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Research Productivity and Performance of Journals in the Creativity Sciences: A Bibliometric Analysis

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A bibliometric approach was employed to analyze the research productivity and performance of creativity studies between 1965 and 2012. A dataset was constructed using all publications and citations retrieved from four key journals that publish creativity research: *Journal of Creative Behavior (JCB)*, *Gifted Child Quarterly (GCQ)*, *Creativity Research Journal (CRJ)*, and *Psychology of Aesthetics, Creativity, and the Arts (PACA)*. Major findings in this study include: (a) During the study period, the four journals have published 1,891 articles on creativity and they have been cited 11,709 times; (b) the impact factors of the four journals increased from lower than .50 in 2002 to over 1.0 in 2012; in 2012 *PACA* had the highest impact factor, followed by *CRJ*; (c) *JCB* published the most creativity papers and *CRJ* had the most citations; (d) about a third of the articles published in the four journals have never been cited. Implications for the field of creativity are discussed.

In recent years, researchers have started to examine publications of creativity to understand characteristics of the field, especially authorship and author productivity. For example, Feist and Runco (1993) studied

authorship patterns of 311 articles published in the *Journal of Creative Behavior* between 1968 and 1989. Beghetto, Plucker, and MaKinster (2001) investigated author productivity by analyzing citations in all issues

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of *Journal of Creative Behavior* published between 1967 and 1998 and reported the distributions of authors' contributions and the number of first authors' publications per year. Nemeth and Goncalo (2005) collected data from Social Science Citation Index (SSCI) and examined the articles published in six top psychological journals between 1981 and 1990 to understand the relationship among citations of creativity articles, number of coauthors, and number of the geographic locations of authors' affiliations.

These studies provided rich insights into the field of creativity; however, they only accounted for a very small portion of publications on creativity. Therefore, the comment Feist and Runco (1993) made 20 years ago about the lack of "systematic empirical work analyzing the trends in the field" (p. 273) is still relevant today. In addition, there were several limitations with these studies. First, they were limited in scope because they either included psychological journals that did not specifically publish work related to creativity (e.g., Nemeth & Goncalo, 2005) or one creativity journal (e.g., Beghetto et al., 2001; Feist & Runco, 1993). More journals that focus on creativity should be included to gain a broader perspective. Second, most studies were limited by time. For instance, some studies only examined articles published within a short period of time (e.g., Feist & Runco, 1993; Nemeth & Goncalo, 2005). In addition, most studies used data collected in the 1990s; only two studies collected data in the 2000s. Considering the rapid increase in journals devoted to creativity and new technological tools that provide access to these publications, new research is warranted to analyze the trends in the field. Third, most studies employed two electronic databases, PsycLIT and PsycINFO. Although these two databases are reliable, they do not provide citation and impact factor data as in Web of Science and Journal Citation Report. Fourth, most studies were limited in content because they focused on only one aspect of creativity studies. Studies encompassing different aspects of creativity research or examining research performance of the creativity field as a whole would be more informative. Last, these studies were limited in their methods. Some studies adopted a historical perspective and reviewed literature in the past (e.g., Becker, 1995; Runco & Albert, 2010). Some studies relied on citation analysis (e.g., Beghetto et al., 2001; Nemeth & Goncalo, 2005). Unfortunately, bibliometrics has never been used in the field, although Beghetto et al. (2001) argued more than 10 years ago, "Incorporating recent advances in bibliometrics and scientometrics in follow-up studies... will go a long way in clarifying the emerging image of growth in the field of creativity" (p. 356).

Research performance refers to productivity and impact of a field and indicates its significance and prestige (Glanzel & Schoepflin, 1999; Kostoff, 1998; Moed,

2005; Narin, 1976; Retzer & Jurasinski, 2009). Traditionally, it was evaluated by a peer review procedure, but in recent years, bibliometrics, a quantitative method of describing characteristics, patterns, and trends of scholarly communications in a field, has gained importance. Publication and citation analyses are two major methods of bibliometrics. Publication analysis reflects research productivity of the field, and citation analysis reflects research impact of the field (Borgman, 1990). King (1987) and Lawani (1977) further suggested that the number of published works demonstrates the quantity of the research performance in a field, whereas the number of times that works have been cited demonstrates the quality of the research performance. Bibliometrics was conceived as a reliable and valid approach. Its correlations with other measures of quality and quantity of research activities, such as literature and peer evaluations, were between .6 and .8 (Narin, 1976). Considerable consistency was also found between the results of bibliometric analysis and peer evaluation of 150 chemistry research groups in the Netherlands (van Raan, 2005). Over the past few decades, this approach has been applied to many fields within the social sciences, for instance, personality psychology (Allik, 2013; Griggs & Proctor, 2002), behavioral psychology (Carr & Britton, 2003), library science (Ding, 2010), sociology (Bott & Hargens, 1991), social work (Holden, Rosenberg, & Barker, 2005), business (de Bakker, Groenewegen, & den Hond, 2005), and biomedicine (Riikonen & Vihinen, 2008).

Many researchers also espouse citation analysis; for example, Garfield (1970, 1979) and Nemeth and Goncalo (2005) believed that it can be used to map the history of a field, reveal the research fronts, and demonstrate methodological and theoretical advances. L. C. Smith (1981) contended that citation analysis is more precise and objective than other methods of evaluating research impact because "unlike data obtained by interview and questionnaire, citations are unobtrusive measures that do not require the cooperation of a respondent and that do not themselves contaminate the response (i.e., they are nonreactive)" (pp. 84–85). The same opinion was held by Garfield (1979) after he discussed the controversies surrounding citation analysis, such as a large amount of negative citations, self-citations, and citations of methodological papers. Cole and Cole (1976) also reported strong positive correlations between total numbers of citations by the scientists in biochemistry, chemistry, physics, psychology, and sociology and the subjective evaluation of their colleagues. Lawani (1977) examined the relationships between citation analysis and the quality of scientific productivity and concluded,

Although I have noted reservations in the use of citations, the evidence pointing to the validity of citations

as a measure of quality is impressive. This is, in general, inferred from the high correlations between scientific eminence and number of citations and between papers of known high quality and the number of citations to them. (p. 31)

Recently, a third method, impact factor analysis, was added to bibliometrics (Garfield, 2006; Retzer & Jurasinski, 2009). It was coined by Garfield in 1955 to assess the impact of publications and was later modified to evaluate the research performance of the field through the impact of the journals in that field. Journal impact factor focuses on how many times the average article in a journal has been cited during a specific period of time. Although impact factor is available in any desired period of time, such as 5-year impact factor, the impact factor in a specific year is calculated by “the number of citations in the current year to items published in the previous 2 years” divided by “the number of substantive articles and reviews published in the same 2 years” (Garfield, 2006, p. 90). Impact factor analysis has its own strengths. In contrast with other methods, for instance, it compares journals regardless of their sizes; it reflects the changes of the journals across time (Garfield, 2006; Moed, 2002). It has also been used in various fields, such as journals in school psychology (Floyd et al., 2011), the journal of *Intelligence* (Wicherts, 2009).

This study aims to examine the research performance of the field of creativity using bibliometric methods. It focuses on research performance of the field from the beginning of 1965 to the end of 2012 and analyzed publications, citations, and impact factors of four key creativity journals. In addition to providing an overview of the development of the field of creativity as a whole, this study can allow empirical examination of previously noted historical trends and serve as a baseline for future comparisons with the development of other fields.

METHOD

Sampling

This study included four US-based, English-language journals. Two of them, *Journal of Creative Behavior*

(*JCB*) and *Creativity Research Journal* (*CRJ*), were journals that only published articles on creativity. *Psychology of Aesthetics, Creativity, and the Arts* (*PACA*) was selected because creativity is an important part of its contents, and a substantial number of articles were published on this topic. *Gifted Child Quarterly* (*GCQ*) was chosen as an education journal that often includes creativity publications, because creativity has been playing a significant role in gifted education and training.

The four journals have different aims and scopes. *JCB* focuses on topics in general areas of creativity, intelligence, and problem solving (Bristol, 1967). *CRJ* publishes creativity articles from different perspectives, including behavioral, clinical, cognitive, cross-cultural, developmental, educational, genetic, organizational, psychoanalytic, psychometric, and social (Runco, 1988). *PACA* accepts empirical studies, literature reviews, and critical analyses that are related to the psychology of aesthetics, creativity, and the arts (J. Smith, Smith, & Kaufman, 2006). By contrast, *GCQ* publishes articles about giftedness and talent development in various contexts, such as school and home. Although all are published quarterly, these four journals have different numbers of articles in each issue (see Table 1).

Data Collection

This study collected three sets of data: publication, citation, and impact factor. Publication and citation data were obtained from the online version of the ISI Web of Science: SSCI. Impact factors of the four journals were generated from journal citation reports. All types of publications available in the databases were collected, including book reviews, articles, editorials, and commentaries. Publication and citation data were collected from the beginning of 1965 to the end of 2012. The beginning year of 1965 was selected because it was the time when the first issue of *GCQ* was published. The data of *JCB* were also retrieved from its first issue, beginning from 1967. The first issues of *CRJ* and *PACA* were published in 1988 and 2006, respectively. But in the Web of Science, data in *CRJ* were only available from 1994, so the data from 1988 to 1994 were missing. Data

TABLE 1
Information of Four Journals

Journal	Year	# of Articles per Issue	Missing Data in Database	Mean	SD
<i>Journal of Creative Behavior</i> (<i>JCB</i>)	1967–2012	4–5	N/A	21	7
<i>Creativity Research Journal</i> (<i>CRJ</i>)	1988–2012	7–9	1988–1994	31	10
<i>Psychology of Aesthetics, Creativity, and the Arts</i> (<i>PACA</i>)	2006–2012	10–11	2006–2009	17	9
<i>Gifted Child Quarterly</i> (<i>GCQ</i>)	1965–2012	3–4	N/A	1	2

Note. Number of articles published in each issue is a rough estimate because there are some variations of the number in different issues even for the same journal.

in *PACA* were available from 2009, so the data from 2006 to 2009 were missing (see Table 1). All the missing data were counted manually and added to the final analysis. Data on the journal impact factor data of *JCB*, *CRJ*, and *GCQ* were collected between 2002 and 2012; *PACA* was only available from 2011 and 2012.

This study first used three search terms, *creativity* OR *innovation* OR *imagination*, simultaneously to retrieve data from anywhere in the four journals. The terms *innovation* and *imagination* were included because they are regarded as frequently used synonyms of creativity (Kaufman, 2009; Plucker, Beghetto, & Dow, 2004; Plucker & Makel, 2010). To broaden the scope of selection, search terms were later changed into *creativ** OR *innovati** OR *imaginati**, where * stands for zero or more characters. For example, *creativ** means terms like *creative*, *creatively*, *creativity*, and any other words with *creativ* as a part.

Data Analysis

After initial retrieval from the databases, all the data were imported into a spreadsheet file. The number of publications and citations was counted because this is the basic method of bibliometrics (Ding, 2010; Moed, 2005). To ensure reliability, two of the authors performed the counts, with interrater agreement of 95%, with the disparities in the counting resolved through discussion.

RESULTS

Productivity of the Field: Number of Publications

The overall productivity of the field is represented by the number of publications, resulting in 1,891 publications in total. The total number of publications on creativity in the four journals grew between 1965 and 2012 (see Figure 1). Publications for *JCB*, *CRJ*, and *PACA*

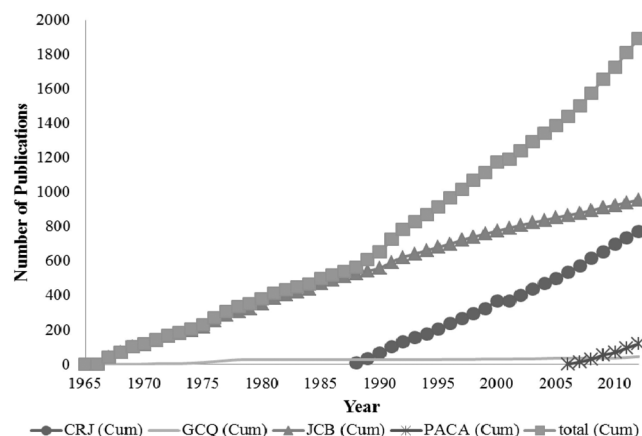


FIGURE 1 Trend of cumulative numbers of publications in total and in each journal.

demonstrated an upward trend, whereas those in *GCQ* were stable. Among 1,891 publications on creativity in the four journals, half of the articles were published in *JCB* ($n = 954$), making it the journal that published the most creativity papers. *CRJ* ranked second and its publication accounted for 40% ($n = 771$) of the total. Publications in *PACA* account for 6% ($n = 120$) of the total number and *GCQ* only published 2% ($n = 46$).

Because the four journals vary by publishing years and by the number of articles published per issue, the mean and standard deviation of the number of publications for each journal were reported (see Table 1). Although *CRJ* ranked second in terms of the total number of publications, it published most creativity studies on average ($M = 31$, $SD = 10$). The average publications for *JCB* and *PACA* were very close ($M = 21$, $SD = 7$ for *JCB*; $M = 17$, $SD = 9$ for *PACA*) even though one was first published in 1967 and the other in 2006. By contrast, *GCQ* published very few creativity articles ($M = 1$, $SD = 2$) during the 47 years examined, which is not surprising given that creativity is not its primary focus.

The annual number of publications for each journal is presented by year in Figure 2. *JCB* dominated the publications between the 1960s and 1980s. But since *CRJ* published its first issue in 1988, it grew quickly and published even more creativity articles than *JCB*. Interestingly, *CRJ* and *JCB* published the same number of articles ($n = 36$) in 1991. The number of publications in *PACA* outnumbered *GCQ* since its first issue in 2006. It even outgrew *JCB* and has remained the journal that has published the second most articles on creativity since 2009.

The distribution of the total number of publications on creativity for each year is presented in Figure 3. During the study period, the number of publications fluctuated: There were no publications in 1966, but the number significantly increased to 42 in 1967 and then declined from 1968 to 1973. After a few minor changes, the number increased 60% ($n = 72$) in 1991 from the

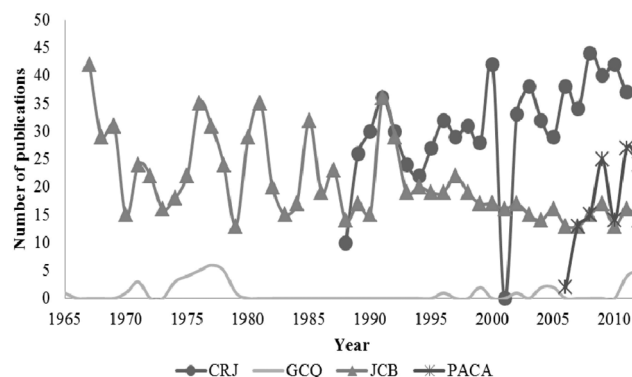


FIGURE 2 Total number of publications of each journal per year.

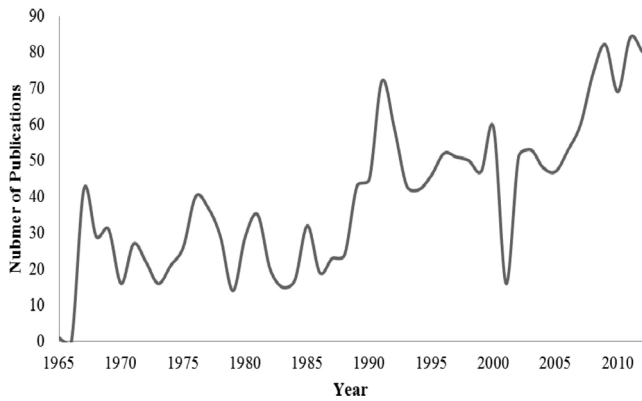


FIGURE 3 Total number of publications per year.

previous year ($n=45$), but the number continuously dropped between 1992 and 2000 and plummeted 73% ($n=16$) in 2001 (most likely due to the 2000–2001 combined *CRJ* issues). Then the number of publications steadily increased to 82 in 2009, indicating a 43% increase from 2005 ($n=47$). Despite a slight decrease in 2010, the number bounced back in 2011 and 2012.

Although the four journals started to publish their first issues at different points of the decades, the total numbers of publications in every decade (i.e., beginning from year 0 to 9) were reported because we believe that this analysis reveals the general trend of the development of publications across the last 5 decades. The time period from 1965 to 1969 reflects publications on creativity between 1960 and 1969 because there were no publications before 1965 for the four journals. Steady increases in the number of creativity publications were observed during the last 5 decades. The 1960s had the fewest publications ($n=103$) and the 2000s had the most ($n=543$). The number of publications in the 1970s and the 1990s doubled that of its previous decade. There were minor growth of publications from the 1970s to 1980s ($n=9$), and from the 1990s and 2000s ($n=36$). The number of publications between 2010 and 2012 accounts for 12% ($n=233$) of the total, and it is close to half of the creativity studies that were published in the 2000s ($n=543$).

Impact of the Field: Journal Impact Factor and Number of Citations

Impact factor of four journals. The impact factors of the four journals between 2002 and 2012 were generated from journal citation reports (see Figure 4). The dataset only included impact factors of 2011 and 2012 in *PACA*; therefore, only two numbers were mapped. On the whole, the impact factors of all four journals ranged over the years from .26 to 1.53. The range was between .26 and .72 from 2002 to 2009, but increased to over 1.00 in the 2010s (i.e., roughly when the importance of

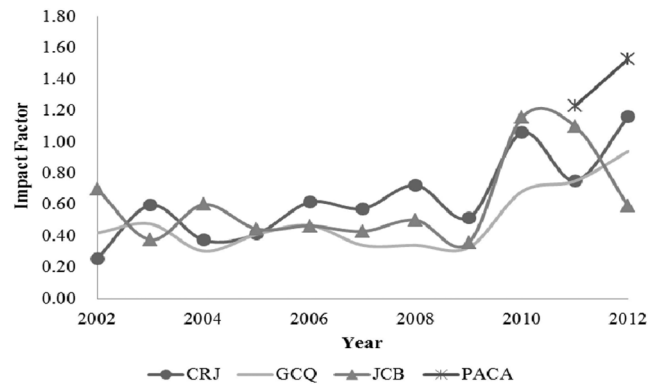


FIGURE 4 Impact factor of each journal.

impact factors began to be emphasized). The impact factors of the journals considerably varied in relative rank over the decade in question. The impact factor of *JCB* was the highest of all three journals in 2002 but fluctuated in the next 3 years. It kept at second place between 2006 and 2008, but then dropped to be the lowest in 2009. Later it went up to be the highest in 2010 and 2011, but was down to the lowest in 2012. The impact factor of *CRJ* was the lowest in 2002, but it took the lead between 2006 and 2009 and then became lower than *JCB* in 2010 and 2011. *GCQ* had the lowest impact factor of all journals between 2004 and 2010, but had the same impact factor as that of *CRJ* in 2011 and had a higher factor than *JCB* in 2012. The impact factor of *PACA* in 2011 and 2012 were 1.23 and 1.53 respectively, and were much higher than those of the other three journals in the same years.

Number of citations. Impact of the field is also shown by the number of citations in the field. The 1,891 creativity publications in the dataset have been cited 11,709 times between the beginning of 1965 and the end of 2012. Overall, the number of citations has been on the rise (see Figure 5). The earliest citations of

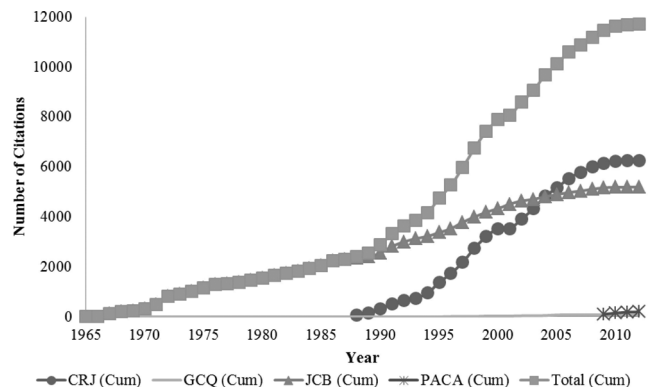


FIGURE 5 Trend of cumulative numbers of citations in total and in each journal.

creativity were found in *JCB*, not in *GCQ*, which published the earliest creativity studies. Although *CRJ* was published later than *GCQ* and *JCB*, it had the most citations of all the journals ($n=6,252$), which accounts for over half of the total. The number of citations in *JCB* was 5,184, accounting for 44% of the total. *PACA* had 194 citations since it published its first issue in 2006. This number was much higher than that of *GCQ* ($n=79$). Mean and standard deviation of the number of citations were also reported for the four journals. *CRJ* had the highest average citations of all the four journals. Its mean ($M=250$, $SD=170$) doubled the average citations in *JCB* ($M=113$, $SD=68$), five times the average in *PACA* ($M=49$, $SD=36$). The average number of citations in *GCQ* was only 2 with a standard deviation of 5.

Figure 6 provides information about the yearly number of citations for each journal. *GCQ* had the fewest citations among the four journals across all the years examined. The number of citations in *CRJ* and *JCB* was very close between 1988 and 1993. However, publications in *CRJ* have been cited much more than those in *JCB* since 1994. There were two peak years for *CRJ*: one was 1998 and the other was 2004. In 1998, the number of citations in *CRJ* ($n=572$) almost tripled that in *JCB* ($n=206$). In 2004, the number of citations in *CRJ* ($n=503$) was almost five times that in *JCB* ($n=104$). In addition, *PACA* had a small amount of citations in total but it has outnumbered *JCB* and *GCQ* since 2009.

The total numbers of citations for the four journals were examined by years. Articles published between 1965 and 1970 have been cited less than 100 times (see Figure 7). Citations of the articles published in 1972 ($n=329$) increased about four times from 1970 ($n=78$). The number later became stable between 1973 and 1990 and had a few ups and downs in the next 3 years. Then the number kept going up until 1998 when citations reached the highest of all the years ($n=778$) and showed a 1.5 times increase from 1993. But the citations in 2001 ($n=179$) dropped 78% from 1998. Although the

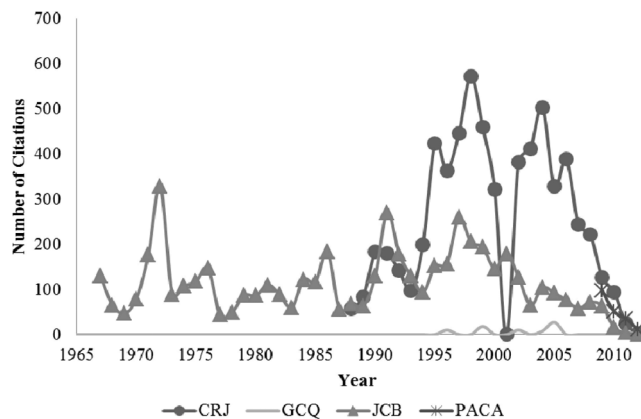


FIGURE 6 Total number of citations of each journal per year.

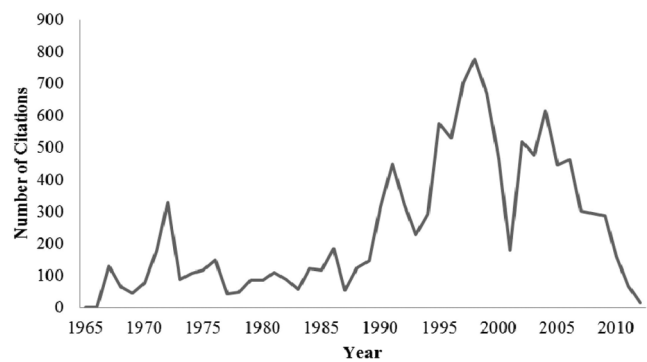


FIGURE 7 Total number of citations per year.

number bounced back in the following 3 years, it kept decreasing from 2004 to 2012.

The patterns of citations for every decade were also examined. The 1960s and the years from 2010 to 2012 had very similar number of citations ($n=242$, 243). They each accounted for only 2% of the total number of citations and had the fewest numbers among all the decades. The 1990s had the most citations ($n=4,860$). The numbers of citations in the 1970s ($n=1,221$) and the 1980s ($n=1,092$) were also close. Furthermore, on the whole, the number of citations did not show continuous increase. It increased three times from the 1960s ($n=242$) to the 1970s ($n=1,221$) but had a 10% decrease ($n=129$) in the 1980s. Another significant growth of 2.5 times appeared from the 1980s ($n=1,092$) to the 1990s ($n=4,860$) and the number of citations in the 2000s ($n=4,051$) decreased 17% from the last decade.

Among 1,891 publications that were collected, about a third ($n=578$) have never been cited, and most publications have been cited less than 6 times. Among all the publications, 12% ($n=224$) have been cited only once. About 9% have been cited twice or four to five times ($n=162$ and $n=176$, respectively), and approximately 7% have been cited three times ($n=134$). On the other hand, fewer works have been cited over 6 times. More specifically, 15% of publications ($n=280$) have been cited between 6 and 10 times; 11% ($n=212$) between 11 and 20 times, and only 7% ($n=125$) have been cited over 20 times.

DISCUSSION

This study found evidence of a significant increase in research productivity and in the impact of the field of creativity during the past five decades. This trend is shown not only in the number of publications and citations but also in the generally rising impact factors of the four main creativity journals. The patterns and trends of publications and citations of the four journals

show some similarities and differences in this study. *GCQ* is the journal with the lowest publications and citations even though it is the earliest one to publish creativity studies. This is probably because the focus of the journal is on gifted education, not on creativity. By contrast, *PACA* is a relatively new journal in the field, and the numbers of its publications and citations are trending very positively. *JCB*, as the earliest creativity journal, has published the most creativity studies in the field. But its dominant position has been challenged by *CRJ*, which has the largest mean of annual publications and citations. These suggest that *CRJ* and *PACA* continued to enhance their impact on the field.

The patterns of development of the field across years demonstrated in this study are partly in line with those found in Feist and Runco's (1993) study on *JCB*. It indicated two "discernible periods of heavy interest" (p. 272) in creativity: the early 1960s and the late 1970s till early 1990s. This study also found that the number of publications increased substantially in the early 1960s and grew continuously from 1986 to 1991. But the number did not go up in the late 1970s; on the contrary, it decreased after 1976.

Unlike continuous growth in the number of publications from decade to decade, the number of citations decreased from the 1990s all the way to the 2010s. This is mainly because recently published articles still need time to gain more citations. But this trend does not necessarily mean that the articles published earlier have been cited more. The articles cited most often were published in the 1990s, not in earlier decades. This finding supports previous research indicating that the number of citations of articles published earlier was not significantly different than that of articles published recently (Nemeth & Goncalo, 2005).

This study also found that a third of the publications have never been cited. This percentage is close to a previous (but much older) finding that 25% of published scientific papers have never been cited (Koshy, 1976). Furthermore, we observed that most publications have been cited very few times and fewer publications have been cited more times. This corroborates the famous Lotka's law (1926), which suggested that the majority of the works in most fields is produced by a small number of authors (see also Runco & Pagnani, 2011; Simonton, 1988).

The patterns shown in different aspects of the field are consistent with each other, which further confirmed reliability of the bibliometric methods. For example, *JCB*, which dominated the field's bibliometric statistics for a period of time but was later surpassed by *CRJ* and *PACA*, had the highest impact factor in 2002 but dropped afterward until 2010. *CRJ* had the lowest impact factor in 2002 but kept increasing between 2006 and 2009. This rise corresponds to its growing

numbers of publications and citations in the same periods of time. *PACA* had the highest impact factor among the four journals in 2011 and 2012, which supports its rising new status in the field.

However, a few questions still remained unaddressed. For example, what does the field of creativity look like if compared with other scientific fields, especially those in education and psychology (i.e., are the growth of citations in the creativity sciences a reflection of a growing social scientific enterprise, or is the observed growth relatively impressive)? What characterizes collaboration and authorship among creativity researchers? What are similarities and differences between creativity research and researchers in the United States and in other countries, such as China and the United Kingdom? What are the major subjects and topics investigated by creativity researchers? This study provides evidence that bibliometric methods can answer these and other important questions.

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