medical Sciences—Psychiatry and Neurology        |
| 15   | Journal of Experimental Psychology (all sections)   | 34        | 0.9     | Psychology                                       |
| 16   | Neurosurgery                                       | 33        | 0.8     | Medical Sciences—Psychiatry and Neurology        |
| 17   | Clinical Neurophysiology                           | 32        | 0.8     | Medical Sciences—Psychiatry and Neurology        |

(Continued)
| Rank | Title                                                                 | Frequency | Percent | Total citations: 3,740 |
|------|----------------------------------------------------------------------|-----------|---------|------------------------|
| 18   | Clinical Journal of Sport Medicine                                   | 30        | 0.8     | Medical Sciences—Sports Medicine; Medical Sciences—Orthopedics and Traumatology; Physical Fitness and Hygiene |
| 18   | Neuropsychologia                                                    | 30        | 0.8     | Medical Sciences—Psychiatry and Neurology |
| 19   | Brain Research                                                      | 29        | 0.8     | Medical Sciences—Psychiatry and Neurology |
| 20   | Journal of Clinical Endocrinology & Metabolism                      | 28        | 0.7     | Medical Sciences—Endocrinology |
| 21   | Journal of Cognitive Neuroscience                                   | 27        | 0.7     | Medical Sciences—Psychiatry and Neurology; Psychology |
| 22   | Proceedings of the National Academy of Sciences of the United States of America | 25        | 0.7     | Sciences—Comprehensive Works |
| 23   | Cerebral Cortex                                                     | 23        | 0.6     | Medical Sciences; Medical Sciences—Psychiatry and Neurology |
| 23   | Gait & Posture                                                      | 23        | 0.6     | Medical Sciences; Medical Sciences—Orthopedics and Traumatology |
| 23   | Physical Therapy                                                    | 23        | 0.6     | Medical Sciences—Orthopedics and Traumatology |
| 24   | Science                                                             | 22        | 0.6     | Sciences—Comprehensive Works |
| 25   | Journal of Biomechanical Engineering                                | 21        | 0.6     | Medical Sciences |
| 25   | Journal of the American Medical Association                         | 21        | 0.6     | Medical Sciences |
| 25   | Neuroscience Letters                                                | 21        | 0.6     | Medical Sciences—Psychiatry and Neurology |
| 26   | Journal of Sport Management                                         | 20        | 0.5     | Business and Economics—Management; Sports and Games |
| 26   | Nature                                                              | 20        | 0.5     | Sciences—Comprehensive Works |
| 27   | British Journal of Sports Medicine                                  | 19        | 0.5     | Medical Sciences—Sports Medicine |
| 28   | Archives of Physical Medicine & Rehabilitation                     | 17        | 0.5     | Medical Sciences—Physical Medicine and Rehabilitation |
| 28   | Neurology                                                           | 17        | 0.5     | Medical Sciences—Psychiatry and Neurology |
| 28   | Stroke                                                              | 17        | 0.5     | Medical Sciences—Cardiovascular Diseases |
| 29   | Developmental Medicine & Child Neurology                            | 16        | 0.4     | Medical Sciences—Psychiatry and Neurology; Medical Sciences—Pediatrics |
| 29   | Journal of Bone & Joint Surgery—Series A                            | 16        | 0.4     | Medical Sciences—Orthopedics and Traumatology |
| 29   | Journal of Clinical Investigation                                   | 16        | 0.4     | Medical Sciences |

(Continued)
Another interesting difference is that none of the journals have a high percentage of citations in the faculty publications. The highest, *Experimental Brain Research*, was cited 2.7% of the time in the faculty citations as opposed to the citations from the kinesiology journals in which the highest percentage was 6.5% for the *American Journal of Sports Medicine*.

Among the journals cited by the faculty there was a greater number in the Medical Sciences—Psychiatry and Neurology subject category that were heavily cited. Of the cited articles, 18% were from journals in this category including the top ranked, *Experimental Brain Research* and the third
most highly ranked, *NeuroImage*. Other highly ranked subject areas were Physiology as well as Endocrinology.

Psychology journals ranked more highly in the faculty citations than they did in the citations from the kinesiology journals. The *Journal of Cognitive Neuroscience* ranked #21 and the *Journal of Personality and Social Psychology* was #30. Among sport management journals, the *Journal of Sport Management* was #26 and *Sport Marketing Quarterly* was #32.

The differences between journals cited in the kinesiology journals and journals cited by faculty become even more striking when looking at the journals cited by faculty, broken down into the four sections of kinesiology (see Tables 9–12). This breakdown makes it evident that it is the faculty in Athletic Training who are citing the sports medicine journals most heavily. Out of the top ten journals cited by Athletic Training faculty (see Table 10), five of the journals are in the sports medicine category and 37% of the citations are from these five journals. In contrast, Movement Science faculty (see Table 11) did not frequently cite any of the top ten sports medicine journals. Instead, Movement Science faculty most heavily cited journals with the subjects Psychiatry and Neurology with 15% of their articles coming from this subject category. Physiology and Endocrinology are two other areas that occur

| Rank | Journal title                          | Frequency | Percentage | Subject categories                                      |
|------|----------------------------------------|-----------|------------|--------------------------------------------------------|
| 1    | *American Journal of Sports Medicine*  | 65        | 12         | Medical Sciences—Sports Medicine                       |
| 2    | *Medicine & Science in Sports & Exercise* | 47        | 8.8        | Medical Sciences—Sports Medicine                       |
| 3    | *Journal of Athletic Training*         | 41        | 7.6        | Medical Sciences—Sports Medicine                       |
| 4    | *Clinical Biomechanics*                | 38        | 7.1        | Medical Sciences—Orthopedics and Traumatology; Medical Sciences—Chiropractic, Homeopathy, Osteopathy |
| 5    | *Neurosurgery*                         | 33        | 6.2        |Medical Sciences—Psychiatry and Neurology; Medical Sciences—Surgery |
| 6    | *Clinical Journal of Sport Medicine*   | 28        | 5.2        | Medical Sciences—Sports Medicine; Medical Sciences—Orthopedics and Traumatology; Physical Fitness and Hygiene |
| 7    | *Journal of Biomechanics*             | 21        | 4          | Biology—Bioengineering; Medical Sciences               |
| 8    | *British Journal of Sports Medicine*  | 17        | 3.2        | Medical Sciences—Sports Medicine                       |
| 9    | *Journal of Biomechanical Engineering*| 14        | 2.6        | Medical Sciences                                       |
### TABLE 10 Top Faculty Cited Journals in Movement Science

| Rank | Journal title                                | Frequency | Percentage | Subject categories                                      |
|------|----------------------------------------------|-----------|------------|--------------------------------------------------------|
| 1    | Experimental Brain Research                 | 97        | 4.1        | Medical Sciences—Psychiatry and Neurology              |
| 2    | NeuroImage                                  | 77        | 3.3        | Medical Sciences—Psychiatry and Neurology              |
| 3    | American Journal of Physiology (all sections)| 67        | 2.9        | Medical Sciences; Biology—Physiology                   |
| 4    | Journal of Physiology                       | 61        | 2.6        | Medical Sciences—Psychiatry and Neurology; Medical Sciences—Orthopedics and Traumatology; Biology—Physiology |
| 5    | Journal of Neurophysiology                  | 51        | 2.2        | Medical Sciences—Psychiatry and Neurology; Biology—Physiology |
| 5    | Journal of Applied Physiology              | 51        | 2.2        | Medical Sciences; Biology—Physiology                   |
| 6    | American Journal of Physiology—Endocrinology & Metabolism | 45 | 1.9 | Medical Sciences—Endocrinology; Biology—Physiology |
| 7    | Diabetes                                    | 44        | 1.9        | Medical Sciences—Endocrinology                         |
| 7    | Journal of Biomechanics                    | 44        | 1.9        | Biology—Bioengineering; Medical Sciences               |
| 8    | Journal of Biological Chemistry             | 41        | 1.7        | Biology—Biochemistry                                   |
| 9    | Brain                                       | 38        | 1.6        | Medical Sciences—Psychiatry and Neurology              |
| 10   | Journal of Experimental Psychology (all sections) | 37 | 1.6 | Psychology                                                |

repeatedly in the top journals for this section. The most highly ranked of the sports medicine journals, the *American Journal of Sports Medicine*, is ranked #14 in this section. Journals in the Orthopedics and Traumatology subject category are also cited much more heavily in athletic training than in movement science. *Clinical Biomechanics* is ranked #4, for instance. Athletic training cites Medical Sciences journals almost exclusively with the exception of the *Journal of Biomechanics*. In contrast, Movement Science cites the Physiology journals that are categorized as Biology—Physiology journals and also cites psychology journals such as the *Journal of Experimental Psychology*, other biology journals such as the *Journal of Biological Chemistry* and more comprehensive science journals such as *Science, Nature* and *Proceedings of the National Academy of Sciences*.

Sports Management faculty (see Table 11) frequently cite business and economics journals such as the *Journal of Sport Management* (#1) and *Sport Marketing Quarterly* (#3) but also more general business and economics
TABLE 11 Top Faculty Cited Journals in Sports Management

| Rank | Title                                      | Frequency | Percent | Subject area                                      |
|------|--------------------------------------------|-----------|---------|--------------------------------------------------|
| 1    | *Journal of Sport Management*              | 20        | 4.5     | Business and Economics—Management; Sports and Games |
| 2    | *Journal of Personality & Social Psychology* | 15        | 3.4     | Psychology                                        |
| 3    | *Sport Marketing Quarterly*                | 13        | 3       | Business and Economics—Marketing and Purchasing; Sports and Games |
| 4    | *Journal of Business Ethics*               | 11        | 2.4     | Business and Economics; Law                       |
| 5    | *Journal of Sports Economics*              | 9         | 2       | Business and Economics; Sports and Games          |
| 5    | *Sports Business Journal*                  | 9         | 2       | Sports and Games                                 |
| 6    | *Corporate Social Responsibility & Environmental Management* | 7 | 1.6 | Environmental Studies; Business and Economics—Management |
| 7    | *Urban Studies*                            | 6         | 1.4     | Housing and Urban Planning; Sociology            |
| 8    | *Academy of Management Review*             | 5         | 1.1     | Business and Economics—Management                |
| 8    | *Information and Management*               | 5         | 1.1     | Computers—Computer Systems                       |
| 8    | *Journal of Consumer Research*             | 5         | 1.1     | Business and Economics—Marketing and Purchasing |
| 8    | *Journal of Leisure Research*              | 5         | 1.1     | Leisure and Recreation; Sports and Games—Outdoor Life |
| 8    | *Journal of Sport & Social Issues*         | 5         | 1.1     | Sociology; Sport and Games                       |
| 8    | *Personality and Individual Differences*   | 5         | 1.1     | Psychology                                       |
| 8    | *Sociology of Sport Journal*               | 5         | 1.1     | Medical Sciences—Sports Medicine; Sociology; Sports and Games |
| 9    | *Business & Society Review*                | 4         | 0.9     | Business and Economics                           |
| 9    | *Journal of Computer-Mediated Communication* | 4     | 0.9     | Communications—Computer Applications              |
| 9    | *Journal of Gambling Studies*              | 4         | 0.9     | Medical Sciences—Psychiatry and Neurology; Sports and Games |
| 9    | *Journal of Marketing Research*           | 4         | 0.9     | Business and Economics—Marketing and Purchasing  |
| 9    | *Journal of Research in Personality*      | 4         | 0.9     | Psychology                                       |
| 9    | *Journal of Sport Behavior*               | 4         | 0.9     | Psychology; Sports and Games                     |
| 9    | *MIS Quarterly*                            | 4         | 0.9     | Computers—Computer Systems                       |
| 9    | *Psychological Bulletin*                   | 4         | 0.9     | Psychology                                       |

journals such as the *Journal of Business Ethics* (4), *Corporate Social Responsibility & Environmental Management* (6) and the *Academy of Management Review* (8). Psychology journals also appear among the top ten including; the *Journal of Personality & Social Psychology* (2) and
**TABLE 12** Top Faculty Cited Journals in Physical Education

| Rank | Journal title                                      | Frequency | Percent | Subject categories                                      |
|------|----------------------------------------------------|-----------|---------|--------------------------------------------------------|
| 1    | *Journal of Teacher Education*                    | 5         | 11      | Education                                              |
| 2    | *British Journal of Educational Psychology*       | 4         | 9       | Psychology; Education                                  |
| 2    | *Journal of Teaching in Physical Education*       | 4         | 9       | Sports and Games; Education—Teaching Methods and Curriculum |
| 3    | *Elementary School Journal*                        | 3         | 7       | Psychology; Education                                  |
| 3    | *Journal of Applied Social Psychology*            | 3         | 7       | Psychology; Social Sciences—Comprehensive Works        |
| 3    | *Journal of Educational Psychology*               | 3         | 7       | Psychology; Education                                  |
| 3    | *Journal of Physical Education, Recreation & Dance* | 3         | 7       | Education—Teaching Methods and Curriculum; Physical Fitness and Hygiene |

Personality and Individual Differences (#8). Sports and Games is another category that comes up regularly among the more highly cited journals including the aforementioned the *Journal of Sport Management* and *Sport Marketing Quarterly* but also the *Journal of Sports Economics* (#5) and *Sports Business Journal* (#5). Of the journals cited, 16% are in business and economics while 14% are from journals in the Sports and Games category (there is some overlap in the subject categories assigned to the journals.)

The top journals cited by Physical Education faculty (see Table 12) are almost all from the Education category. The one exception is *Journal of Applied Social Psychology*.

Publishers

Human Kinetics is the most cited publisher in the kinesiology journal articles as well as in the faculty journal articles (see Tables 13 and 14). Human Kinetics was cited 301 times in the journal articles, or 9% of the time, and 15 times in the faculty journal articles, or 4% of the time. There were 182 unique books cited in the journal articles and 13 in the faculty journal articles. This is undoubtedly the most important publisher in the field. Subject selectors in the field would be wise to pay close attention to its publications. Yet Human Kinetics also publishes many practitioner oriented publications which were not cited as heavily so a subject selector would still need to use some judgment when choosing among the publisher’s offerings.

The next most commonly cited publishers differed somewhat in the two lists. Major publishers such as Sage, Routledge, and Lawrence Erlbaum were
TABLE 13 Publishers Cited in Kinesiology Journals

| Publishers                        | Times cited | Percentage | Unique citations |
|-----------------------------------|-------------|------------|------------------|
| Human Kinetics                    | 301         | 9          | 182              |
| Sage                              | 232         | 6          | 117              |
| Lawrence Erlbaum                  | 120         | 3          | 69               |
| Routledge                         | 113         | 3          | 86               |
| No Publisher                      | 112         | 3          | 95               |
| Wiley                             | 99          | 3          | 77               |
| McGraw Hill                       | 87          | 2          | 53               |
| Lippincott                        | 81          | 2          | 46               |
| Oxford University Press           | 75          | 2          | 63               |
| Prentice Hall                     | 73          | 2          | 41               |
| Springer                          | 58          | 2          | 49               |
| Cambridge University Press        | 54          | 1.5        | 47               |
| Jossey Bass                       | 47          | 1          | 30               |
| Elsevier                          | 46          | 1          | 42               |
| University of Chicago Press       | 44          | 1          | 25               |
| Saunders                          | 40          | 1          | 30               |
| Academic Press                    | 39          | 1          | 32               |
| Blackwell                         | 30          | 1          | 26               |
| Fitness Information Technology    | 29          | 0.8        | 15               |
| Macmillan                         | 27          | 0.8        | 26               |
| Mosby                             | 26          | 0.8        | 22               |
| Guilford Press                    | 24          | 0.7        | 15               |
| MIT Press                         | 23          | 0.6        | 17               |
| SUNY Press                        | 21          | 0.6        | 17               |
| Pearson                           | 20          | 0.5        | 16               |
| Free Press                        | 20          | 0.5        | 16               |
| Allyn & Bacon                     | 20          | 0.5        | 18               |

in the top tier in both lists but the rankings varied. Routledge was #4 among the publishers cited in the kinesiology journal articles and #5 among the publishers cited in the faculty journal articles. Sage was #2 among the kinesiology journal articles and #4 among the faculty journal articles. While the rankings might vary, it is clear that kinesiology subject selectors should certainly pay attention to these major commercial publishers when preparing their approval profiles or checking catalogs for new publications. The number of unique books cited for the major publishers varied greatly in the kinesiology journal citations but not in the University of Michigan faculty citations. The University of Michigan faculty citations (Tables 13–15) had few repeats among the books that were cited. In the kinesiology journal citations some publishers, such as Sage, had many repeats for books covering research methodology such as *Qualitative Evaluation and Research Methods* and *Case Study Research: Design and Methods* while others such as Lippincott had one major reference work that was cited repeatedly, *ACSM’s Guidelines for Exercise Testing and Prescription*. Still other publishers such as Cambridge University Press had few repeat citations.
| Publisher                                      | Total number | Percentage | Athletic training | Movement science | Physical education | Sports management |
|-----------------------------------------------|--------------|------------|-------------------|-----------------|-------------------|-------------------|
| No publisher cited                            | 56           | 16.56%     | 2/9.09%           | 51/38.63%       | 0                 | 3/1.97%           |
| Human Kinetics                                | 15           | 4.43%      | 0                 | 6/4.54%         | 5/15.62%          | 4/2.63%           |
| Oxford University Press                       | 13           | 3.84%      | 1/4.54%           | 8/6.06%         | 0                 | 4/2.63%           |
| Sage                                          | 13           | 3.84%      | 0                 | 1/7.57%         | 3/9.37%           | 9/5.92%           |
| Routledge                                     | 12           | 3.55%      | 0                 | 1/7.57%         | 0                 | 11/7.23%          |
| Prentice Hall                                 | 9            | 2.66%      | 1/4.54%           | 2/1.51%         | 0                 | 6/3.94%           |
| Lawrence Erlbaum                              | 8            | 2.36%      | 1/4.54%           | 1/7.57%         | 1/3.12%           | 5/3.28%           |
| National Trust for Historic Preservation      | 8            | 2.36%      | 0                 | 0               | 0                 | 8/5.26%           |
| CRC Press                                     | 7            | 2.07%      | 0                 | 6/4.54%         | 0                 | 1/6.57%           |
| Wiley                                         | 7            | 2.07%      | 2/9.09%           | 4/3.03%         | 1/3.12%           | 0                 |
| Elsevier                                      | 5            | 1.47%      | 1/4.54%           | 0               | 3/9.37%           | 0                 |
| Academic Press                                | 5            | 1.47%      | 2/9.09%           | 0               | 2/6.25%           | 1/6.57%           |
| McGraw Hill                                   | 5            | 1.47%      | 0                 | 0               | 1/3.12%           | 4/2.63%           |
| Brookings Institution                         | 5            | 1.47%      | 0                 | 0               | 5/3.28%           | 0                 |
| Cambridge University Press                    | 5            | 1.47%      | 0                 | 1/7.57%         | 0                 | 4/2.63%           |
| MIT Press                                     | 4            | 1.18%      | 0                 | 4/3.03%         | 0                 | 0                 |
| Guilford                                      | 4            | 1.18%      | 0                 | 0               | 2/6.25%           | 2/1.31%           |
| Kluwer Academic                               | 4            | 1.18%      | 0                 | 1/7.57%         | 1/3.12%           | 2/1.31%           |
| National Association for Sport and Physical Education | 4        | 1.18%      | 0                 | 0               | 4/12.5%           | 0                 |
| Springer Verlag                               | 4            | 1.18%      | 0                 | 3/2.27%         | 0                 | 1/6.57%           |
| Getty Conservation Institute                  | 3            | .887%      | 0                 | 0               | 0                 | 3/9.79%           |
| Mayfield                                      | 3            | .887%      | 0                 | 1/7.57%         | 2/6.25%           | 0                 |
| Mosby                                         | 3            | .887%      | 2/9.09%           | 0               | 0                 | 1/6.57%           |
| Plenum Press                                  | 3            | .887%      | 0                 | 2/1.51%         | 0                 | 1/6.57%           |
| Taylor and Francis                            | 3            | .887%      | 0                 | 2/1.51%         | 0                 | 1/6.57%           |
| Thieme                                        | 3            | .887%      | 0                 | 3/2.27%         | 0                 | 0                 |
| University Press of New England              | 3            | .887%      | 0                 | 0               | 0                 | 3/1.97%           |
TABLE 15 Unique Citations in Faculty Publications

| Publisher              | Unique citations |
|------------------------|------------------|
| No publisher           | 46               |
| Human Kinetics         | 13               |
| Oxford                 | 13               |
| Sage                   | 12               |
| Routledge              | 12               |
| Prentice Hall          | 8                |
| National Trust         | 8                |
| CRC                    | 7                |
| Erlbaum                | 7                |
| Elsevier               | 5                |
| Wiley                  | 5                |
| Brookings              | 5                |
| Cambridge              | 5                |
| Academic Press         | 4                |
| MIT                    | 4                |
| Kluwer                 | 4                |
| Springer               | 4                |
| McGraw                 | 3                |
| Getty                  | 3                |
| Mayfield               | 3                |
| Mosby                  | 3                |
| Plenum                 | 3                |
| Taylor & Francis       | 3                |
| Guilford               | 2                |
| NASPE                  | 2                |
| Thieme                 | 1                |
| University Press of New England | 1          |

Oxford University Press was the commonly cited university press publisher in both lists with 13 citations (4%) in the faculty journal article citations and 75 citations (2%) in the journal citations. Other university press publishers included in the top rankings from the kinesiology journal articles were Cambridge University Press and the University of Chicago Press. The faculty journal articles also cited Cambridge University Press as well as MIT Press.

There were a large number of monographs with no publisher cited—56 (17%) in the faculty citations and 112 (3%) in the kinesiology journal articles. Monographs published by organizations were not cited often. The highest ranking was the National Association for Sport and Physical Education. It had four (1%) citations in the faculty journal articles and was not ranked in the top twenty publishers cited in the kinesiology journal articles. This does not mean that such publications should be ignored by subject selectors. It does mean that subject selectors will need to be aware of their faculty members’ specific research interests. For instance, there were eight citations or 2% of the citations from the faculty journal articles that cited publications from the National Trust for Historic Preservation. This was an example of a single faculty member’s interest in a particular area of research that happened to
include many publications from this particular organization. Such specific interests can often call for publications outside of the more common sources and subject selectors can either do their best to keep informed of these diverging research interests or hope that their subject selector colleagues are doing a good job of selecting in these areas outside of the normal scope of kinesiology.

How Do the Four Areas Differ?

The articles we investigated from publications done by researchers publishing in kinesiology journals in the sports management discipline cite a relatively high number of books—20.31% of citations in the discipline were book citations. Of the citations in sports management, 64.54% were from journal articles. Major journals in sports management include the *Journal of Sport Management*, *Sport Marketing Quarterly*, *Sport Marketing Review*, and the *Journal of Marketing*. Articles from sports management journals cited a higher number of newspaper articles than did articles in other disciplines; 100 newspaper articles were cited in the sports management articles we reviewed (1.49% of the citations were newspaper articles), whereas there were no newspaper articles cited in the movement science literature. It's worth noting that court cases were cited in sports management literature more than other disciplines of kinesiology (1.22%). Sports management articles also tended to cite a high number of webpages (5.62% of citations), comparable to the percentage of webpage citations found in physical education journals (6.49%).

The journals cited most frequently by Sports Management faculty from the University of Michigan School of Kinesiology included the *Journal of Sport Management*, the *Journal of Personality & Social Psychology*, *Sport Marketing Quarterly*, the *Journal of Business Ethics*, the *Journal of Sports Economics*, and the *Sports Business Journal*.

Articles we investigated from researchers publishing in kinesiology journals in the discipline of athletic training cited journal articles almost exclusively (95.11%). Similarly to movement science, this discipline relies heavily on medical journals. Books made up 3.06% of citations found in athletic training literature. This discipline had the lowest number of citations from books and the highest number of citations from journal articles.

The journals cited most frequently by Athletic Training faculty from the University of Michigan School of Kinesiology included the *American Journal of Sports Medicine*, *Medicine & Science in Sports & Exercise*, the *Journal of Athletic Training*, *Clinical Biomechanics*, *Neurosurgery*, and the *Clinical Journal of Sports Medicine*.

While analyzing the movement science and athletic training articles by researchers publishing in kinesiology journals, we found those two disciplines are the most similar in terms of subject area and use of sources.
We found that 93.37% of all citations in movement science came from journal articles whereas 95.11% of all citations from the athletic training literature we studied came from journal articles. Books made up 4.57% of citations in the movement science literature we studied.

The journals cited most frequently by Movement Science faculty from the University of Michigan School of Kinesiology included *Experimental Brain Research, NeuroImage, the American Journal of Applied Physiology* (all sections), the *Journal of Physiology, the Journal of Neurophysiology*, and the *Journal of Applied Physiology*.

While analyzing the physical education articles by researchers publishing in kinesiology journals, we found this discipline was most similar to sports management in terms of sources cited in the literature we studied. We found that the physical education discipline was the discipline most dependent on books (25.12%), webpages (6.49%), and conference proceedings (1.62%). Physical education is the least dependent of the four disciplines on journal articles with journal articles making up 60.48% of the citations we studied in this discipline.

The journals cited most frequently by the Physical Education faculty from the University of Michigan School of Kinesiology included the *Journal of Teacher Education, the British Journal of Educational Psychology*, and the *Journal of Teaching in Physical Education*.

**CONCLUSION**

In our citation analysis we studied the citations in 11 major kinesiology journals as well as the citations in the journal articles written by University of Michigan School of Kinesiology faculty. All the journal articles were from 2011. We found that the most common format cited was journal articles, but the percentage of journal articles varied depending on the section of kinesiology examined. When investigating the researchers publishing in kinesiology journals, we found the disciplines of movement science and athletic training cited journal articles over 90% of the time while sports management and physical education cited journal articles about 60% of the time. Surprisingly, some of these journal articles cited went as far back as 1874 even in journal articles from the life sciences such as in the *American Journal of Sports Medicine*. The mean age of the journal articles, however, was much more recent, ranging from 1996 in *Quest* to 2004 in *Exercise and Sport Sciences Reviews*. The age of the books cited in the kinesiology journal articles also varied a great deal with the oldest being from 1899. The mean age was slightly older than for the journal articles, ranging from 1996 to 2002. The most cited publisher in the kinesiology journal articles is Human Kinetics with other major commercial publishers such as Sage, Routledge, Elsevier, and Lawrence Erlbaum also being cited often although the specific rankings
of these publishers varied between the citations from the kinesiology journal articles and the faculty journal articles. Among the academic publishers Oxford University Press was the most often cited. Cambridge University Press, University of Chicago Press, and MIT Press were among some of the others cited.

The most commonly cited journals in the kinesiology journal articles written by researchers in the kinesiology journals were the *American Journal of Sports Medicine* and *Medicine in Science in Sports and Exercise* with other medical sciences journals such as *Arthroscopy*, the *Journal of Applied Physiology*, and the *Journal of Bone and Joint Surgery* among the top five. The University of Michigan Kinesiology faculty citations, on the other hand cited most often *Experimental Brain Research, NeuroImage*, and the *American Journal of Physiology* along with the *American Journal of Sports Medicine* and *Medicine in Science in Sports and Exercise*. Athletic Training faculty were more likely to cite articles from sports medicine journals while Movement Science faculty cited articles from psychiatry and neurology journals, as well as physiology and endocrinology journals. Sports Management faculty were more likely to cite articles from business and economics and sports and games journals, as well as psychology journals, while the Physical Education faculty were more likely to cite articles from education and psychology journals. This difference between the journals cited by the University of Michigan Kinesiology faculty and the journals cited in the kinesiology journal articles might well be because of different research interests at a particular point in time. Perhaps, for instance, the University of Michigan faculty happened to be doing more research on the brain and on neurology while the researchers publishing in kinesiology journals were more focused on areas specifically related to sports medicine and/or orthopedics. It would be interesting to do a follow-up survey of the faculty to ask them more details about how they choose which journals they read and cite.

Athletic training citations and movement science citations leaned heavily toward citing journal articles in both the kinesiology journal articles and the articles written by University of Michigan Kinesiology faculty. Athletic training cited many sports medicine journals while movement science leaned more toward psychiatry and neurology, physiology and endocrinology. Sports Management and Physical Education faculty from the University of Michigan cited journal articles at least 60% of the time but also cited books as well as miscellaneous other sources. For Sports Management faculty this often included webpages as well as newspaper articles and court cases. For Physical Education faculty this often included conference proceedings.

Subject librarians in the discipline of Kinesiology would serve their departments well by focusing collection efforts on the major journals mentioned above. While journals are the main source of citations across the field,
the disciplines of sports management and physical education cite heavily from books. We also concluded that more training in creating proper citations would be beneficial for faculty, as there were many errors in the University of Michigan faculty citations and citations from the kinesiology journals. Proper citing is an issue across the discipline. Subject librarians would also do well to communicate frequently with their faculty about their current research since the focus of the faculty research seems to have a heavy influence on what materials are needed in the collection and can take the researcher far outside the traditional fields of kinesiology. They should also learn what languages and countries might be particularly relevant to a faculty member’s research and then search for relevant literature from those countries. Subject librarians should also make sure that their collection has access to some of the most heavily cited books. Some of the publishers, such as Sage and Erlbaum, had titles that were cited repeatedly and those books would certainly need to be part of any core collection.

The University of Michigan Library system owns about 75% of the items cited in both the kinesiology journal articles and the faculty journal articles. Two areas that are not covered well by the current library collection are textbooks and foreign language materials. The current kinesiology subject selector will look more closely at buying more kinesiology textbooks in the future. The foreign language materials that were cited, on the other hand, seem to be too narrow in scope and in less commonly known languages to be of use to more than a small number of researchers.

This research was limited in a few ways. Not all faculty published journal articles in 2011. In Physical Education, for instance, only one faculty member published journal articles in that year. Thus, the results for that section of Kinesiology are not as representative as one would hope. It would be interesting in the future to also include faculty citations from book chapters to see if they are any different from the faculty citations in journal articles. Two of the journals studied, the *American Journal of Sports Medicine* and *Medicine and Science in Sports and Exercise*, provided a little more than half of the citations and this impacted the results. It would be helpful in future research to note such limitations and compensate for them. The research was also limited in terms of the faculty citations to the four sections of kinesiology represented by the School of Kinesiology at the University of Michigan. Other schools might place more emphasis on leisure research, for instance, or different areas of sports management. The authors also had a limited amount of time to analyze the data. This kept them from doing other analyses such as ranking the most commonly cited books and studying the country and language of publication. It seemed that researchers in movement science and in athletic training were including more citations in their articles and it would be interesting to take time to follow up on this and see if this is true for the life sciences, in general, as opposed to the social sciences. It would also be interesting to learn more about why so many textbooks are
cited in kinesiology publications. Finally, our statistical analysis is somewhat
limited. Thus, the statistical significance of differences in format and most
cited sources is not currently determined.

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