Running Head: TRACING THOUGHT THROUGH

Tracing thought through time and space:

A selective review of bibliometrics in social work

Gary Holden, DSW

New York University

Gary Rosenberg, Ph.D

Mount Sinai School of Medicine

Kathleen Barker, Ph.D.

The City University of New York: Medgar Evers College

Correct citation for final version:

Holden, G., Rosenberg, G., & Barker, K. (2005). Tracing thought through time and space: A selective review of bibliometrics in social work. *Social Work in Health Care, 41, ¾,* 1-34.

Keywords:

Informetrics, scientometrics, citation analysis, sociology of science, social work education

The first author may be contacted at: Room 407, MC: 6112, New York University: School of Social Work, 1 Washington Square North, New York, NY 10003,

gary.holden@nyu.edu

Abstract

Bibliometrics is a field of research that examines bodies of knowledge within and across disciplines. Citation analysis, a component of bibliometrics, focuses on the quantitative assessment of citation patterns within a body of literature. Citation analysis has been used in social work to examine the quantity and the impact of the work of individuals and academic institutions. This paper presents a selective review of these uses of bibliometrics within social work.

Introduction

Bibliometrics

Scholarship in social work has been examined from a variety of perspectives (e.g., Fraser, 1994). One of those perspectives uses bibliometrics, a field of research that examines bodies of knowledge within and across disciplines (Norton, 2000; Twining, 2002). Rao (1998) notes that a variety of terms have been used over time and across disparate geographic locales to refer to relatively similar areas of study, such as statistical bibliography, librametry, scientometrics and informetrics. More recently, the terms webometrics and cybermetrics have been observed (Nisonger, 2001). Nisonger states that the 'metrics' in these various descriptions of research areas refers to quantitative assessments of the topic (e.g. scientometrics involves the quantitative analysis of science). Informetrics is the more general field of study that encompasses scientometrics and bibliometrics (Bar-Ilan, 2001; Brookes, 1990; Tague-Sutcliffe, 1992). The term bibliometrics will be used here as it is the one to which social workers will most likely have been exposed.

Bibliometrics draw on a variety of theories and models. These include: information science and cybernetics (Brookes, 1991); the sociology of science (e.g., Robert Merton's group at Columbia: Cole, 2000); an economic theory of science (e.g., Franck, 2002); semiotics (e.g., Cronin, 2000) and evaluation theory (e.g., Narin, Olivastro & Stevens, 1994). Within the field of bibliometrics, there have been discussions of theory (e.g., *citationology,* Garfield, 1998), metatheory (e.g., *moral and political economy; structuration;* Cronin, 1998), and numerous references to methodologies. Bibliometric

methods include such approaches as citation analysis, co-citation coupling, bibliographic coupling and coword analysis. The range of foci in bibliometric studies extends from macro levels examinations related to science policy to micro level examinations of the scholarship of individuals (e.g., Narin, Olivastro & Stevens, 1994). Common quantitative outcomes in bibliometrics are expressed in a number of laws, such as Bradford's Law of Scattering, Garfield's Constant, Garfield's Law of Concentration, Lotka's Law and Zipf's Law (Garfield, 1998). Bibliometrics have been used outside of social work in a range of areas including agriculture, the sciences, library and information sciences, medicine, social sciences, and technology (Sellen, 1993). In addition to numerous books on the subjects, there are a variety of journals related to this topical area including: *Cybermetrics: International Journal of Scientometrics, Informetrics and Bibliometrics; Information Processing & Management; Journal of the American Society for Information Science (*after 2000 titled *Journal of the American Society for Information Science and Technology*); *Journal of Documentation*; *Journal of the Medical Library Association; Library Collections, Acquisitions, and Technical Services; Scientometrics* and *Social Studies of Science.*

Citation analysis, a component of bibliometrics, focuses on the quantitative assessment of citation patterns in a body of literature. Citation analyses depend on citation indexes. Garfield noted:

> The concept of citation indexing is simple. Almost all the papers, reviews, corrections, and correspondence published in scientific journals contain citations. These cite . . . documents that support, provide precedent for, illustrate, or

> elaborate on what the author has to say. Citations are the formal, explicit linkages between papers that have particular points in common. A citation index is built around these linkages (1979, p. 1).

Forms of citation indexing have been used since the 12th century (Wouters, 2000). More specific to the focus of this paper, citations have long been recognized as a potentially valid, although imperfect, measure of a scientist's impact (e.g., Myers, 1970; Oppenheim, 1997). In the past decade, citation analysis has been extended to the murkier world of the web with the advent of '*sitation analysis*' which is the analysis of the linkages between web sites (e.g., Rousseau, 1997).

Giving the increasing number of publications covering bibliometrics in social work, it seemed to be an appropriate time to summarize that scholarship. This paper will therefore present a selective review of this area. In order to provide the reader with some methodological background with which they may approach the review more critically, a summary of critiques of bibliometric methods is presented first.

Both pros and cons have been raised regarding the use of bibliometrics both inside and outside of social work (e.g., Baker, 1990; 1991; 1992a; Borgman & Furner, 2002; Cnaan, Caputo & Shmuely, 1994; Cole, 2000; Cole & Cole, 1971; Garfield, 1997; Jones, 1999; Kirk, 1984; Kostoff, 2002; Krueger; 1993; Lindsey, 1978a; 1980; 1982; 1989; MacRoberts & MacRoberts, 1989; 1992; Plomp, 1990; Phelan, 1999; Porter, 1977; von Ungern-Sternberg, 2000). Many of these are detailed in Table 1. This list of disadvantages might cause a reader to think bibliometrics are a crude tool at best. For instance, MacRoberts and MacRoberts (1989) argued that until citation analysis received

much more careful examination of the theories and assumptions upon which it is based, any findings from using this method would have to be considered very tentative. Lindsey (1989) asks if citation studies are "measuring what is measurable rather than what is valid" (p. 200) and Krueger (1993), in part, calls for a moratorium on the publication of studies that rank social work programs based on publication and citation counts.

Meinert (1993) responded to Krueger suggesting that it might be more productive to critically review and attempt to improve bibliometric methods. We agree with Meinert. Any research area worthy of investigation needs to have its methods continuously and critically reviewed. Research methods can take time to develop and they may be less than optimally applied during the development period (as well as afterward). Further, a number of these criticisms focus on inter-institutional comparisons. Bibliometrics has applications beyond studies that rank social work programs. We have suggested elsewhere (as have others) that bibliometrics could be used as a decision-making aid in academic hiring, reappointment, tenure and promotion decisions, as well as for descriptions of larger aggregations of scholarship such as journals. In general, one should remember the Institute for Scientific Information's (ISI) suggestions for interpretation in citation analysis. These recommendations merit summation:

1. Compare like with like: scientists or papers in the same field and papers of the same vintage, since different fields exhibit different average rates of citations and older papers have more time to collect citations than younger papers.

2. Multiple measures (number papers, citations, cites/paper, percent cited vs. uncited) and large datasets are superior to single, thin ones.

3. Relative measures should be used, not merely absolute scores (such as setting citation counts relative to appropriate baseline, or average, scores).

4. Sometimes the area of research is not adequately surveyed by the database examined, in which case the measures will not be robust and could be misleading.

5. And, most important, that these methods should be used as supplement and not as replacement for careful consideration by informed peers or experts (ISI, 2003, p. 1)

The reader should keep these recommendations in mind while reading this article as well as other applications of bibliometrics in social work, in order to maximize the probability of arriving at valid conclusions.

Bibliometrics in Social Work

Within social work, the productivity and impact of individuals and academic institutions has been examined using citation analysis. These are the focus of this paper and will be examined in the next sections. Bibliometric approaches have been used in other ways in social work. These include examination of: the production of books and dissertations in social work over time (Baker, 1991); evolving issues related to the Danish Welfare State (Wormell, 2000a; 2000b); the pattern of citations to articles published in drug and alcohol journals (Howard & Howard, 1992) the social work holdings of libraries (Jones, & Jones, 1986); the relative importance of journals in social

work (Williams, 2001); the impact of a social work journal over a decade (Rosenberg, Holden & Barker, 2005) the relationships among journals in the social work journal network (Baker, 1992b); the interaction of social work and other fields (Cheung, 1990); the use of social science literature in social work journals (Bush, Epstein & Sainz, 1997); the use of citations to contrast rapid assessment instruments (McMurty, Rose & Cisler, 2003); the relationship of citations to reputation as a social work researcher (Rothman, Kirk & Knapp, 2003); and the use of bibliometrics in academic employment decisions (Holden, Rosenberg & Barker, 2005).

Quantity

Perhaps the most basic approach in bibliometrics is to calculate the number of publications by some individual or group. Table 2 details research on the quantity of scholarship of social workers. The reader should be aware that some of these study reports overlap. That is the same data (e.g. articles for a particular time period) may be included in more than one study. While the purposes of the citation analyses in Table 2 vary, we focused on findings relevant to the quantity of journal articles published by social workers. Unrelated findings from these studies have been omitted. The studies reviewed herewith include descriptions of the quantity of publications by: social work doctoral graduates; editorial board members; highly successful authors; schools of social work; and social work faculty in general, as well as faculty subgroups (e.g., females/males, African-Americans). Productivity statistics are provided for the reader and these calculations result from averaging the number of publications over a period

of time. For instance, a faculty member who publishes one article every three years would have a yearly productivity rate of .33.

It should also be noted that the data source for a number of studies is the *Social Science Citation Index* (SSCI). SSCI is one of three databases that comprise the Web of Science (WoS) available from Thomson's Institute for Scientific Information (http://isi4.isiknowledge.com/portal.cgi). Thomson claimed that in January 2004, SSCI covered over 1700 social science journals and the three WoS databases combined covered approximately 8500 journals.

In terms of quantity of publications, the studies found in Table 2 generally support the notion that social work scholars publish in both social work and non-social work journals. Many of these studies also reveal that a substantial proportion of faculty never or rarely publish, while a much smaller subset of faculty are relatively prolific. This finding appears to coincide with *Lotka's Law of Scientific Productivity of Authors.* Lotka's law states that "the number (of authors) making n contributions is about $1/n^2$ of those making one; and the proportion of all contributors that make a single contribution, is about 60% "(Twining, 2002, no p). Therefore, the relative percentages of the authors contributing n articles within an analysis should be (approximately): 60% of authors would have published 1 article; 25% would have published 2 articles; 11% would have published 3 articles and so on (this is obviously a rough approximation given that the proportions exceed 100%). While insufficient data was available in most of these studies to calculate comparable statistics, the rough form of positive skew represented by Lotka's Law was observed. For instance, Hull and Johnston (1994) found

that in the seven journals they studied for the 1985-1991 period, approximately 9% (*n*=167) of undergraduate faculty published an article. Of those 167 who published, 73% published one article. A positively skewed productivity distribution appears at the academic organization level as well with approximately 20% of the doctoral faculties producing 44% of the articles in one major study (Green, Baskind & Bellin, 2002).

It is also worth noting that differences in sampling (e.g., time periods, journals, schools) and operational definitions (what is a "publication") make other comparisons difficult. It is clear that research on practitioner publication is much more rare than research on faculty publication. While practitioners were included in some of these studies, analysis of them as a subgroup was not clearly executed. For instance, studies of social work doctoral program graduates likely included current and past faculty.

Impact

How should one think about the quantity of scholarship versus the impact of scholarship? Should one be emphasized over the other or should one seek a relatively balanced combination? The Coles (Cole & Cole, 1967) grappled with this issue in their examination of physicists by describing existing patterns of publications. They proposed four rough types: the prolific physicist (high quantity, high quality), the mass producer, the perfectionist and the silent physicist (low quantity, low quality). Lindsey (1978b) proposed the *corrected quality ratio,* which combined the n of publications and n of citations (using a variety of adjustments, but it has not been used frequently (Glanzel & Moed, 2002. Note that throughout our studies, the focus is on impact rather than 'quality' which is a more difficult to define construct that has led to criticisms of

bibliometrics in the past (Phelan, 1999). Although we raise the question of what is the desired mix of quantity and impact, a serious discussion is beyond the scope of this article.

In the narrative review provided below, we focus on impact (operationalized as citations to journal articles), as *an* indicator of the quality of a scholar's work (cf., Garfield, 1996; Narin, Olivastro & Stevens, 1994). The early assumption that citations were equivalent to quality has often been critiqued. Lindsey (1989) discusses these limitations and uses the term contribution at one point, which also seems less problematic than quality. Kostoff (2002) notes: "[t]he assumption is then made that documents with higher relative numbers of citation counts have more impact than those with lower citation counts, and are of higher quality from a citation metric perspective" (p.50). Our view is that impact is a more neutral term than quality or contribution and that impact and quality are imperfectly correlated. For instance, (to echo Lindsey's (1989) point about work outside the dominant paradigm) a very high quality article may be infrequently cited because the author has chosen a topic that is of little interest to colleagues during the years subsequent to its publication. While some of the following studies we discus below were included in Table 2 if they reported quantity data, we return to them here because the authors also reported citation analyses.

In the 1970s, Lindsey published a series of seminal pieces that set a standard for bibliometrics in social work. For instance, he examined a proportional, stratified, random sample of journal articles from the sciences (biochemistry) and the social sciences (economics, psychiatry, psychology, social work and sociology) published in

1970 (Lindsey, 1978a). He found that social work articles had fewer references to prior work than the other surveyed fields. In terms of citations to the articles (during the 1970-1976 period), the distribution of citations was positively skewed in all fields and social work had the lowest overall mean and median numbers of citations. Lindsey noted: "In all of the fields, 10 percent of the papers attracted 42 to 49 percent of the citations. Most of the papers that are published are rarely, if ever, used by future investigators" (p. 92).

Impact of editors. One line of subsequent research stemmed from Lindsey's (1976; c.f., Lindsey, 1978a, Ch. 4) contrast of the productivity of psychology, social work and social work journal editorial board members. Utilizing various citation related indicators as measures of quality, Lindsey concluded that social work editorial board members produced less and lower quality scholarship. Pardeck, et al., (1991) partially replicated Lindsey's studies from the mid- to late-1970's and contrasted five social work and five psychology journal editorial boards. They used the number of times each editorial board member was cited (when they were the first author) in the SSCI in 1989 as the outcome and found that psychology editorial board members were cited more frequently in 1989. The re-analysis of this data (Pardeck, 1992a) was published in *Research on Social Work Practice* along with a series of commentaries (Epstein, 1992; Fortune, 1992; Gillespie & Khinduka, 1992; Hopps, 1992; Lindsey, 1992; Reamer, 1992; Schuerman, 1992) and a reply from Pardeck (1992b). The finding that journal editorial board members in psychology were cited more frequently than those in social work was

replicated in the re-analysis. Conceptual and methodological issues were framed as concerns in many of the commentaries.

Responding in part to commentators' criticisms, Pardeck, Chung and Murphy (1995) reported a replication and extension of Pardeck and Lindsey's earlier work. Looking at editorial board members and guest reviewers for six core social work journals for the 1987-90 period, they found that the median number of articles published ranged from 0 to 1 (depending on the journal). During this period, the percentage of board members and reviewers who were cited three times or less during the four year period ranged from 0 to 53% across the six journals. These findings may underestimate editorial board impact because citations were only counted when the board member/reviewer was the first or sole author and self-citations were not included. Multiple authorship and self citation are potential problems in bibliometrics and although the approach used in this study has been employed in other studies, we have suggested elsewhere that this practice may not be optimal (Holden, Rosenberg & Barker, 2005).

These editorial board scholarship analyses were replicated again, when Pardeck and Meinart (1999a) examined the editorial board and consulting editors of *Social Work.* Productivity (articles) and impact (citations) for the 1990-95 period were analyzed. In terms of productivity, 50% of the editorial board and 19.1% of the consulting editors did not publish an article that the authors could uncover in their search of three sources (*Social Work Abstracts, Sociological Abstracts and Psychological Abstracts*). In terms of impact, 50% of the editorial board and 23.4% of the consulting editors fell in the

category of 0-3 citations during the six years. As in the first version of this publication, there were a series of responses (Browning & Winchester, 1999; Epstein, 1999; Ginsberg, 1999; Karger, 1999; Kreuger, 1999; Lindsey, 1999; Midgley, 1999; Reamer, 1999) and a response to these responses (Pardeck & Meinart, 1999b). In that response, Pardeck and Meinart note that:

> Within the field of social work, the worship of diversity may have overshadowed the importance of social work as the features of science have been devalued. In all activities, we insist on casting the widest inclusionary net and are fearful of leaving out a group; yet at the same time, we do not exhibit the same degree of insistence that scientific merit be included (p. 123).

Pardeck's (2002) most recent research entailed contrasting the productivity of the editors of five major psychology with five major social work journals. During the 1992 through June 2001 period, the psychology editors published 24.4 articles on average (*SD*=9.5), whereas the social work editors published 3.4 articles on average (*SD*=4.22; *M* = .36 articles per year, per editor). In terms of citations (the same restriction to sole or first authors as noted above), psychology editors were cited 76.8 times on average during a five year period (1995-99), while social work editors were cited 9.28 times (*M* = 1.86 times per year, per editor).

These results for social work editors are disquieting (c.f. Lindsey, 1999 for similar preliminary results regarding endowed chairs in social work). Even with acquiescence to the view that more is required of an editor than being a prolific scholar (e.g., Reamer, 1999), the role of editor is a self-selected one that hinges on, presumably at least in part,

a quest for knowledge, scholarship and writing. In depth discussion of the reasons for this consistent and dramatic differentiation is beyond the scope of this article but root causes are likely many. As one of our reviewers alluded to, is this simply a difference in publication and citation norms of the two fields (e.g., ISI, 2003; Najman & Hewitt, 2003)? Lindsey (1991) has noted the related issue that there seem to be differences between 'academic' and 'practice' fields in the amounts of citations received (Lindsey, 1991). Other questions could be raised. Are academic institutions providing enough support for journal editors in social work? Is editing a social work journal different than editing journals in other fields (i.e., more onerous)? These issues are worthy of empirical investigation and discussion. Despite the need for further research in this area, Lindsey's and Pardeck's research has illuminated and maintained a focus on the situation that may have already (or may in the future) increased the presence of active scholars on editorial boards in social work.

A related issue is the quality of peer review. It has seemed clear for some time that the peer review process in social work can be problematic (cf., Lindsey, 1978c, 1988; 1991; 1999; Pardeck & Meinart, 1999b). We assume that this is, in part, due to a failure on the part of academics to teach students to carry out this professional responsibility. Lindsey's and Pardeck's findings may be an additional component of the explanation of this problem. If one is not taught how to perform constructive peer review, and one rarely publishes (thereby having both positive and negative models of the peer review process), then the likelihood that one would produce strong reviews is reduced. Regardless, higher quality peer review is so important to the profession that it deserves

ever more serious attention by editors, scholars and faculty responsible for the design of doctoral curricula.

Impact of journals. Lindsey and Kirk (1992) used the impact factor score (IFS) to contrast the impact of social work journals. The IFS was developed by Garfield and Sher in the early 1960's (Garfield, 1999). A journal's IFS is computed by "dividing the number of citations in year 3 to any items published in the journal in years 1 and 2 by the number of substantive articles published in that journal in years 1 and 2" (Saha, Saint & Christakis, 2003, p. 43). Lindsey and Kirk compared social work journals' IFSs and found that of the core social work journals, *Social Work* (SW) had the highest IFS during the 1981-89 period (mean = .70). These authors suggest that such findings may be due in part to the vast differentials in the distribution of SW relative to specialty journals, and others have reported a strong positive correlation (r = .68) between journal citation rates and the size of the journals' circulation (Howard & Howard, 1992). With bibliometric indicators, as with any indicator in the social sciences, one needs to be cautious about regarding the psychometric properties of the indicator. IFSs have received support as an indicator of journal quality (Christenson & Sigelman, 1985; Saha, Saint, & Christakis, 2003), although they have also been critiqued regarding a number of issues (e.g., Frank, 2003; Garfield, 1996; Glanzel & Moed, 2002). For instance, within social work, Furr (1995) reported findings suggesting that the IFS may not reflect impact within the journal's discipline, as opposed to across disciplines (as they are currently computed).

Impact of authors in social work journals. Dumas, Logan and Finley (1993) studied citations to articles published in the *British Journal of Social Work* (BJSW) and *Social Work* (SW) during the 1984-91 period and described the highly cited articles and subject categories for each journal. The most highly cited article in the BJSW had been cited 16 times during the period, whereas the most highly cited article in SW had been cited 29 times during the period. Eight articles from SW were cited 20 or more times. Conversely, there were 89 articles in the *British Journal of Social Work* and 231 articles in *Social Work* that had only been cited one time during the period. In terms of interpreting the differences in citations rates, Dumas, Logan and Finley suggest that the smaller number of articles in each issue of BJSW, along with its less frequent rate of publication should be considered. Differences in citation norms may also have been a factor.

Impact of faculty. In their 1992 paper, Klein and Bloom sought to help the profession reduce the level of subjectivity in tenure and promotion decisions. They reported four studies using citation analysis. In the first study of social work experts (authors in the *Encyclopedia of Social Work*), they found that in 1987 these experts averaged 9.4 citations per person, and among academics, full professors (13.7) were cited more than associate professors (7.6) and assistant professors (4.7). In their second study, Klein and Bloom found that the 99 deans and directors of CSWE accredited programs were cited an average of 2.9 times in 1987. In their third study of a convenience sample of four U.S. schools of social work, they found that full professors were cited more frequently, but that the rankings were mixed for associate and assistant professors. They also found generally lower average rates of citation for faculty in these

four "major" schools compared to the expert and deans samples. In their fourth study of three individual faculty, Klein and Bloom employed statistics such as the write/cite index, lag time and persistence that allow for a more in-depth view of three scholars' work.

Subsequently, Bloom and Klein (1995) studied 344 faculty (333 for whom cites were found) from the top 13 schools in the Thyer and Bentley (1986) study. Overall, they found that 29.7% of these faculty had a publication listed in SSCI and that 76.6% of these faculty had been cited. The average rate of publication for these faculty was .56 and the average number of citations per faculty was 9.55 in 1992. Bloom and Klein combined three variables (average total journal articles published, proportion of all faculty members publishing, and average number of citations) to create a critical mass of scholarship score which they saw as a more comprehensive measure of an institution's scholarly productivity. The mean critical mass score in this sample of 13 schools was 2.49, which was exceeded by the University of California-Berkeley (*M*=11.58), Columbia University (*M*=6.27), Washington University (*M*=3.34), the University of Wisconsin-Madison (*M*=3.26) and the University of Washington-Seattle (*M*=2.78).

In another study that contrasted psychologists with social workers, Thyer and Polk (1997) randomly selected 20 universities with doctoral programs and then obtained the names of full professors in the social work and psychology programs at these universities. Thyer and Polk determined the number of times that each of these full professors were cited in the SSCI during 1994. Given the positive skew of the

citation distributions for each group, Thyer and Polk reported the median number of citations for the full professors, which was 19 for psychology and 4 for social work. More recently, Green and Hayden (2001) examined the number of published articles and citations for the ten most productive social work faculties during the 1990-1997 period. The average faculty member on these faculties published 4.4 articles during the period with those articles being cited 3.27 times on average (means were positively skewed by the University of California-Berkeley faculty). Perhaps most revealing was that non social work journal articles were much more frequently cited (4.22 times per non-social work vs. 1.69 times per social work article). For both of these studies, as with the inter-professional contrasts of journal editors reported above, the possibility of differing norms of citing behavior remains one possible, partial explanation of the results.

A small body of knowledge regarding the impact of social work scholarship has been evolving since Lindsey's 1978 work. The emerging picture seems to be that as a group, social work faculty were publishing regularly, although productivity is skewed, with a small group of authors responsible for a disproportionate share of the output. In terms of impact, we have preliminary evidence: that impact as measured by citations is similarly skewed with a small group of papers receiving most of the citations; that as one might expect full professors tended to have higher rates of citation, as do deans and 'experts' in the field; and that social work faculty publications in non-social work journals were more likely to be cited.

Although less is known about the scholarship of practitioners as a group, some researchers have begun to study the topic (e.g., Bush, Epstein & Sainz, 1997; Rehr, Showers, Rosenberg & Blumenfield, 1998; Staudt, Dulmus & Bennett, 2003). Further investigation of the scholarship of practitioners is in order. As Rehr, Rosenberg, Showers and Blumenfield (1998), suggest "[w]e need to learn, from practice writings, what concerns clinicians, and what they have examined" (p.76).

Examination of practitioners' scholarship is but one possibility in an area that is ripe for exploration. Our group has explored the use of bibliometrics in academic employment decisions (Holden, Rosenberg & Barker, 2005) and the examination of the output of a core social work journal over the course of a decade (Rosenberg, Holden & Barker, 2005). These represent merely two among many possible lines of research.

Conclusion

Like any other area of study, bibliometrics is in a process of evolution. To date, the field has provided us with some fascinating windows into the world of scholarship. As can be seen from the preceding review, social workers are publishing journal articles and these articles are having an impact. Yet, there is much to learn about these processes and outcomes. Although the methods of citation analyses have varied, over time more agreement about the best methods should emerge and estimates will become easier to interpret. Scholars are developing bibliometric methods and advocating for the development of databases such as the WoS. The prevailing views of citation analysis as a method appear to range from the relatively positive such as the one you have encountered in this paper to the relatively negative (e.g., MacRoberts & MacRoberts,

1989). Social workers should remember that both bibliometrics and scientometrics are subsumed under the general field of informetrics (Brookes, 1990). The evolution of easily accessible, full-text source materials opens up even more informetric research possibilities (c.f., Borgman & Furner, 2002).

In our view, it is too early to "go negative" on bibliometrics. In closing, we offer the simple maxim oft stated: Better data leads to better decisions. Better bibliographic data will lead to better understanding of, and decisions about, social work scholarship.

References

Abbott, A. A. (1985). Research productivity patterns of social work doctorates. *Social Work Research and Abstracts, 21, 3,* 11-17.

Baker, D. R. (1990). Citation analysis: A methodological review. *Social Work Research & Abstracts, 26,* 3-10.

Baker, D. R. (1991). On-line bibliometric analysis for researchers and educators. *Journal of Social Work Education, 27,* 41-47.

Baker, D. R. (1992a). Author responds. *Social Work Research & Abstracts, 28,* 4-5.

Baker, D. R. (1992b). A structural analysis of the social work journal network: 1985-1986. *Journal of Social Service Research, 15,* 153-168.

Baker, D. R., & Wilson, M. V. K. (1992). An evaluation of the scholarly productivity of doctoral graduates. *Journal of Social Work Education, 28,* 204-213.

Bar-Ilan, J. (2001). Data collection methods on the Web for informetric purposes – A review and analysis. *Scientometrics, 50, 1,* 7-32.

Black, P. E. (2002). Lotka's law. Retrieved 12/23/02 from: http://www.nist.gov/dads/HTML/lotkaslaw.html

Bloom, M. & Klein, W. C. (1995). Publications & citations: A study of faculty at leading schools of social work. *Journal of Social Work Education, 31,* 377-387.

Borgman, C. L., & Furner, J. (2002). Scholarly communication and bibliometrics. In B. Cronin (Ed.), *Annual Review of Information Science and Technology, 36* (pp. 3-72). Medford, NJ: Information Today.

Brookes, B. C. (1990). Biblio-, sciento-, infor-metrics??? What are we talking about? In L. Egghe & R. Rosseau (Eds.), *Informetrics 89/90.* (pp. 31-44). Amsterdam: Elsevier.

Browning, J. & Winchester, N. (1999). Scholarship, inclusiveness, and *Social Work. Research on Social Work Practice, 9,* 113-4.

Bush, I., Epstein, I. & Sainz, A. (1997). The use of social science sources in social work practice journals: An application of citation analysis. *Social Work Research, 21, 1,* 45-56.

Cheung, K. M. (1990). Interdisciplinary relationships between social work and other disciplines: A citation study. *Social Work Research and Abstracts, 26, 3,* 23-9.

Christenson, J.A. and Sigelman, L. (1985). Accrediting knowledge: journal stature and citation impact in social science. *Social Science Quarterly 66,* 964-975

Cnaan, R. A., Caputo, R. K. & Shmuely, Y. (1994). Senior faculty perceptions of social work journals. *Journal of Social Work Education, 30,* 185-199.

Cole, J. R. (2000). A short history of the use of citations as a measure of the impact of scientific and scholarly work. In B. Cronin & H. B. Atkins (Eds.), *The Web of Knowledge: A Festchrift in Honor of Eugene Garfield.* (pp. 281-300). Medford, NY: Information Today.

Cole, J. & Cole, S. (1971). Measuring the quality of sociological research: Problems in the use of the *Science Citation Index. The American Sociologist, 6,* 23-29.

Cole, S. & Cole, J. (1967). Scientific output and recognition: A study of the reward system in science. *American Sociological Review, 32,* 377-390.

Corcoran, K. J., & Kirk, S. A. (1990). We're all number one: Academic productivity among schools of social work. *Journal of Social Work Education, 26,* 310-321.

Cronin, B. (1998). Metatheorizing citation. *Scientometrics, 43,* 45-55.

Cronin, B. (2000). Semiotics and evaluative bibliometrics. *Journal of Documentation, 56,* 440-453.

Cronin, B. & Overfelt, K. (1994). Citation-based auditing of academic performance. *Journal of the American Society for Information Science, 45, 2,* 61-72.

Dumas, T., Logan, E., & Finley, A. (1993). In focus: Using citation analysis and subject classification to identify and monitor trends within a discipline. In S. Bonzi (Ed.), *Proceedings of the 56th Annual Meeting of the American Society for Information Science.*(pp135-50). Medford, NJ: Learned Information, Inc.

Epstein, W. M. (1992). A response to Pardeck: Thump therapy for social work journals. *Research on Social Work Practice, 2,* 525-528.

Epstein, W. M. (1999). Of newsletters and scholarly journals. *Research on Social Work Practice, 9,* 111-112.

Fortune, A. E. (1992). More is not better – manuscript reviewer competence and citations: From the Past Editor-in-Chief *Journal of Social Work Education. Research on Social Work Practice, 2,* 505-510.

Fox, M. F. & Faver, C. A. (1985). Men, women, and publication productivity: Patterns among social work academics. *Sociological Quarterly, 26,* 537-549.

Frank, M. (2003). Impact factors: Arbiter of excellence. *Journal of the American Medical Library Association, 91,* 4-6 .

Franck, G. (2002). The scientific economy of attention: A novel approach to the collective rationality of science. *Scientometrics, 55, 1,* 3-26.

Fraser, M. W. (1994). Scholarship and research in social work: Emerging challenges. *Journal of Social Work Education, 30,* 252-266.

Furr, A. L. (1995). The relative influence of social work journals: Impact factors vs. core influence. *Journal of Social Work Education, 31,* 38-45.

Garfield, E. (1979). A conceptual view of citation indexing. In E. Garfield (Ed.), *Citation indexing – Its theory and application in science, technology and humanities.* (pp. 1-5). New York: John Wiley.

Garfield, E. (1996). How can impact factors be improved? *BMJ, 313, 7054,* 411-413.

Garfield, E. (1997). Validation of citation analysis. *Journal of the American Society for Information Science,48,* 962-964.

Garfield, E. (1998). Random thoughts on citationology. Its theory and practice. *Scientometrics, 43,* 69-76.

Garfield, E. (1999). Journal impact factor: A brief review. *Canadian Medical Association Journal, 161,* 979-980.

Gastel, B. (2001). Assessing the impact of investigators' work: Beyond impact factors. *Canadian Journal of Anesthesia, 48,* 941-945.

Gillespie, D. F. & Khinduka, S. (1992). A response to Pardeck: From the Associate Editor and the Chair of the Editorial Board of the *Journal of Social Service Research. Research on Social Work Practice, 2,* 511-514.

Ginsberg, L. (1999). Reviewers, orthodoxy, and the passion to publish. *Research on Social Work Practice, 9,* 100-103.

Glanzel, W. & Moed, H. F. (2002). Journal impact measures in bibliometric research. *Scientometrics, 53, 2,* 171-193.

Green, R.G. (1998). Faculty rank, effort, and success: A study of publication in professional journals. *Journal of Social Work Education, 34,* 415-427.

Green, R. G., & Bentley, K. J. (1994). Attributes, experiences, and career productivity of successful social work scholars. *Social Work, 4,* 405-412.

Green, R. G., & Secret, M. (1996). Publishing by social work scholars in social work and non-social work journals. *Social Work Research, 20, 1,* 31-41.

Green, R. G., & Hayden, M. A. (2001). Citation of articles published by the most productive social work faculties in the 1990's. *Journal of Social Service Research, 27, 3,* 41-56.

Green, R. G., Baskind, F. R., & Conklin, B. (1995). The 1990s publication productivity of schools of social work with doctoral programs: "The times, are they a-changin?" *Journal of Social Work Education, 31,* 388-401.

Green, R. G., Baskind, F. R., Best, A. M. & Boyd, A. S. (1997). Getting beyond the productivity gap: Assessing variation in social work scholarship. *Journal of Social Work Education, 33,* 541-553.

Green, R. G., Baskind, F. R., & Bellin, M. H. (2002). Results of the doctoral faculty publication project: Journal article productivity and its correlates in the 1990s. *Journal of Social Work Education, 37,* 135-152.

Green, R.G., Hutchison, E. D., & Sar, B. K. (1992). Evaluating scholarly performance: The productivity of graduates of social work doctoral programs. *Social Service Review, 66,* 441-466.

Green, R. G., Kvarfordt, C. L. & Hayden, M. A. (2001). The middle years of the Decade Publication Project: 1994-97. *Journal of Social Work Education, 35, 2,* 195-202.

Grinnell, R. M. & Royer, M. L. (1983). Authors of articles in social work journals. *Journal of Social Service Research, ¾,* 147-154.

Holden, G., Rosenberg, G., & Barker, K (2005). Bibliometrics: A potential decision making aid in hiring, reappointment, tenure and promotion decisions. *Social Work in Health Care.*

Hopps, J. G. (1992). A response to Pardeck: From the Past-Editor of *Social Work*. *Research on Social Work Practice, 2,* 499-500.

Howard, M. O. & Howard, D. A. (1992). Citation analysis of 541 articles published in drug and alcohol journals: 1984-1988. *Journal of Studies on Alcohol, 53,* 427-434.

Hull, G. H., & Johnson, H. W. (1994). Publication rates of undergraduate social work programs in selected journals. *Journal of Social Work Education, 30,* 34-62.

ISI (2003). *Interpretation*. Retrieved 1/13/04 from: http://esi-topics.com/interpreting.html

Jayaratne, S. (1979). Analysis of selected social work journals and productivity rankings among schools of social work. *Journal of Education for Social Work, 15, 3,* 72-80.

Johnson, H. W., & Hull, G. H. (1995). Publication productivity of BSW faculty. *Journal of Social Work Education, 31,* 358-368.

Jones, A. W. (1999). The impact of *Alcohol and Alcoholism* among substance abuse journals. *Alcohol and Alcoholism*, *34, 1,* 25-34.

Jones, J. F. & Jones, L. M. (1986). Citation analysis as an approach to journal assessment in social work. *National Taiwan University Journal of Sociology, 18,* 207-219.

Karger, H. J. (1999). The politics of social work research. *Research on Social Work Practice, 9,* 96-9.

Kirk, S. A. (1984). Methodological issues in the comparative study of schools of social work. *Journal of Social Service Research, 7, 3,* 59-73.

Kirk, S. A. & Rosenblatt, A. (1980). Women's contributions to social work journals. *Social Work, May,* 204-209.

Kirk, S. A. & Rosenblatt, A. (1984). The contribution of women faculty to social work journals. *Social Work, January-February,* 67-9.

Kirk, S. A., Wasserstrum, K., & Miller, D. A. (1977). Publish and perish: A study of promotion and tenure in schools of social work. *Journal of Social Welfare, Winter,* 90-7.

Klein, W. C. & Bloom, M. (1992). Studies of scholarly productivity in social work using citation analysis. *Journal of Social Work Education, 28,* 291-299.

Kostoff, R. N. (1998). The use and misuse of citation analysis in research evaluation. *Scientometrics, 43, 1,* 27-43.

Kostoff, R. N. (2002). Citation analysis of research performer quality. Scientometrics, 53, *1,* 49-71.

Kreuger, L. W. (1993). Should there by a moratorium on articles that rank schools of social work based on faculty publications? Yes! *Journal of Social Work Education, 29,* 240-246.

Kreuger, L. W. (1999). Shallow science? *Research on Social Work Practice, 9,* 108-110.

Kroll, H. W. (1976). Institutional sources of articles published in social work journals: 1965-1974. *Arete, 4,* 121-125.

Ligon, J. & Thyer, B. A. (2001). Academic affiliations of social work journals authors: A productivity analysis from 1994-98. *Journal of Social Service Research, 28,* 69-81.

Ligon, J., Thyer, B. A. & Dixon, D. (1995). Academic affiliations of those published in social work journals: A productivity analysis, 1989-1993. *Journal of Social Work Education, 31, 3,* 369-76.

Lindsey, D. (1976). Distinction, achievement and editorial board membership. *American Psychologist, 31,* 799- 804.

Lindsey, D. (1978a). *The scientific publication system in social science.* San Francisco: Jossey-Bass.

Lindsey, D. (1978b). The corrected quality ratio: A composite index of scientific contribution to knowledge. *Social Studies of Science, 8 3,* 349-354.

Lindsey, D. (1978c). The outlook of journal editors and referees on the normative criteria of scientific craftsmanship. *Quality and Quantity, 12,* 45-62.

Lindsey, D. (1980). Production and citation measures in the sociology of science: The problem of multiple authorship. *Social Studies of Science, 10,* 145-162.

Lindsey, D. (1982). Further evidence for adjusting for multiple authorship. *Scientometrics, 4, 5,* 389-395.

Lindsey, D. (1988). Assessing precision in the manuscript review process: A little better than a dice roll. *Scientometrics: 14, 1-2,* 75-82.

Lindsey, D. (1989). Using citation counts as a measure of quality in science: Measuring what's measurable rather than what's valid. *Scientometrics, 15,* 189-203.

Lindsey, D. (1991). Precision in the manuscript review process: Hargens and Herting revisited. *Scientometrics, 22, 2,* 313-325.

Lindsey, D. (1992). Improving the quality of social work journals: From the Editor of *Children and Youth Services Review. Research on Social Work Practice, 2,* 515-524.

Lindsey, D. (1999). Ensuring standards in social work research. *Research on Social Work Practice, 9,* 115-120.

Lindsey, D., & Kirk, S. A. (1992). The role of social work journals in the development of a knowledge base for the profession. *Social Service Review, 66,* 295-310.

MacRoberts, M. H. & MacRoberts, B. R. (1989). Problems of citation analysis: A critical review. *Journal of the American Society for Information Science, 40,* 342-349.

MacRoberts, M. H. & MacRoberts, B. R. (1992). Problems of citation analysis. *Social Work Research & Abstracts, 28,* 4.

MacRoberts, M. H. & MacRoberts, B. R. (1997). Citation content analysis of a botany journal. *Journal of the American Society for Information Science, 48,* 274-275.

McMurty, S. L., Rose, S. J., & Cisler, R. A. (2003). Identifying and administering the most-used rapid assessment instruments. Presentation at the Seventh Annual Society for Social Work & Research Conference, Washington, DC.

McNeece, C. A. (1981). Faculty publications, tenure, and job satisfaction in graduate social work programs. *Journal of Education for Social Work, 17, 3,* 13-19.

Meinert, R. (1993). Response to Dr. Kreuger. *Journal of Social Work Education, 29,* 245-246.

Mendelsohn, H. N. (1997). *An author's guide to social work journals.* Washington, DC: NASW Press.

Midgley, J. (1999). Academic merit, professional needs, and social work education. *Research on Social Work Practice, 9,*104-107.

Mokau, N., Hull, G., & Burkett, S. (1993). The development of knowledge by undergraduate program directors. *Journal of Social Work Education, 29, 2,* 160-170.

Myers, C. R. (1970). Journal citations and scientific eminence in contemporary psychology. *American Psychologist, 25,* 1041-1048.

Najman, J. M. & Hewitt, B. (2003). The validity of publication and citation counts for Sociology and other selected disciplines. *Journal of Sociology, 39, 1,* 62-80.

Narin, F., Olivastro, D., & Stevens, K. A. (1994). Bibliometrics/theory, practice and problems. *Evaluation Review, 18, 1,* 65-76.

Nisonger, T. E. (2001). Report on the 8th International Conference on Scientometrics and Informetrics in Sydney, Australia. *Library Collections, Acquisitions, and Technical Services, 25,* 485-488.

Norton, M. J. (2000). *Introductory concepts in information science.* Medford, NJ: Information Today, Inc.

Oppenheim, C. (1997). The correlation between citation counts and the 1992 research assessment exercise ratings for British research in genetics, anatomy and archaeology. *Journal of Documentation, 53,* 477-487.

Pardeck, J. T., Arndt, B. J., Light, D. B., Mosley, G. F., Thomas, S. D., Werner, M. A., & Wilson, K. E. (1991). Distinction and achievement levels of editorial board members of psychology and social work journals. *Psychological Reports, 68,* 523-27.

Pardeck, J. T. (1992a). Are social work journal editorial boards competent? Some disquieting data with implications for research on social work practice. *Research on Social Work Practice, 2,* 487-96.

Pardeck, J. T. (1992b). The distinction and achievement levels of social work editorial boards revisited. *Research on Social Work Practice, 2,* 529-537.

Pardeck, J. T. (2002). Scholarly productivity of editors of social work and psychology journals. *Psychological Reports, 90,* 1051-1054.

Pardeck, J. T., Chung, W. S., & Murphy, J. W. (1995). An examination of the scholarly productivity of social work journal editorial board members and guest reviewers. *Research on Social Work Practice, 5,* 223-234.

Pardeck, J. T., & Meinart, R. G. (1999a). Scholarly achievements of the *Social Work* editorial board and consulting editors: A commentary. *Research on Social Work Practice, 9,* 86-91.

Pardeck, J. T., & Meinart, R. G. (1999b). Improving the scholarly quality of *Social Work's* editorial board and consulting editors: A professional obligation. *Research on Social Work Practice, 9,* 121-127.

Phelan, T. J. (1999). A compendium of issues for citation analysis. *Scientometrics, 45, 1,* 117-36.

Plomp, R. (1990). The significance of the number of highly cited papers as an indicator of scientific prolificacy. *Scientometrics, 19,* 185-197.

Porter, A. L. (1977). Citation analysis: Queries and caveats. *Social Studies of Science, 7,* 257-67.

Rao, I. K. R. (1998). Informetrics: Scope, definition, Methodology and conceptual questions. Workshop on *Informetrics and Scientometrics,* 16-19 March 1998, Bangalore. Retrieved 8/2/03 from: http://drtc.isibang.ac.in/~sneha/gsdl/AA.PDF

Reamer, F. G. (1992). A response to Pardeck: Form the Editor-in-Chief of the *Journal of Social Work Education. Research on Social Work Practice, 2,* 501-504.

Reamer, F. G. (1999). Social work scholarship and gatekeeping: Reflection on the debate. *Research on Social Work Practice, 9,* 92-95.

Rehr, H. , Rosenberg, G., Showers, N., & Blumenfield, S. (1998). Social work in health care: Do practitioners's writings suggest an applied social science? *Social Work in Health Care, 28, 2,* 63-81.

Rehr, H. , Showers, N., Rosenberg, G., & Blumenfield, S. (1998). Profiles of published social work practitioners: Who wrote and why. *Social Work in Health Care, 28, 2,* 83-94.

Robbins, S. P., Corcoran, K. J., Hepler, S. E., & Magner, G. W. (1985). *Academic productivity in social work education.* Washington, D.C.: Council on Social Work Education.

Rosen, A. (1979). Evaluating doctoral programs in social work: A case study. *Social Work Research & Abstracts, 15, 4,* 19-27.

Rosenberg, G., Holden, G., & Barker, K (2005). What happens to our ideas? A bibliometric analysis of articles in *Social Work in Health Care* in the 1990s. *Social Work in Health Care.*

Rothman, J., Kirk, S. A., & Knapp, H. (2003). Reputation and publication productivity among social work researchers. *Social Work Research, 27,* 105-115.

Rousseau, R. (1997). Sitations: An exploratory study. *Cybermetrics: International Journal of Scientometrics, Informetrics and Bibliometrics, 1,1.* http://www.cindoc.csic.es/cybermetrics/

Rubin, A. & Powell, D. M. (1987). Gender and publication rates: A reassessment with population data. *Social Work, 32,* 317-320.

Saha, S., Saint, S., & Christakis, D. A. (2003). Impact factor: A valid measure of journal quality? *Journal of the Medical Library Association, 91,* 42-46.

Seaberg, J. R. (1998). Faculty reports of workload: Results of a national survey. *Journal of Social Work Education, 34*, 7-19.

Sellin, M. K. (1993). *Bibliometrics: An annotated bibliography, 1970-1990.* New York: G. K. Hall & Co.

Schiele, J. (1991). Publication productivity of African-American social work faculty. *Journal of Social Work Education, 27, 2,* 125-134.

Schoepflin, U. , & Glanzel, W. (2001). Two decades of "Scientometrics": An interdisciplinary field represented by its leading journal. *Scientometrics, 50,* 301-312.

Schuerman, J. R. (1992). A response to Pardeck: From the Editor of the *Social Service Review. Research on Social Work Practice, 2,* 499-500.

Smith, S. L., Baker, D. R., Campbell, M. E., & Cunningham, M. E. (1985). An exploration of the factors shaping the scholarly productivity of social work academicians. *Journal of Social Service Research, 8, 3,* 81-99.

Staudt, M. M., Dulmus, C., & Bennett, G. A. (2003). Facilitating writing by practitioners: Survey of practitioners who have published. *Social Work, 48, 1,* 75-83.

Tague-Sutcliffe, J. (1992). An introduction to informetrics. *Information Processing & Management, 28, 1,* 1-3.

Thyer, B. A., & Bentley, K. (1986). Academic affiliations of social work authors: A citation analysis of six major journals. *Journal of Social Work Education, 22,* 67-73.

Thyer, B. A., Boynton, K. E., Bennis, L., & Levine, D. L. (1994). Academic affiliations of social work journal article authors: a publication productivity analysis from 1984-1988. *Journal of Social Service Research, 18, ¾,* 153-167.

Thyer, B. A., & Myers, L. L. (2003). An empirical evaluation of the editorial practices of social work journals. *Journal of Social Work Education, 39, 1,* 125-140.

Thyer, B. A., & Polk, G. (1997). Social work and psychology professors' scholarly productivity: A controlled comparison of cited journal articles. *Journal of applied Social Sciences, 21, 2,* 105-110.

Twining, J. (2002). Bibliometrics: An overview. Retrieved 11/10/02 from: http://www.du.edu/~jtwining/LIS4326/bibliometrics.htm

vonUngern-Sternberg, S. (2000). Scientific communication and bibliometrics. Retrieved 11/14/02 from: http://www.abo.fi/~sungern/comm00.htm

Williams, J. W. (2001). Journals of the century. *The Serials Librarian, 39, 3,* 69-77.

Wormell, I. (2000a). Bibliometric analysis of the welfare topic. *Scientometrics, 48,* 203-236.

Wormell, I. (2000b). Critical aspects of the Danish Welfare State – as revealed by issue tracking. *Scientometrics, 48,* 237-250.

Wouters, P. (2000). Garfield as alchemist. In B. Cronin & H. B. Atkins (Eds.), *The Web of Knowledge: A Festchrift in Honor of Eugene Garfield.* (pp. 65-72). Medford, NY: Information Today.

Table 1. Selected potential advantages and disadvantages of bibliometric analyses that have been noted in the literature.

Advantages	*Disadvantages*
1] Bibliometric methods facilitate examination of large data sets.	1] Citation analyses may encounter measurement and technical problems including: spelling; name changes; homonyms; synonyms; clerical errors; changes in citation databases over time; language biases; problems with the journal impact factor.
2] Bibliometric analyses can facilitate decision making regarding institutions (e.g., research funding).	2] Sampling problems such as: some studies that have focused on a small selection of journals; non-article scholarship is ignored; and databases such as SSCI may not cover all the relevant journals or all of the volumes of journals that are included in the database. Journal coverage in the database may fluctuate over time.
3] Bibliometric analyses can facilitate decision making regarding organizational issues (e.g., library collections).	3] Citations may not be equivalent and the types of citations vary. Citations can occur for non-scientific reasons. They may not be positive and/or central to the issue being discussed. Authors may be more likely to reference work that: is indexed in more commonly used databases; is more easily available to them; is written in the language they speak; is newer; is a popular fad or trend; etc.
4] Bibliometric analyses can facilitate decision making about individuals (e.g., hiring, reappointment, tenure, and promotion decisions) and by individuals (e.g. choice of publication outlets).	4] Authors may be referencing themselves or colleagues and thereby inflating citation rates (self-citation). Similarly, authors might inappropriately cite friends, colleagues, mentors or editors of the journal.
5] Bibliometrics can facilitate examination of the sociology of science (e.g., invisible colleges).	5] Referencing patterns can vary across fields, nations, time period studied or publications.
6] Bibliometrics can facilitate examination of trends in subject areas.	6] Authors may be citing work that is incorrect, not citing the best work, not correctly citing satisfactory work or may be failing to cite work that influenced them.

Table 1 (cont'd).

7] Bibliometrics can facilitate examination of trends within individual or sets of journals.	7] Informal influences such as discussions with colleagues are ignored (acknowledgements and personal communications citations are not credited to the target individual in citation counts).
8] Citations are measured on a ratio level scale (although the conceptual meaning of units may vary).	8] Quality (and components of quality such as morals and ethics) is an important factor not necessarily captured by quantity of publication or number of citations.
9] Scholars should be motivated to cite others work appropriately, as they are always at risk for exposure for doing otherwise.	9] Citations are not measured on an interval level scale.
10] Citation counts are less susceptible to manipulation by authors than publication counts.	10] Citation analysis may be biased against high quality work that is published in very specialized journals that are read by relatively few scholars.
11] Citations are a relatively reliable indicator.	11] Citation analysis may not reflect the impact of unpublished scientific work or the impact a journal or article has on professionals who are reading it (but not writing and citing it).
12] There is evidence supporting citations as a valid indicator of impact.	13] Multiple authorship makes determination of appropriate authorship credit difficult.
	14] Skewed distributions (many do not publish) are often present which may cause problems of interpretation.
	15] The publication process is biased (e.g., towards dominant paradigms) and citation analysis is biased towards logical positivism.
	16] The submission to publication time lag may bias some studies.
	17] Publication analyses that are based on self-report surveys have the typical array of problems.
	18] Disadvantages specifically noted regarding studies involving social work faculty include issues such as: faculty demographic characteristics (e.g., age, level of turnover) that may impact results in organization focused studies depending on the time period studied; publication can be less than half of social work faculty's workload; citation counts may be biased against applied scientists; variation in publication practices (e.g., analyses are biased against programs that have heavier teaching loads and less support for research and writing); the relative rankings for schools are difficult to interpret.

Table 2. Studies estimating the quantity of publication of social work scholars.

Authors / Year	*Sample*	*Data source*	*Productivity statistic*	*Findings*
Lindsey (1976)	N = 323 Editorial board members of psychology, social work and sociology journals.	Various abstracts (e.g., Psychological Abstracts)	Adjusted total articles published (during time periods which varied depending on the databases used).	Psychology editorial board members had the highest mean number of adjusted total articles (13.0) followed by sociology (8.1) and social work (1.0).
Kroll, H. W. (1976).	N = 683 articles by social work faculty members in four social work journals.	Four social work journals	Number of articles in these journals during the 1965-74 period. Appears from report to be equal credit proportional counts for institutions.	Positively skewed productivity. The University of Chicago, Columbia University and the University of California: Berkeley were the most productive schools.
Kirk, Wasserstrum & Miller (1977)	Survey of all US and Canadian graduate programs. 32% of all schools responded describing a total n of 76 faculty members being reviewed for tenure or promotion during the 1974-75 academic year.	Mailed survey	Number of articles in refereed journals.	Positively skewed productivity. 33% had not published an article, 10% published 10 articles or more. Mean *n* of articles = 3.7.
Rosen (1979)	*N* = 30 81% of the PhD graduates from Washington University during the 6/70 – 5/78 period.	Mailed survey & academic records	Total productivity index. Output weighted as follows: authored books=5; edited books=2.5; article, chapter, monograph=2; unpublished conference presentation=1.25; unpublished paper=1. Single, first and second listed authors given full weight, all other authors .5 of the weight.	Positively skewed productivity. Total productivity index: min – max: 2.0 – 102.0, *M*=22.8 (*SD*=24.4).

Authors / Year	*Sample*	*Data source*	*Productivity statistic*	*Findings*
Jayaratne (1979)	N= 79 schools Articles by social work faculty members	Five social work journals	Normal count. *n* of articles per faculty member for the 1972-76 period[1]	Positively skewed productivity. Mean *n* of .29 articles per faculty member in the selected journals for the period.
Kirk & Rosenblatt (1980	N= 9,967 articles All articles in these journals	Five social work journals	Sex distribution of authors for the 1934-77 period.	Proportion of male authors for the period was .45.
McNeece (1981)	*N*= 97 50.5% response rate to a randomly selected list of US MSW program faculty	Mailed survey	N of articles in refereed journals for 1978	Positively skewed productivity distribution – 56% of the respondents did not publish an article in 1978. Mean *n* of articles = .876)
Council on Social Work Education (CSWE, 1983-2000)	varies	Yearly survey of CSWE accredited programs for the publication *Statistics on Social Work Education in the United States*	Average number of articles in the most recent 12 month period in refereed journals. The authors of these reports caution the reader to be wary of this data, because of missing data and their inability to know how many respondents adjusted the total number of reported publications for multiple authorship as instructed (e.g., if two colleagues co-authored an article each would receive .5 of a credit).	When article productivity distribution reported it was positively skewed. Average numbers of faculty member articles were: .39 (83); .38 (84); .41 (85); .35 (86); .46 (87); .43 (88); .42 (89); .38 (90); .30 (91); .30 (92); .28 (93); .26 (94); .29 (95); .29 (96); .31 (97); .27 (98); .32 (99); .26 (00).
Grinnell & Royer (1983)	*N* = 10,416 Full length articles	Sixteen social work journals for the	Proportion of articles published by senior/sole authors' affiliation during the life of the journal (initial publication – 1/1/79 period).	University affiliated senior/sole authors published the largest proportion of articles (41.5%) followed by those affiliated with government (27.1%) and private agencies (24.3%)
Kirk & Rosenblatt (1984)	N=593 social work faculty N = 439 articles by them.	Sixteen social work journals	Equal credit proportional count and productivity ratio (% of articles / % of faculty), for articles published during the 1977-79 period.	Compared men and women at five faculty ranks. Males produced greater percentage of articles at all five.

Authors / Year	*Sample*	*Data source*	*Productivity statistic*	*Findings*
Abbott (1985)	*N* = 175 50% response rate from a random sample of 350 doctoral program graduates	Mailed survey & *Social Science Citation Index*	N of articles in refereed social work journals on which the respondent was the first or second author during two periods (graduation (1960-74) - 1975 & 1976-1981).	Positively skewed productivity distributions. Respondents published a annual mean of .5 articles per year during the graduation – 1975 period and .25 articles per year during the 1976-81 period.
Fox & Faver's (1985)	*N* = 300 Subset of the 64% response rate to a random survey of faculty in 44 US graduate social work programs.	Mailed survey	N of journal articles in the two years prior to the study	Positively skewed productivity distributions. Men published slightly more articles during the period than women (2.1 vs. 1.63, p <.1).
Robbins, Corcoran, Hepler & Magner (1985)	*N* = 286 46% response rate to a randomly distributed survey of undergraduate and graduate accredited programs in the US.	Mailed survey	*N* of single and joint authored articles during the 1972-82 time period.	Positively skewed productivity distributions. Assistant, associate and full professors produced .77, 2.1 and 4.0 single authored articles respectively. Assistant, associate and full professors produced .90, 1.61 and 2.05 jointly authored articles respectively.
Smith, Baker, Campbell & Cunningham (1985)	*N* = 128 Faculty from a mixed method approach with an initial random sample from 299 accredited US social work programs	Mailed survey	Recent and career productivity. *n* of articles published and accepted for publication during 1980-82 period and for entire career.	Positively skewed productivity distribution for 1980-82.
Thyer & Bentley (1986)	All articles in these journals	Six social work journals	Normal count. Number of times a school's faculty member was listed as an author on a journal article during the 1979-83 period.	Positively skewed productivity distribution. University of Wisconsin-Madison faculty appeared most frequently in this set of journals during the 1979-83 period.

Authors/Year	*Sample*	*Data source*	*Productivity statistic*	*Findings*
Rubin & Powell (1987)	*N* = 1,002 FT faculty members in CSWE accredited graduate programs with more than 50% teaching responsibilities and no administrative position	CSWE Annual Statistics (self/school-report)	Normal count. *n* of articles per faculty member for 1983 & 1984.	Replicated analyses for 1984 for the significant findings in the 1983 data. Only significant result replicated was that female professors with non–social work doctorates published more book chapters than their counterparts.
Corcoran & Kirk (1990)	All articles authored by social work faculty in these journals.	Sixteen social work journals for the 1977-82 period & a subset of seven academic social work journals for the 1977-87 period.	Normal count. *n* of articles in three types of journals during two time periods (1977-82; 1977-87).	Positively skewed productivity distributions. Average faculty member produced .39 academic journal articles, .06 agency journal articles and .16 mixed journal articles for the 1977-82 period. For the 1977-87 period, the average faculty member produced .79 articles in academic journals.
Schiele (1991)	*N* = 290 Usable response rate = 48.7%. African-American faculty in CSWE preaccredited & accredited programs in 1989-90	Two mailed surveys.	*n* of articles published during career.	Positively skewed productivity distribution. Mean *n* of articles during career was 1.84 in social work journals and 1.85 in non-social work journals.

Authors / Year	*Sample*	*Data source*	*Productivity statistic*	*Findings*
Baker & Wilson (1992)	*N* = 284 Mixed (random / 100%) sample of doctoral graduates from 30 social work programs (1970-80) identified by *Social Work Abstracts/Social Work Research & Abstracts*	Source index of *Social Science Citation Index*	*n* of articles during the graduation and the 6 subsequent years.	Positively skewed productivity distribution. 50% of the sample had not published an article that appeared in the SSCI database. Minimum – maximum: 0 – 13 articles. *M*= 1.34 (*SD*=1.98) for the 7 year period and an annual mean productivity of .19 articles.
Green, Hutchison & Sar (1992)	*N* = 1548 56% response rate subsequently adjusted to the n of 1548. Social work doctoral program graduates[2] from the 1960-88 period	Mailed survey	Normal count. *n* of articles since receiving the doctorate.	Positively skewed productivity distributions. Average graduate published 3.44 articles in social work and 3.40 articles in non social work journals during their career.
Mokau, Hull & Burkett (1993)	*N* = 85 43% response rate to random sample of 200 undergraduate CSWE accredited program directors	Mailed survey	Number of articles in prior 12 months	Positively skewed productivity distribution. 71% of the respondents did not publish an article in the prior 12 months. Mean *n* of publications = .26

Authors / Year	*Sample*	*Data source*	*Productivity statistic*	*Findings*
Green & Bentley (1994) (c.f., Green & Secret, 1996)	*N* = 202 "most successful" from a group of 3,423 authors who had published in a set of 18 social work journals during the 1980's (useable response rate of 81%)	Mailed survey	Professional journal articles published during entire career.	Positively skewed productivity distribution. 88.1% of sample were full time faculty. Number of articles for their career: min-max: 5-145, *M* = 26.47 (*SD*=18.13). Mean yearly rate of 2.08.
Hull & Johnston (1994)	*N* = 167 Baccalaureate faculty who had published in the seven journals.	Seven social work journals.	Normal count. *n* of articles during the 1985-mid 1991 period.	Positively skewed productivity distribution. Among those that did publish, the mean *n* of publications was 1.49 for the 6.5 year period.
Thyer, Boynton, Bennis & Levine, (1994)	All regular articles in these journals	Six social work journals	Normal count. Number of times a school's faculty member was listed as an author on a journal article during the 1984-88 period.	Positively skewed productivity distribution. University of Michigan faculty appeared most frequently in this set of journals during the 1984-88 period.
Johnson & Hull, (1995)	*N* = 198 Undergraduate faculty in CSWE accredited programs in the 1988-92 period (response rate not reported).	Mailed survey	Devised scoring system for multiple authorship, but focus here is the n of articles during the 1988-92 period.	Positively skewed productivity distribution. Total of 240 articles; 1.21 per faculty member for an annual average rate of .24 articles.

Authors / Year	*Sample*	*Data source*	*Productivity statistic*	*Findings*
Ligon, Thyer & Dixon (1995)	N = 1480 authors from 245 academic institutions	Six social work journals	Normal count. Number of times a school's faculty member was listed as an author on a journal article during the 1989-93 period.	Positively skewed productivity distribution. University of Maryland at Baltimore faculty appeared most frequently in this set of journals during the 1989-93 period.
Pardeck, Chung, & Murphy (1995)	*N* = 123 editorial board members & 106 guest reviewers from "core" social work journals.	*Social Science Citation Index & Psychological Abstracts*	Total N of articles published by editorial board members and guest reviewers that were listed in *Psychological Abstracts* during 1987-90.	Positively skewed productivity distribution. The median number of articles published for both editorial board members and guest reviewers was 1 or less for the 1987-1990 period.
Green, Baskind & Conklin (1995)[3] (c.f., Green, Baskind, Best & Boyd, 1997)	*N* = 1,084 Full time US social work doctoral faculty in the 1/90-9/93 period	Mailed surveys to obtain list of faculty. *Social Science Citation Index*	Combined normal & straight count. Number of articles published during 1990-93 period	Positively skewed productivity distribution. Average faculty member published 1.25 articles during the period.
Green (1998)	*N* = 535 Full time US social work MSW/PhD faculty in 1994	Mailed survey	No multiple authorship adjustment. N of journals submitted and accepted or published by 5/1/95 in a group 55 social work journals.	Positively skewed productivity distribution– 28.9% of these faculty did not submit an article during 1994. Faculty submitted an average of 2.11 articles during 1994.

Authors / Year	*Sample*	*Data source*	*Productivity statistic*	*Findings*
Seaberg (1998)	*N* = 149 Mixed method from an initial stratified random sample of 40 accredited graduate social work programs. 49% response rate from faculty members at final step.	Mailed survey	*n* of peer reviewed articles over a two year period.	Positively skewed productivity distribution. Mean *n* of articles = 1.5 per year (1.8 for "active" scholars).
Pardeck & Meinert (1999a)	*N* = 55 Editorial board members and consulting editors of *Social Work* in 1/96	*Psychological Abstracts, Social Work Abstracts, Sociological Abstracts,* and the *Social Science Citation Index*	Total N of articles published by editorial board members and consulting editors during 1990-95 (and listed in these sources).	For the 1990-1995 period, 50% of the editorial board members and 19% of the consulting editors did not publish an article that appeared in the first three of these data sources.
Green, Kvarfordt & Hayden (2001)[3]	*N* = 45 Social work faculties' publications during the 1994-97 period.	*Social Science Citation Index*	Combined normal & straight count. Number of articles published during 1994-97 period.	Positively skewed productivity distribution. Columbia University faculty had the highest total productivity (unadjusted for faculty size).
Ligon & Thyer (2001)	N = 1093 articles	Six social work journals	Normal count. Number of times a school's faculty member was listed as an author on a journal article during the 1994-98 period.	Positively skewed productivity distribution. Columbia University faculty appeared most frequently in this set of journals during the 1994-98 period.

Authors/Year	*Sample*	*Data source*	*Productivity statistic*	*Findings*
Green, Baskind & Bellin (2002)[3]	*N* = 61 Social work faculties	*Social Science Citation Index*	Combined normal & straight count. Number of articles published during the 1990-99 period.	Positively skewed productivity distribution overall for the decade. Total n of articles published by the 61 schools during the period was 4,406 (min-max: 3-259, *M* = 72.23). There was a trend over the decade with mean yearly rates of 6.61 (1990-93); 7.43 (1994-97); 8.02 (1998-99).
Pardeck (2002)	*N* = 10 Psychology and social work journal editors	*PsychInfo* and the *Social Science Citation Index*	Number of articles published from 1992 through 6/01 that were covered in *PsychInfo* .	Social work editorial board members published an average of 3.4 during the 1992 through 6/01 period, whereas psychology board members published an average of 24.4 articles.

Note: *Adjusted total articles* – each article is divided by the number of authors and then summed. *Normal counts (aka whole counts)* - multiple individuals receive full credit for a single article. *Straight counts* - give all credit to the first author. *Equal credit proportional counts* - Co-authors receive equal credit proportions (e.g. three authors each receive .333). Combined normal & straight count (Green, Baskind & Conklin, 1995) when co-authors were on same faculty only the first (or only one credit granted to that faculty) was credited so that schools received only one credit per article, though multiple schools could each receive credit for publication (c.f. Cronin & Overfelt, 1994)..

[1] A second time period was included in another aspect of this study.

[2] Included interdisciplinary doctorates from Brandeis who did not have masters in social work.

[3] The same data is used for elements of these studies as they were all part of the Virginia Commonwealth University *Doctoral Faculty Decade Publication Project.*