ORIGINAL ARTICLES

Trends in Articles Published Over the Past 20 Years in *The Journal of Chiropractic Education*: Country of Origin, Academic Affiliation, and Data Versus Nondata Studies

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Purpose: To review trends in articles published during the first 20 years of *The Journal of Chiropractic Education* (JCE), which is the primary periodical that publishes chiropractic educational research. This study focused on article type, country of origin, contributions by institutions, use of references, and use of structured abstracts. **Methods**: All volumes of the JCE were retrieved (1987–2006). Only full articles were included in this study; abstracts from proceedings and ephemera were excluded from this analysis. Articles that presented no data (eg, commentary, narrative descriptions) were classified as nondata articles. Articles that reported data (eg, experimental studies, survey research, etc) were classified as data articles. Each article was reviewed by hand for the type of study (data vs nondata), geographic region of origin, college of origin, use of references, and the presence of a structured or unstructured abstract. **Results**: After applying the inclusion and exclusion criteria, 153 papers were assessed. Published articles came from 5 countries and represented 23 chiropractic colleges. A majority (80.2%) of papers were from the United States. Of all articles, 101 articles (66%) were nondata in nature. Consistent use of references and structured abstracts increased over time. **Conclusion**: During its first 20 years, the JCE has published more nondata than data studies and the number of data papers published per year has remained constant. The journal has reached a consistent level of quality in its publication of manuscripts containing structured abstracts and references, and articles have been authored primarily by US authors. It is recommended that more efforts and resources are dedicated to data-driven studies and that greater geographic diversity is obtained to better represent the worldwide distribution of the chiropractic profession's educational institutions. (J Chiropr Educ 2008;22(1):4–11)

Key Indexing Terms: chiropractic; education; periodicals; writing

INTRODUCTION

In 1987, *The Journal of Chiropractic Education* (JCE) was introduced to the chiropractic profession.[1] The JCE began as a humble newsletter in 1987; its initial mission was stated as such:

> *The Journal of Chiropractic Education* is a forum for the open and responsible discussion of the topics relevant to chiropractic education. Its mission is to inform its readers of progress in both educational methodologies and the content relevant to the discipline of chiropractic.[1]

For the first 2 years, the journal was privately published as a service by Grace Jacobs, DA, the founding editor, with a subscription rate of $12 per year. Beginning in 1989, the Association of Chiropractic Colleges (ACC) sponsored and published the JCE. In 1990, the first editorial board was created and included selected representatives of the ACC.

Over the years, the JCE transformed from a newsletter format into a peer-reviewed, indexed, and bound journal. The first system to index the

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journal was the Index to Chiropractic Literature, occurring in 1988, as noted in volume 2, number 1, page 2. The JCE was subsequently indexed in CINAHL in 1995 and also in MANTIS (formerly CHIROLARS). Through the efforts of the founding editor, the journal continued to grow. When her successor, Robert Ward, DC, assumed editorship in 1999, he provided more structure to the journal. He implemented more stringent acceptance standards, improved the peer-review process, and required structured abstracts. In mid-2006, the journal editorship was passed on to the current editor.

Much can be learned from publication trends. It can be argued that more articles may not be desirous if they do not contribute to the field in a substantive manner. Analyses of periodicals are performed to generate evaluative and descriptive information. Such analyses are valuable because they demonstrate the foci of various participants in the profession.[2–4] The number of articles, article types, and research designs published in a periodical help to clarify past and present research agendas.[5] As well, the content and sophistication of articles helps to clarify what type of research priority exists and the resources dedicated to that research. It has been suggested that the type of research output and the number of articles published may reflect the various biases and interests within a research community.[6]

As Mrozek et al state,[5(p.762)] "... research in education should inform the practice of instruction." Because the JCE is the only journal that focuses exclusively on the field of education in the chiropractic profession, we felt that it would be prudent to perform an analysis of key components of its articles to determine what growth may have occurred over the past 20 years. The purpose of this study is to review trends in publication of the JCE focusing on data versus nondata studies, manuscript country of origin, contributions by institutions, use of references, and use of structured abstracts.

METHODS

The methods for this analysis are similar to those of Scriven[7] and Rourke and Szabo,[4] in which they identified contributions by country and other classifications and attempted to identify emerging trends. The data for this study were collected by reviewing all contents of the JCE from 1987 (volume 1, number 1) through the end of 2006 (volume 20, number 2).

Only full papers were included in this study. Abstracts from conference proceedings (eg, Association of Chiropractic Colleges Educational Conference and the Research Agenda Conference proceedings) and ephemera (eg, conference announcements, faculty change in location, advertisements, etc) were excluded. Papers that did not present data (eg, nonexperimental, descriptive studies, narrative reviews, commentary, etc) were classified as nondata studies. Articles that reported data (eg, experimental educational research, survey research, quantitative studies, mixed method studies, etc) were classified as data studies.

Abstracts were identified as structured versus unstructured by using the features described by Nakayama et al,[8] which are considered standard elements of modern-day abstracts. Essentially, structured abstracts are broken down into small sections to ensure that they include the essential information that readers need to know. Although various working groups have recommended that structured abstracts contain up to seven subsections, variations are common.[8] We classified abstracts as structured if they were broken down into any subsections whatsoever and designated any other abstract, such as written in narrative format, as unstructured.

To extract the data, each issue of the JCE was evaluated manually cover-to-cover by the primary author and the information for this report was input into a Microsoft Excel 2002 (Microsoft Corp, Redmond, WA) spreadsheet. The table of contents and each article in every issue was manually searched by the first author, an experienced author and editor of chiropractic publications. The following items were recorded for each article: article type (data or nondata), abstract style, use of references, geographic locations of the authors, and academic affiliations of the authors. Frequency counts were performed for data/nondata studies, abstract style, reference use, geographic origin of authors, and the academic affiliation of the authors.

RESULTS

Nineteen volumes of the JCE were published in 20 years. There were a total of 50 issues published; some years 4 issues and some years 2 issues were published. No issues were published in 1998, as the journal was in search of a new editor at that time.

One hundred and fifty-three articles were included in this study. Of the 153 articles, 101 (66%) were nondata in nature (Fig. 1). Twelve articles had no abstract. Of the 141 abstracts published, 12 were written in a structured format (Fig .2). Articles were generated from 5 different countries: Australia, Canada, England, South Africa, and the United States. The relative percent of data and descriptive studies for each country is represented in Figure 3 and number per year in Figure 4. Of the 153 articles, 143 were affiliated with one of 22 named chiropractic colleges, 2 were affiliated with a state university, and 8 had no academic affiliation listed. The number of articles per college is represented in Figure 5.

DISCUSSION

Growth of the Journal

In the first 10 years of the journal's existence, there was an increase in the number of articles published. It is possible that more articles were submitted because of the inclusion of an editorial board, indexing (which may have improved the perceived prestige of the journal), improved quality, and formatting of the contents of the journal.

It seems that the journal served its purpose as a forum for chiropractic educators. However, some of these early papers lacked the rigor that one would have expected in peer-reviewed journals of the day. The number of articles published per year declined in 1999 but reached what appears to be a plateau of 4 articles per year (Fig. 1). The reduction in the number of articles may have been caused by a variety of factors, such as there being fewer submissions or more stringent acceptance standards. However, we do not know definitively why fewer papers were published from 1999 to 2006.

Although there are more chiropractic colleges today, and an apparent demand for more scholarly publication and improvement in educational methods, the number of articles published per year in the JCE has not increased. One possible reason for this observation could be that authors are publishing their works in other journals. While this may certainly be the case, another explanation could be that there continues to be an insufficient impetus for educators to convert investigations and conference presentations into full-fledged articles acceptable for publication. This last point has been made by two of the editors of the JCE.[9,10] Further progress in this area is needed.

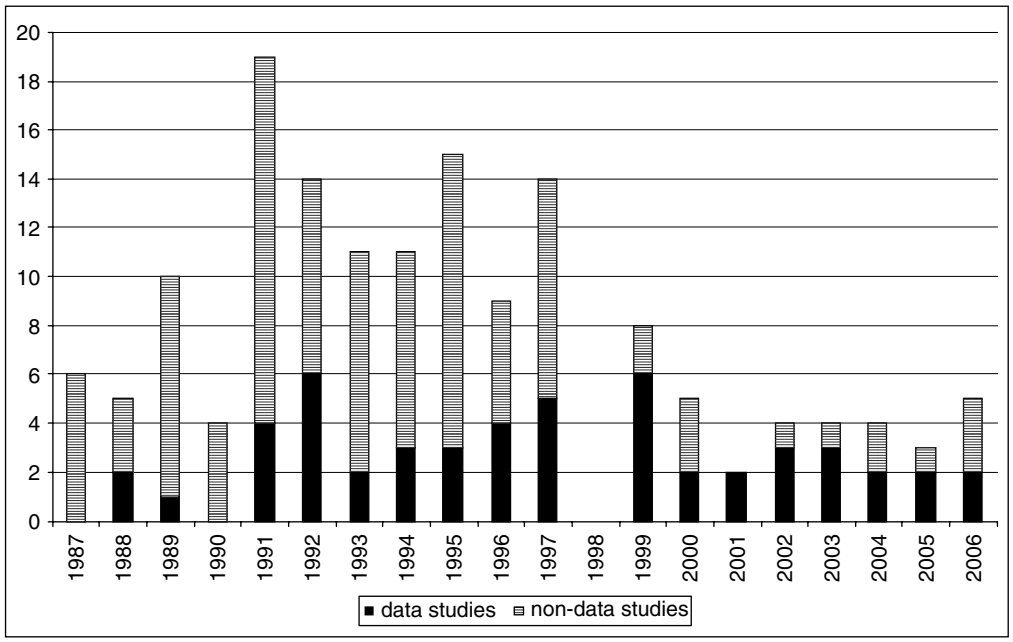


Figure 1. Number of data (n = 52) vs nondata (n = 101) studies published per year in The Journal of Chiropractic Education, 1987–2006.

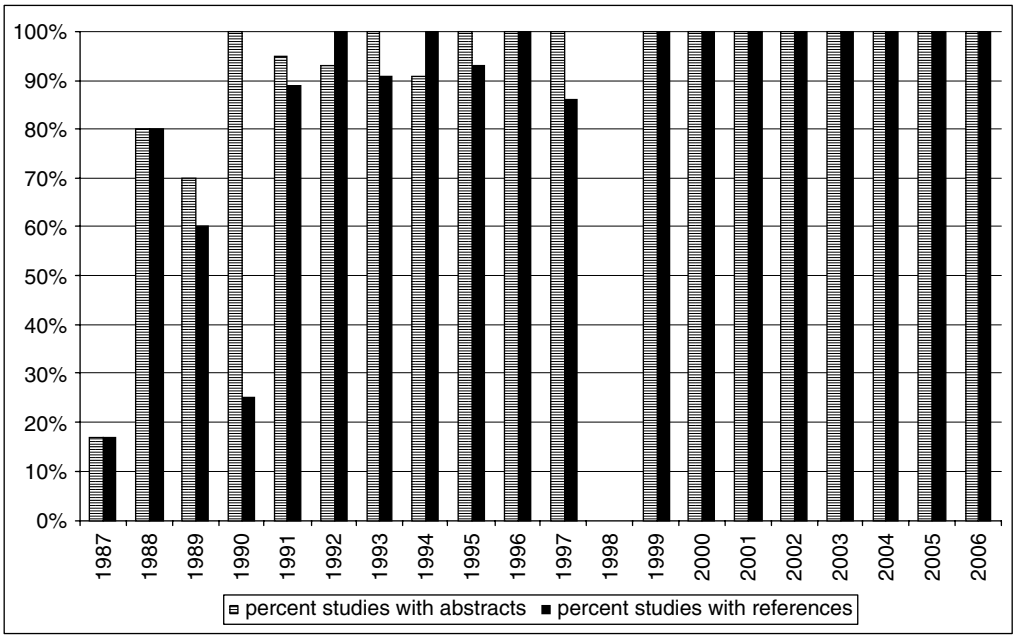


Figure 2. Percentage of articles that included references and abstracts.

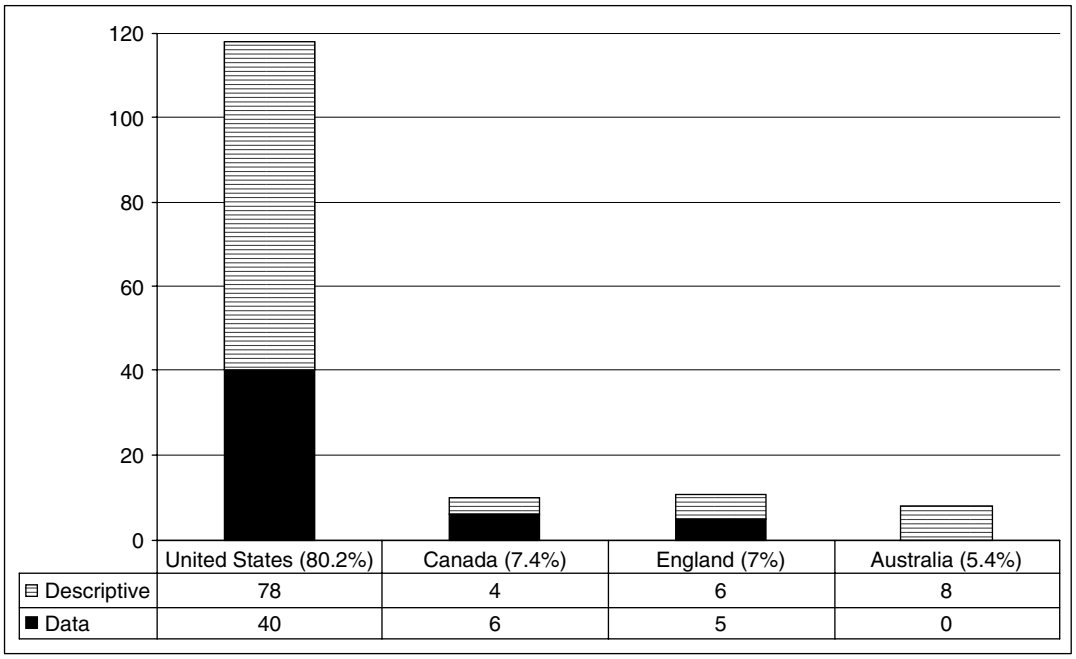


Figure 3. Number of data vs nondata articles by geographic region (percentage of overall papers).

Data Versus Nondata Studies

There was an increase in the number of articles published in the early years of the journal; however, these articles were primarily descriptive, opinion-based, or commentary-like in nature. Comparing the first and second decades, 24% in the first decade versus 55% in the second decade were data studies. Although this may appear to be a trend toward more data-driven studies, this percentage change is mainly due to the drop-off in the number of nondata studies, not because of an increase in data studies. Figure 1 shows that the number of data studies has

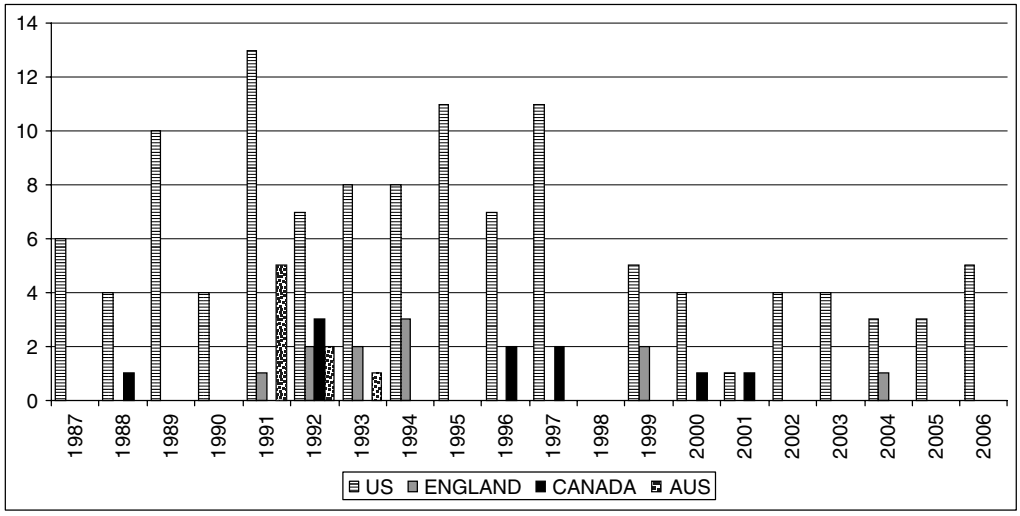


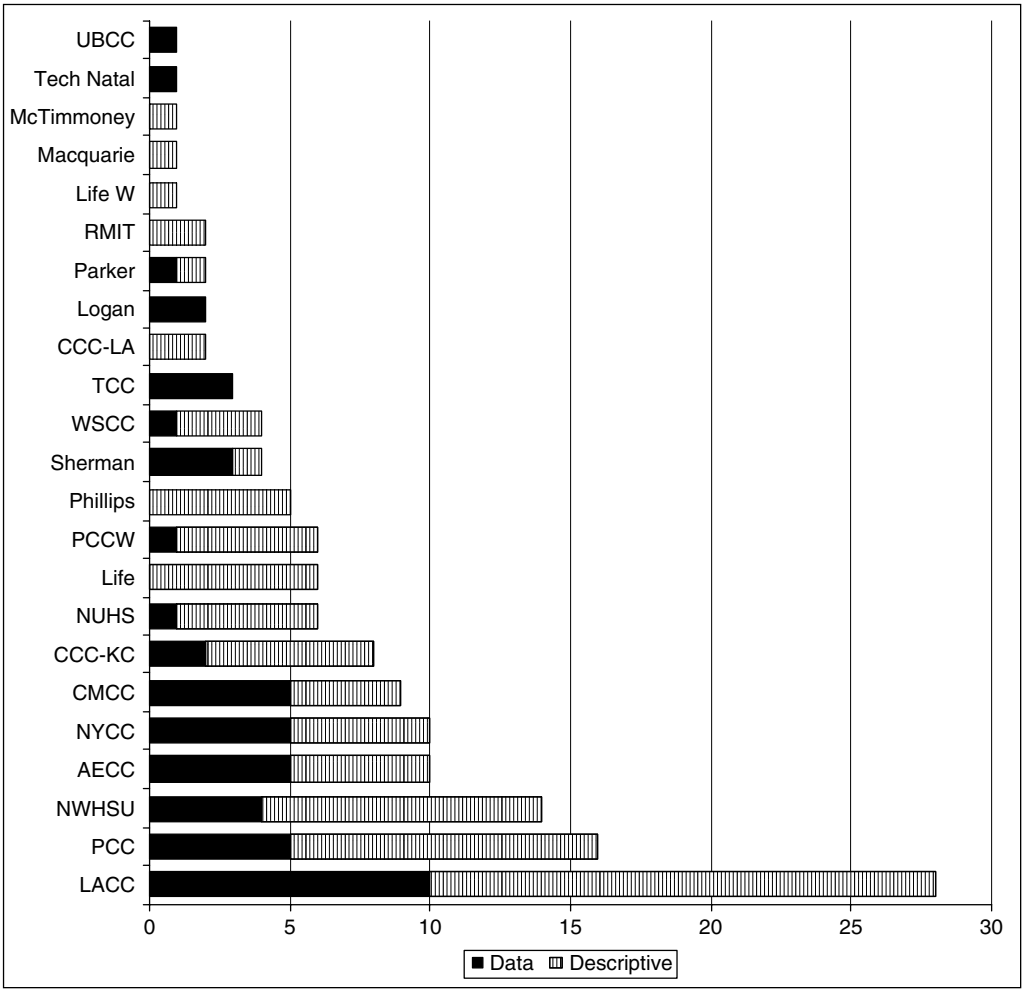
Figure 4. Number of articles over time by country.

remained fairly constant, whereas the overall number of nondata studies has declined. The number of data studies has been consistent (average 2.6 over 20 years) and the frequency has reached a plateau at 2 to 3 data articles per year for the last 7 years. It is not clear why the number of nondata studies has diminished. It is hypothesized that the rigor of acceptance standards and expectations of the most recent editor increased, that authors are no longer submitting nondata manuscripts, or that in the early years (since material was needed to fill the pages) nondata studies were easy to write and people were encouraged to submit these types of articles.

There may be additional reasons why a majority of the manuscripts published in the journal over its first 20 years were nondata papers. It has been demonstrated in other professions that increased teaching load, decreased assigned research time, and lack of training negatively impact research productivity.[11–13] Our primary assertion is that because chiropractic educators may have more than double the teaching workload of most other educators,[14] they have less time to write manuscripts and publish. Given the data reported by Ward, it is noteworthy that chiropractic faculty members publish at all. Therefore, it is not surprising that these professors might publish the results of their practices of teaching using studies without data. In addition, faculty members may have little dedicated time or funding to perform advanced data-driven educational research that evaluates the effectiveness of various teaching strategies or that applies statistics to various hypothesized relationships. Without the appropriate funding or resources (eg, time and support services), it is unlikely that faculty members would have the means to produce educational research with outcome data. Finally, chiropractic faculty may be similar to medical faculty, in that they are not trained to perform research and publish studies and there may be an absence of "research culture" at various chiropractic educational institutions. Thus, low publication rates may be due to lack of training, experience, and environment.[15]

Although the number of chiropractic colleges throughout the world is growing, and one would hope that the research capacity of the educational institutions is improving, the number of published data-oriented studies in chiropractic education does not seem to be increasing, at least in the JCE. This is a cause for concern for the future and integrity of chiropractic education research. Why there is a dearth of data-oriented studies about chiropractic education needs further investigation. Aside from the possible lack of priority at the colleges, we see no clear underlying pattern in reviewing the number of data studies by country (Fig. 4) or by college (Fig. 5).

Journals that publish original research with data that test explicit hypotheses or use prospective designs are generally perceived to publish articles of advanced methodological quality.[16] Articles from such periodicals tend to receive higher citation rates, which has a positive influence on methodological quality scores for journal articles.[17,18] Thus, by observing the relative percentage of data versus nondata studies, an impression of the quality of the journal can be obtained. The data obtained from this



Abbreviations: UBCC (University of Bridgeport College of Chiropractic), Tech Natal (Technikon Natal College of Chiropractic), McTimoney (McTimoney College of Chiropractic), Macquarie (Macquarie University), Life W (Life Chiropractic College West), RMIT (Royal Melbourne Institute of Technology), Parker (Parker College of Chiropractic), Logan (Logan College of Chiropractic), CCC-LA (Cleveland Chiropractic College Los Angeles), TCC (Texas Chiropractic College), WSCC (Western States Chiropractic College), Sherman (Sherman College of Straight Chiropractic), Phillips (Phillips Institute of Technology), PCCW (Palmer College of Chiropractic West), Life (Life University), NUHS (National University of Health Sciences), CCC-KC (Cleveland Chiropractic College Kansas City), CMCC (Canadian Memorial College of Chiropractic), NYCC (New York Chiropractic College), AECC (Anglo-European College of Chiropractic) NWHSU (Northwestern Health Sciences University), PCC (Palmer College of Chiropractic), LACC (Los Angeles College of Chiropractic).

Figure 5. Data vs nondata articles per named college in 20 years.

study may serve as a baseline for future analyses of the JCE to monitor its growth and quality.

Use of Abstracts

When investigators are searching for articles, they often make determinations about whether to retrieve the article based on the content of the article's abstract. In the early years of the JCE, some papers were published without abstracts. When abstracts were presented, they were formatted in an outdated prose style. Over time, the use of abstracts increased to 100%. Structured abstracts were introduced to the JCE in 2004, approximately 10 years after the concept was introduced to the biomedical community.[8] This was an important and necessary improvement to the journal, thereby providing more substance to its contents and an enhanced capacity to retrieve articles via database searching.

Use of References

In the early years of the JCE, several papers were published devoid of any references. By any journal benchmark, this was substandard. An argument could be made that since the journal was new, there were few, if any, references for authors to cite. However, the 1980s witnessed great growth in education research in medicine and other health care fields. Therefore lack of material is not to blame, as such papers would have been useful sources of information and worthy of citation. Why such resources were not cited is unknown. Perhaps early scholars in chiropractic education had limited access to information retrieval systems or were unaware of developments in parallel fields. Regardless, a noteworthy improvement was that, beginning in 1999, no articles were published without references (Fig. 2), setting the standard for the JCE that all articles would include references.

Contributions by Geographic Region

The chiropractic profession began in the United States and the JCE is the official journal of the Association of Chiropractic Colleges, which is primarily made up of US colleges. Therefore, it is not surprising that 80% of the articles published in the JCE were affiliated with colleges within the United States (Fig. 3). With the current growth of chiropractic colleges outside of North America and the globalization of chiropractic, it is especially important to make education research available to the developing colleges and to provide a venue in which international research may be published. With 18 chiropractic colleges in the United States and now an estimated 20 in other countries, we should expect to see an increase in the number of articles published from authors outside of the United States.

Because many of the colleges outside of the United States have recently commenced operations, it is likely that faculty efforts at these schools are focused on developing teaching exercises, assessment strategies, and curricula, rather than performing educational research projects. Thus, it may be a while before an increase in published international educational scholarship is evident. In addition, English is the vehicular language for scholarly journals today.[19] If English is not a language used at these international institutions, authors may experience a language barrier to publication if they are not able to write in English. Another interpretation of the data in Figure 4 could be that non-US authors are publishing their chiropractic education research in other periodicals. The extent of this practice is not known and was not investigated in the present study.

Contributions by Institution

If the number of articles is related to the size of a chiropractic college (ie, the theory that more faculty members should produce more manuscripts), then one would expect to see proportionally more papers from the chiropractic institutions with more faculty members, such as Life University and Palmer College. There is no apparent observable relationship between the size of an institution and the number of published manuscripts. For example, Palmer College had the second greatest number of papers during the first two decades of the journal's existence (Fig. 5) and it is one of the largest schools. Yet, Life University, which also is one of the largest chiropractic institutions, had just as many papers published as Palmer College of Chiropractic West (Fig. 5), one of the smaller colleges. Thus, size of the institution does not seem to influence educational research productivity. There are many factors that influence publication rates from the various colleges; additional studies are needed to identify these factors.

Limitations

There were several limitations to this study. This analysis focused on the JCE and only included the contents of the JCE. Other chiropractic education research is published elsewhere and, therefore, this study does not include all chiropractic education research ever published. The JCE was chosen as the focus of this study because its sole purpose is the dissemination of educational research pertaining to chiropractic and it is the primary periodical for this research.

Another limitation is that we did not attempt to identify how many times an individual author or group of authors contributed to each article to evaluate if the representation of any given college was skewed by a single author or group of authors. A more formal content analysis would allow one to detect this influence.[20] Further, we did not perform an analysis of all of the words of each article published in the journal over the two decades that we reviewed. This is another common qualitative method used in descriptive content analysis, whereas authors will select specific items of focus (eg, male vs female authors, use of specific terminology, etc).[4] Typically, this type of analysis requires that the articles be available in electronic form for word

analysis using software programs. Unfortunately, all 20 years of articles were not available to us in a reliable electronic medium. There are many future studies that could address these additional issues.

CONCLUSION

This descriptive analysis of the JCE revealed trends in article types over a 20-year period. Papers were submitted primarily by authors from US chiropractic colleges and the majority were nondata in nature. Overall, only 34% of the papers were data studies, demonstrating a need for more primary research. Few articles were generated from countries other than the United States; thus, there is a need for greater international participation. If education research is a priority for the chiropractic research agenda, this study suggests that the chiropractic profession should include a greater focus on motivating investigators to publish their projects, particularly data-oriented educational research.

If May's[6] suggestion that research performance can be measured by research publications is correct, it would appear that education research in the chiropractic profession is not yet a priority and still has much room for growth. We hope that in the future there will be more data-oriented articles published, that the quality of education research will continue to improve, and that greater involvement of chiropractic educational institutions throughout the world will be realized.

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