

Predicting subsequent citations to articles published in twelve crime-psychology journals: Author impact versus journal impact

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Four hundred and twenty-eight articles published in 12 crime-psychology journals during the 2003 calendar year were reviewed for subsequent citations in the Social Science Citation Index (SSCI). Fifteen potential predictors were reduced to nine after subjecting the 15 variables to a principal components analysis with varimax rotation. The nine predictors included author characteristics – gender, occupational affiliation (academic–nonacademic), national affiliation (U.S.–other), citations per 2001–2002 first author publications – article characteristics – collaboration (single author–multiple author), article length, reviews, subject matter (corrections/criminology-legal/forensic) – and journal characteristics – journal impact. Negative binomial regression of the citations earned by these 428 journal articles in a 23 to 34 month follow-up ($M = 28$ months) revealed significant effects for citations per 2001–2002 first author publications, national affiliation, and review articles. These results suggest that author impact may be a more powerful predictor of citations received by a journal article than the periodical in which the article appears.

Introduction

FRANCES (2002) divides the lifecycle of a journal article into two stages. The first stage entails conceptualizing the problem, researching the issues, writing up the results, and submitting the paper, and ends with acceptance of the manuscript for publication.

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The second stage in the life of a journal article begins with publication of the paper and lasts as long as the paper is read, used, and recognized by other professionals. One of the most commonly employed measures of professional recognition is the number of times an article is cited by fellow researchers and writers. Although using citations to judge the quality of both journals and individual papers has been criticized (see ROUSSEAU, 2002; SEGLEN, 1997) it should be noted that citations frequently correlate with other forms of professional recognition like winning a Nobel Prize (COLE & COLE, 1967), receiving a prestigious scientific award (MYERS, 1970), or being rated a highly effective teacher (ROTHMAN & PRESHAW, 1975). Consequently, citations, as measured by the Institute for Scientific Information's (2004) Social Science Citation Index (SSCI), will serve as a proxy for the professional recognition received by a journal article in the present study while three groups of covariates – author characteristics, article characteristics, and journal characteristics – will serve as predictor variables.

Certain author characteristics appear to be associated with the number of citations an author's work receives. Gender, however, is not among them. Researchers have consistently found that while women publish fewer articles than men, the papers that they do publish are cited at least as often as the papers of their male colleagues (LONG, 1992; RODGERS & MARANTO, 1989; STACK, 2002). Academic affiliation is an author characteristic that may be more clearly predictive of subsequent citations. OVER (1980) reports that citation rates vary according to academic appointment whereas STACK (2002) notes that faculty rank (assistant professor, associate professor, professor) correlates moderately with both publications and citations. Seeing as research is often a core component of a faculty member's annual evaluation it is reasoned that authors with a primary academic affiliation should have more publications and citations than authors without a primary academic affiliation. National affiliation may also be important in that U.S. researchers often produce more papers and receive more citations than researchers from other countries (FAVA et al., 2004). The results of one study revealed that while the authors of papers published in Scandinavian journals cited research from U.S. and Scandinavian authors, papers published in American journals cited U.S. authors almost exclusively (GREESON, 1991).

Article characteristics have also been found to correlate with subsequent citations. LEE & BOZEMAN (2005), for instance, witnessed a positive correlation between collaboration and productivity as defined by the normal count of peer-reviewed publications by coauthors. NEMETH & GONCALO (2005), on the other hand, discerned that the number of collaborators and the number of citations correlated in articles published in six psychology journals. More methodologically sound and more clearly written studies earned more citations in a study by SCHWAB (1985), while HARTLEY et al. (2002) unearthed a relationship between article readability and colleague-rated influence but failed to discover a relationship between article readability and citation counts. Article content may likewise influence a paper's chances of being accepted for

publication (KERR et al., 1977); as a matter of speculation, it may also influence the number of citations the paper receives. Finally, review articles (AMIN & MABE, 2000) and meta-analyses (PATSOPOULOS et al., 2005) typically receive more citations than regular articles, an advantage that may run as high as two to one (MOED & VAN LEEUWEN, 1995).

Journal characteristics are a third category that may correlate with citations. SEGLEN (1997) contends that high impact journals publish high impact articles but that factors other than a journal's Impact Factor (IF: GARFIELD, 1999) are responsible for an article's degree of impact. CALLAHAM et al. (2002), nevertheless, determined that a journal's IF, rather than its methodology or research design, was the best predictor of subsequent citations in 204 studies originally submitted to an emergency medicine conference and later published in Science Citation Index (SCI) source journals. A number of criticisms have been leveled against the IF, most notably the fact that all items contribute to the numerator, yet only notes, reviews, and regular articles contribute to the denominator. Consequently, journals that publish items like book reviews, letters, meeting abstracts, and editorials, whose citations are counted in the numerator but whose presence is not counted in the denominator, enjoy an inflated IF (GLÄNZEL & MOED, 2002). WALTERS (in press) devised an alternate citation-based measure, Citations Per Article (CPA), by dividing the total number of citations to notes, reviews, and regular articles in a journal by the number of notes, reviews, and regular articles published by the journal over a specified period of time. The results of the WALTERS (in press) study showed that while the CPA measure correlated with peer-rated journal utility, the IF, despite its significant correlation with the CPA, failed to correlate with peer-rated utility.

The principal hypothesis tested in this study held that citations for 2001–2002 first author* publications but not the 2000 CPA of the publishing journal would significantly predict citations attained by first author 2003 articles when other potentially relevant predictors are incorporated into the regression. The other potentially relevant predictors included in this study were author characteristics like gender, occupational affiliation (academic versus non-academic), and national affiliation (U.S. versus other), article characteristics like collaboration (single author versus multiple authors), number of references, article length in pages, review papers, and subject matter

* In the interests of both simplicity and uniformity only data on first authors were included in this study. Research indicates that first authorship is frequently valued over second and third authorship because it usually entails a greater investment of time, energy, and intellectual resources in the final product (LOGAN, 1988). One first author publication and five second/third author publications is generally not comparable to five first author publications and one second/third author publication. Therefore, in order to avoid a complicated and largely arbitrary weighting scheme (e.g., first author publications assigned double the weight of second/third author publications) only first author publications were included in the citations per 2001–2002 publications variable.

(corrections/criminology versus legal/forensic), and journal characteristics like a journal's peer-rated utility, Impact Factor (IF), and the number of academic libraries with holdings of that particular journal. The original 15 predictor variables were reduced to a more manageable number through factor analysis in order to minimize the probability of collinearity between predictors. Moreover, because the exposure period for the dependent variable was not equivalent across observations (i.e., articles published in early 2003 had a greater chance of being cited by virtue of a longer follow-up period than articles published in late 2003) a time variable was added to the regression equation in order to control for length of exposure.

Method

Journals

The 15 peer-reviewed journals identified in a study by WALTERS (in press) of crime-psychology journals were initially reviewed for inclusion in this study. Three journals had to be removed from consideration because they did not appear in the 2003 SSCI, the edition in which the criterion articles for this study were published. The twelve journals contributing 2003 articles to this study were: *Aggression and Violent Behavior*, *Behavioral Sciences and the Law*, *Criminal Justice and Behavior*, *International Journal of Law and Psychiatry*, *International Journal of Offender Therapy and Comparative Criminology*, *Journal of Forensic Psychiatry and Psychology*, *Journal of Interpersonal Violence*, *Journal of the American Academy of Psychiatry and the Law*, *Law and Human Behavior*, *Legal and Criminological Psychology*, *Prison Journal*, and *Psychology, Public Policy, and Law*. There were 428 notes, reviews, and regular articles published in these 12 journals during the 2003 calendar year.

Measures

Citation outcome measure. All citations recorded by the 428 articles published in the 12 crime-psychology journals during the 2003 calendar year served as the dependent variable for this study. The follow-up period began the month the article was published and ended in mid-October 2005. Unlike the earlier WALTERS (in press) investigation, author and journal self-citations were not eliminated and review article citations were not reduced by half because WALTERS (in press) discovered that the relationship between the CPA and other relevant measures like the IJU and IF did not change when author/journal self-citations were eliminated and citations to review articles were reduced by half.

Author predictor variables. Gender was dichotomized as male or female based on the first author's gender. In cases where gender could not be determined from the first author's given name a name directory was consulted or the author's picture was searched for on the internet. The affiliation section of the SSCI furnished two additional putative author predictor variables for this study, the first author's occupational affiliation (academic versus other) and the first author's national affiliation (U.S. versus other). Finally, the number of 2001–2002 first author publications, the number of citations to 2001–2002 first author publications, and citations per 2001–2002 first author publications were additional author predictor variables considered for inclusion in this study.

Article predictor variables. Author collaboration was categorized as single author versus multiple authors (two or more). The number of references and article length in pages for each 2003 article were also catalogued. Furthermore, articles were dichotomized into review studies (literature review, meta-analysis) and non-review studies (empirical, theoretical, or methodological papers). Article content or subject matter was grouped into two broad categories: correctional/criminology and legal/forensic. Articles addressing jails, prisons, offender characteristics/rehabilitation, and the causes of crime were assigned to the correctional/criminology category, whereas articles addressing legal, forensic, police, and court issues were assigned to the legal/forensic category. Ten percent ($n = 43$) of the articles were independently evaluated by a second rater and the results displayed adequate inter-rater reliability, $\kappa = 0.76$.

Journal prediction variables. Citations Per Article (CPA) were calculated for all 12 crime-psychology journals and were restricted to articles published in 2000. Hence, the version of the CPA employed in the present investigation (CPA 2000) consisted of the number of citations appearing between 2000 and 2004 to notes, articles, and reviews (biographies, book reviews, comments, corrections/retractions, editorials, letters, and meeting abstracts were excluded) published in a journal in the year 2000 divided by the total number of notes, articles, and reviews published by the journal in that same year. A Spearman Rank correlation of 0.96 arose between the CPA 2000 and the 2000–2002 CPA rankings reported in the earlier WALTERS (in press) investigation. The rationale for using articles from different years to calculate the CPA predictor variable (2000), citations per first author publication predictor variable (2001–2002), and the citation outcome variable (2003) was to maintain the independence of these three variables.

As part of the WALTERS (in press) investigation a group of 58 researchers with four or more first author publications in crime-psychology journals rated the frequency with which they consulted or read articles from each of the 12 journals on a 5-point scale: 1 = never, 2 = rarely (less than once a month), 3 = occasionally (one to three times a month), 4 = regularly (approximately once a week), 5 = frequently (several times a week). These ratings were then averaged across the 58 raters to create a mean rating for

each journal known as the Informal Journal Utility (IJU) measure. To control for differences in the number of articles published by a journal a corrected IJU (cIJU) was computed whereby the IJU was divided by the natural log of the journal's total output of articles between 2000 and 2002.

The Impact Factor (IF) for articles published in 2000–2001 was a third candidate journal variable considered for inclusion in this study. The IF was computed as the number of citations in 2002 to all items published in 2000–2001 divided by the number of citable source items (notes, reviews, regular articles) published between 2000 and 2001. A fourth journal variable employed in the present investigation was an estimate of the number of academic libraries subscribing to the 12 crime-psychology journals included in this study. Information was obtained from the WorldCat internet search program and determined that the number of libraries holding these 12 journals ranged from 72 to 784, with a mean value of 459.

Procedure

Initially, citable sources (notes, reviews, and regular articles) were identified in the 2003 volumes of the 12 crime-psychology journals. This revealed the presence of 428 notes, reviews, and regular articles. Each article was examined and the following information was extracted: first author gender, first author occupational affiliation, first author national affiliation, first author 2001–2002 publications, citations to 2001–2002 first author publications, citations per 2001–2002 first author publications, collaboration, references, article length, reviews, subject matter, CPA 2000, cIJU, IF, library holdings, and all citations to 2003 publications.

In order to reduce the possibility of collinearity between covariates a principle components analysis with varimax rotation was computed using the 15 original covariates, a procedure that yielded nine factors with eigenvalues above 0.6. Loading onto Factor 1 were the CPA 2000 (0.92), cIJU (0.92), IF (0.79), and library holdings (0.60), loading onto Factor 2 were first author 2001–2002 publications (0.81), citations to 2001–2002 first author publications (0.96), and citations per 2001–2002 first author publications (0.84), and loading onto Factor 3 were references (0.72) and article length (0.90). Reviews (0.93), national affiliation (0.96), subject matter (0.93), collaboration (0.98), occupational affiliation (0.96), and gender (0.98) loaded onto Factors 4, 5, 6, 7, 8, and 9, respectively.

The CPA 2000 represented the first factor, citations per 2001–2002 first author publications represented the second factor, and the highest loading items for each of the remaining factors represented the final seven factors in a regression analysis of citations to 2003 articles. A Poisson class regression was considered optimal given that the outcome (2003 article citations) was a count variable. Since Poisson class procedures assume equal exposure for all observations and articles published in early 2003 had

longer periods of exposure than articles published in late 2003 (range = 23 to 34, mean = 28) the natural log of time in months between article publication and the end of the follow-up (mid-October 2005) was added to the regression equation with its parameter fixed at 1.00.

Results

There are three issues that must be resolved before one can select a Poisson class model with which to analyze count data: overdispersion, truncation/censoring, and excess zeros. Overdispersion was tested with CAMERON & TRIVEDI's (1990) Ordinary Least Squares (OLS) regression procedure (topt) and revealed that the regression was highly overdispersed ($p < 0.001$). Accordingly, negative binomial regression, which makes allowances for overdispersion (GREENE, 2003), was used to assess the relationship between the nine covariates and 2003 citations. On the other hand, there was no evidence of either truncation (loss of a portion of the distribution; e.g., no zeros) or censoring (collapsing a range of outcomes into a single value) in the dependent variable. Whether the negative binomial model needed to be modified to accommodate excess zeros was evaluated with the VUONG (1989) statistic. Since the results of the Vuong test proved inconclusive ($V = -0.98$), standard negative binomial regression was employed.

Univariate results for each of the original nine covariates (gender, occupational affiliation, national affiliation, citations per 2001–2002 first author publications, collaboration, article length, reviews, subject matter, CPA 2000) are listed in Table 1.

Table 1. Univariate results for individual covariates

Covariate	β	p
Gender	-0.27	0.7895
Occupational Affiliation	0.22	0.8219
National Affiliation	-3.27	0.0011
Citations/01-02 Publications	5.90	0.0001
Collaboration	1.36	0.1728
Article Length	3.54	0.0004
Reviews	3.31	0.0009
Subject Matter	0.26	0.7930
CPA 2000	3.56	0.0004

Note. β = unstandardized coefficient; p = significance level; gender (male = 1, female = 2); occupational affiliation (academic = 1, non-academic = 2); national affiliation (U.S. = 1, other = 2); citations/01-02 Publications = number of citations per 2001–2002 first author publications; collaboration (1 = one author, 2 = two or more authors); reviews (literature review/meta-analysis = 1; other article = 0); subject matter (correctional/criminological = 1; legal/forensic = 2); CPA 2000 = Citations Per Article for papers published in a particular journal in 2000; N = 428. A constant was employed with each univariate analysis but the results of the constant are not shown.

In each case a single variable and constant term were regressed onto citations for 2003 articles using the negative binomial regression procedure. Analysis revealed that five of the variables – national affiliation, citations per 2001–2002 first author publications, article length, reviews, and the CPA 2000 – achieved univariate significance. Multivariate negative binomial regression was subsequently used to determine whether national affiliation, citations per 2001–2002 first author publications, article length, reviews, and the CPA 2000 continued to predict citations to 2003 articles when entered into a multivariate regression equation that contained all nine covariates.

Negative binomial regression results obtained when the nine covariates (gender, occupational affiliation, national affiliation, citations per 2001–2002 first author publications, collaboration, article length, reviews, subject matter, CPA 2000) were regressed onto the outcome of citations to 2003 articles can be found in Table 2.

Table 2. Negative binomial regression results for citations per 2001–2002 first author publications, the CPA 2000 and seven other predictors of citations to 2003 articles

Variable	β	SE	t	p	β_x^s	exp β_x^s	95% CI
Constant	-3.9326	0.4998	-7.87	0.0001			
Gender	0.0322	0.1196	0.27	0.7875	0.0161	1.02	-0.1762/0.2786
Occupation Affiliation	0.2082	0.1447	1.44	0.1502	0.0874	1.09	-0.1232/0.5024
National Affiliation	-0.3008	0.1313	-2.29	0.0220	-0.1444	0.86	-0.5636/-0.0588
Citations/01-02 Publications	0.0712	0.0139	5.13	0.0001	0.2792	1.32	0.0482/0.0980
Collaboration	0.2608	0.1466	1.78	0.0752	0.1095	1.12	-0.0048/0.5272
Article Length	0.0074	0.0104	0.71	0.4779	0.0432	1.04	-0.0159/0.0303
Reviews	0.5172	0.1798	2.88	0.0040	0.1552	1.17	0.1865/0.8639
Subject Matter	0.0004	0.1203	0.00	0.9972	0.0002	1.00	-0.2572/0.2594
CPA 2000	0.0811	0.0228	1.67	0.0949	0.1048	1.11	-0.0215/0.0929
Log of Time	1.0000.....					(Fixed Parameter).....

Note. β = unstandardized coefficient; SE = standard error; $t = \beta/SE$; p = significance level; β_x^s = x-standardized coefficient; exp β_x^s = exponent of x-standardized coefficient, 95% CI = 95th percentile confidence interval of the unstandardized coefficient obtained via bootstrap estimation (R = 100); gender (male = 1, female = 2); occupational affiliation (academic = 1, non-academic = 2); national affiliation (U.S. = 1, other = 2); citations/01-02 Publications = number of citations per 2001-2002 first author publications; collaboration (1 = one author, 2 = two or more authors); reviews (literature review/meta-analysis = 1; other article = 0); subject matter (correctional/criminological = 1; legal/forensic = 2); CPA 2000 = Citations Per Article for papers published in a particular journal in 2000; log of time = natural log of follow-up period in months; N = 428.

As the results indicate, citations per 2001–2002 first author publications, reviews, and national affiliation but not the CPA 2000 correlated with the number of citations

attained by 2003 publications.* The exponent of the x -standardized coefficient for citations per 2001–2002 first author publications denotes that a one standard deviation increase in citations per 2001–2002 first author publications (3.92) predicted a 32% increase in 2003 citations when all other variables were held constant, whereas the x -standardized coefficient for the CPA 2000 denotes that a one standard deviation increase in the CPA 2000 (2.75) predicted an 11% rise in 2003 citations keeping all other variables constant.

Discussion

Many grant and tenure committees continue to operate on the assumption that the journal in which a paper appears provides the best estimate of the paper's scholarly merit. Some committees go so far as to weight the published papers of a grant or tenure candidate with the IF of the journal in which the article appears. Results from the present investigation raise serious questions about this strategy and suggest that the citation record of the paper's first author is a stronger correlate of subsequent citations than the citation record of the journal in which the paper is published. The CPA 2000 and several other journal impact measures (IF, cIJU, library holdings) failed to correlate significantly with citations for 2003 articles when entered into a negative binomial regression with a measure of citations per prior first author publications and seven other covariates. In fact, citations per prior first author publication attained an effect size twice that of the next best covariate (reviews) and three times that of journal impact (CPA, IF, cIJU). This finding supports the hypothesis that citations to an author's past work do a better job of predicting citations to future papers than the journal in which the article appears. It may well be that high impact journals gain much of their status from the fact that this is where high impact authors elect to send their work. The question for future research is what makes certain authors consistent producers of high impact research (topic selection, writing style, analytic reasoning).

The majority of journals included in this study had American publishers, editors, and audiences and so the citation bias in favor of U.S. authors originally observed in a study by GREESON (1991) was confirmed in the present investigation. Furthermore, meta-analyses and review articles, as documented in several earlier studies (AMIN & MABE, 2000; PATSOPOULOS et al., 2005), received significantly more citations than regular articles. Gender did not correlate univariately with citations, consistent with past research (LONG, 1992; RODGERS & MARANTO, 1989; STACK, 2002), but neither did

* Replacing the CPA 2000 with alternate journal impact measures like the cIJU, IF, and library holdings did not change the results of the negative binomial regression analysis. Whereas two of the three alternate measures achieved significant univariate results – cIJU ($t = 2.64, p = 0.0083$), IF ($t = 2.66, p = 0.0079$), library holdings ($t = -0.85, p = 0.3968$) – none of the alternate measures achieved multivariate significance – cIJU ($t = 1.51, p = 0.1321$), IF ($t = 1.37, p = 0.1705$), library holdings ($t = -1.40, p = 0.1600$).

occupational affiliation or subject matter. Perhaps if covariates like academic rank and research design had been used instead of occupational affiliation and subject matter then the results would have been more positive, though the use of either measure would have led to a significant loss of information in that 23% of the authors worked in non-academic settings and 35% of the papers were theoretical, methodological, or review articles with no research design. In contrast to what was found in a study by NEMETH & GONCALO (2005), the present investigation failed to find evidence that collaboration increased the number of citations a paper receives, and while article length correlated univariately with citations this variable was nonsignificant when included in the multivariate equation, perhaps because of its overlap with the review article covariate.

A potential limitation of this study is that it sampled from a narrow content area, 12 crime-psychology journals, and computed impact over a relatively brief period of time (mean follow-up = 28 months). It could be argued that if the sample had encompassed a broader range of journals or if the follow-up had been longer the results would have been different. After all, in the WALTERS (in press) investigation one of the principal advantages of the CPA over the IF and perhaps a principal reason why the CPA correlated better than the IF with the cIJU was that the CPA was calculated on a longer follow-up. Hence, both the internal and external validity of the present findings are open to question. The results may also have been different had a subjective measure of article quality, such as research design or writing clarity, been used. Just the same, in a study where research design was evaluated, CALLAHAM et al. (2002) ascertained that the quality of the research design was much less predictive of citations than journal impact, the latter of which turned out to be nonsignificant in the present study. Moreover, while HARTLEY et al. (2002) discerned a relationship between the quality of writing and peer ratings of influence there was no relationship between the quality of writing and subsequent citations.

There are those who would argue that there are better ways to judge the quality of professional articles than citation counts. Readability, relevance, and novelty are three alternative measures of article impact or quality available to scholars and committees. The problem, of course, is quantifying these largely qualitative indicators. Journal counts, on the other hand, are objective, quantifiable, and accessible (RUSHTON, 1984). Therefore, while we should never rely solely on citation analysis when judging the merit or impact of a professional paper, neither should we dismiss citation counts out of hand. Rather, we must attempt to compensate for some of the more blatant limitations of citation analysis by blending it with the benefits of operationalized forms of qualitative analysis, such as the readability analyses conducted by HARTLEY et al. (2002). The contribution that the present study makes is to verify what most people have long suspected; namely, that (1) high impact journals earn their reputation by publishing high impact articles; (2) authors who have published high impact articles in the past will continue publishing high impact articles in the future; and (3) high impact

authors may consider journal prestige in deciding where to send an article but there are many other equally if not more important considerations (e.g., relevance, publication lag) that enter into the author's decision; otherwise, journal impact would be superior to author impact in predicting citations to subsequent articles.

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