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Brief communication

Externalities and article citations: experience of a national public health journal (*Gaceta Sanitaria*)

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ABSTRACT

Purpose: The purpose of the study was to analyze the determinants of citations such as publication year, article type, article topic, article selected for a press release, number of articles previously published by the corresponding author, and publication language in a Spanish journal of public health.
Methods: Observational study including all articles published in *Gaceta Sanitaria* during 2007–2011. We retrieved the number of citations from the ISI Web of Knowledge database in June 2013 and also information on other variables such as number of articles published by the corresponding author in the previous 5 years (searched through PubMed), selection for a press release, publication language, article type and topic, and others.
Results: We included 542 articles. Of these, 62.5% were cited in the period considered. We observed an increased odds ratio of citations for articles selected for a press release and also with the number of articles published previously by the corresponding author. Articles published in English do not seem to increase their citations.
Conclusions: Certain externalities such as number of articles published by the corresponding author and being selected for a press release seem to influence the number of citations in national journals.

Introduction

Editorial boards of peer-reviewed journals have in their agendas different ways to raise or maintain the bibliometric impact factor (BIF) of the publications they serve, and many authors are guided by BIF when deciding the journal to submit their work. The BIF does not measure the quality of a specific article, but provides a figure that is being used to compare (and rank) journals. BIF has also received hard critics [1]. The number of citations that an article receives should be related to its quality and importance of results, but there are other factors that we can call externalities, that might also influence this number, and that Editors sometimes use. Among them we can find press releases or author's experience measured as the number of articles published previously. The probability of citation has been recognized by some editors to be used as a basis for rejecting an article [2].

Sometimes editors have used practices borderline with ethics to increase BIF such as, (1) increasing self-citations to their journal, (2) manipulating the number of citable items by reducing the number of citable items (if citations remains stable, it increases the BIF); and (3) increasing the number of citable items that have more probabilities of receiving citations, such as reviews [3].

Approximately 75% of published articles have never been cited [4]. There is evidence about some factors which predict a higher probability of being cited such as article type [5] or language [6]. Sometimes even articles with a highest probability of being cited

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are not always of interest for most of the readership of the journal—a situation difficult to be concealed.

The objective of the present article is to analyze the determinants of citations, especially those with less evidence defined as externalities such as number of articles previously published by the corresponding author, selection for a press release, and other factors in a Spanish journal of public health.

Materials and methods

To perform the present study, we formed a cohort with all the articles published in *Gaceta Sanitaria* in the period 2007–2011. *Gaceta Sanitaria* is the official journal of the *Spanish Society for Public Health and Health Policy* and started its publication in 1987. It is the non-English language journal with the highest BIF in the Journal Citation Reports (JCR; Thomson Reuters) classified in the category public, environmental & occupational health (2013 BIF: 1,250) [7,8]. The journal is published by Elsevier since 2007 and received its first BIF in 2009 (IF: 1,172) [9].

For each article, we registered the following information: citations received since publication (retrieved from the ISI Web of Knowledge database in June 2013); number of authors; number of articles published by the corresponding author until the publication of the included article in the last 5 years; corresponding author's institution (classified into university, health administration, research center, and health center and/or hospital, for authors with more than one affiliation we selected the first one); type of article (original, brief original, review, editorial, special article, debate, field note, methodological note [proposing new methods in public health], letter, and so forth); publication year; publication language (Spanish or English); topic (grouped in infectious diseases, chronic diseases, health economy and health managing, environmental protection and promotion, methodology, editorial policies and formation, social epidemiology, pharmacoeconomy and pharmacoepidemiology, and other topics); competitive funding declared (yes or no); selected for a press release by the editorial committee (yes or no). A common data format database was designed, and the authors extracted the information for the year assigned.

Statistical analysis

We first performed an univariate analysis describing the distribution of the different variables. We performed two multivariate logistic regression models. The first one considered as the dependent variable if the article was cited or not. The second analysis only included cited articles, and we used as a cut point for the dependent variable the median value of citations to have the same number of articles for each category. The dependent variable was in this second analysis being cited three times or more versus one or two times. We could not include some variables in the analysis because of missing or difficult to obtain information (statistical significance, sample size, geographical scope of the study, study design, or time since online publication). Both regression models included the covariates as mentioned in the previous paragraph. The analysis was performed with SPSS, version 17.

Results

We included a total of 542 articles. Of these, 339 were cited in the period considered (62.5%). The average number of citations was 3.3, and the median number was 2, with an interquartilic range of 1 to 4. Table 1 shows the description of the included articles. Forty percent had five or more authors, and 61% of the corresponding authors had published five or more articles in the 5 years previous to the article publication. The most frequent publication types were original articles (43%). There were 19 review articles, accounting for 3.5% of all included articles. Forty-three articles were published in English (8.2%).

Table 1
Characteristics of the articles published in *Gaceta Sanitaria* (2007–2011) and included in the analysis of citations ($n = 542$)

Variables	Articles, *n* (%)
Publication year	
2007	99 (18.3)
2008	112 (20.7)
2009	132 (24.4)
2010	85 (15.7)
2011	114 (21.0)
Number of authors	
≤4	323 (59.6)
5–6	199 (35.6)
≥7	19 (3.5)
Articles published by corresponding author in the last 5 y	
≤4	203 (38.4)
5–10	114 (21.6)
≥11	212 (40.1)
Institution of corresponding author	
University	164 (31.1)
Health administration	167 (31.6)
Research center	91 (17.2)
Health care facility	104 (19.7)
Others	2 (0.4)
Article type	
Original	232 (43.1)
Brief original	54 (10.0)
Review	19 (3.5)
Editorial	25 (4.6)
Editorial note	20 (3.7)
Special article	37 (6.9)
Methodological note	20 (3.7)
Field note	25 (4.6)
Letter	41 (7.6)
Comment	28 (5.2)
Other types	35 (10.8)
Language	
Spanish	496 (91.8)
English	43 (8.2)
Topic	
Infectious diseases	45 (8.4)
Chronic diseases	64 (12.0)
Health economy and health services	109 (20.4)
Environmental protection and promotion	78 (14.6)
Methodology	56 (10.5)
Social epidemiology	105 (19.6)
Phamarcoepidemiology	30 (5.6)
Other topics	48 (9.0)
Competitive funding	
Yes	160 (31.4)
No	349 (68.6)
Selected for press release	
Yes	47 (8.7)
No	495 (91.3)

Table 2 shows the odds ratio (OR) that an article was cited according to different variables. Articles published in 2010 and 2009 had the highest OR of being cited (reference year 2011). The number of articles published by the corresponding author was statistically significant associated with a higher OR of being cited: each previously published article increased the OR of being cited by a 2% ($P = .03$). The institution of the corresponding author does not seem to increase the OR of citation. Regarding the topic, articles on pharmacoepidemiology (OR = 4.99; $P = .02$) and on methodology (OR = 3.56; $P = .02$) have a statistically significant higher OR of being cited. Articles on environmental protection and health promotion had a marginally significant increased OR of being cited. No association was observed for publication language or article type. Competitive funding or article type is not associated with the OR of citation, but being selected for a press release is significantly associated to the OR of citation (OR = 2.77; 95% confidence interval = 1.05–7.32; $P = .04$).

Table 2
Article cited compared with those not cited in *Gaceta Sanitaria* (2007–2011), according to articles' characteristics ($n = 495$)

Variable	Cited, *n* (%)	Uncited, *n* (%)	Multivariable OR*	95% CI
Publication year				
2011	44 (38.6)	70 (61.4)	1	—
2010	64 (75.3)	21 (24.7)	5.58	2.67–11.67
2009	85 (64.4)	47 (35.6)	6.30	3.00–13.20
2008	76 (67.9)	36 (32.1)	3.90	2.03–7.51
2007	70 (70.7)	29 (29.3)	4.38	2.04–9.39
Published articles as corresponding author in the 5 y preceding the article publication†,‡	8	6	1.02	1.00–1.03
Institution of the corresponding author				
University	109 (66.5)	55 (33.5)	1	—
Health administration	103 (61.7)	64 (38.3)	0.88	0.49–1.56
Research center	63 (69.2)	28 (30.8)	1.04	0.52–2.09
Health care facility	62 (59.6)	42 (40.4)	0.95	0.48–1.85
Others	1 (50.0)	1 (50.0)	0.56	0.02–13.86
Language				
Spanish	307 (61.9)	190 (38.1)	1	—
English	32 (74.4)	11 (25.6)	1.57	0.70–3.69
Topic				
Infectious diseases	23 (51.1)	22 (48.9)	1	—
Chronic diseases	47 (73.4)	17 (26.6)	2.21	0.89–5.49
Health economy and health services	61 (56.0)	48 (44.0)	1.65	0.74–3.68
Environmental protection and promotion	52 (66.7)	26 (33.3)	2.22	0.93–5.30
Methodology	36 (64.3)	20 (35.7)	3.56	1.21–10.47
Social epidemiology	67 (63.8)	38 (36.2)	1.80	0.77–4.19
Phamacoepidemiology	24 (80.0)	6 (20.0)	4.99	1.34–18.54
Other topics	29 (60.4)	19 (39.6)	2.24	0.81–6.21
Competitive funding				
No	207 (59.3)	142 (40.7)	1	—
Yes	119 (74.4)	41 (25.6)	1.15	0.67–1.96
Press release				
No	298 (60.2)	197 (39.8)	1	—
Yes	41 (87.2)	6 (12.8)	2.77	1.05–7.32
Article type				
Original	171 (73.7)	61 (26.3)	1	—
Brief original	40 (74.1)	14 (25.9)	0.78	0.37–1.64
Review	17 (89.5)	2 (10.5)	2.82	0.56–14.10
Editorial	15 (60.0)	10 (40.0)	0.78	0.25–2.45
Editorial note	14 (70.0)	6 (30.0)	0.30	0.07–1.18
Special article	22 (59.5)	15 (40.5)	0.50	0.21–1.17
Methodological note	13 (65.0)	7 (35.0)	0.54	0.18–1.63
Field note	13 (52.0)	12 (48.0)	0.42	0.15–1.16
Letter	11 (26.8)	30 (73.2)	0.09	0.03–0.25
Comment	6 (21.4)	22 (78.6)	0.04	0.01–0.17
Other types	19 (51.4)	18 (48.6)	0.31	0.12–0.83

CI = confidence interval.
* Multivariable analysis includes all variables included in the table.
† Continuous variable.
‡ Median number of published articles in the last 5 years.

Table 3
Articles cited three or more times compared with articles cited one or two times in *Gaceta Sanitaria* (2007–2011; $n = 325$), according to their characteristics

Variable	≥3 Citations, *n* (%)	1 or 2 citations, *n* (%)	Multivariable OR*	95% CI
Publication year				
2011	7 (15.9)	37 (84.1)	1	—
2010	27 (57.8)	37 (42.2)	10.67	3.73–30.50
2009	39 (45.1)	46 (54.9)	8.79	2.88–26.84
2008	41 (53.9)	35 (46.1)	5.28	1.90–14.71
2007	41 (58.6)	29 (41.4)	3.42	1.20–9.78
Published articles as corresponding author in the last 5 y†,‡	10	7	1.01	1.00–1.03
Institution of the corresponding author				
University	55 (50.5)	54 (49.5)	1	—
Health administration	44 (42.7)	59 (57.3)	0.88	0.46–1.68
Research center	31 (49.2)	32 (50.8)	0.79	0.38–1.64
Healthcare facility	23 (37.1)	39 (62.9)	0.65	0.30–1.40
Others	1 (100.0)	0 (0.0)	—	—
Language				
Spanish	139 (45.3)	168 (54.7)	1	—
English	16 (50.0)	16 (50.0)	1.51	0.64–3.55
Topic				
Infectious diseases	10 (43.5)	13 (56.5)	1	—
Chronic diseases	22 (46.8)	25 (53.2)	0.95	0.30–2.99
Health economy and health managing	26 (42.6)	35 (57.4)	0.93	0.31–2.80
Environmental protection and promotion	26 (50.0)	26 (50.0)	1.40	0.44–4.40
Methodology	16 (44.4)	20 (55.6)	0.72	0.19–2.76
Social epidemiology	32 (47.8)	35 (52.2)	0.80	0.26–2.47
Phamacoepidemiology	9 (37.5)	15 (62.5)	0.76	0.20–2.90
Other topics	14 (51.7)	15 (48.3)	0.84	0.22–3.19
Competitive funding				
No	96 (43.4)	111 (53.6)	1	—
Yes	57 (47.9)	62 (52.1)	1.11	0.63–1.94
Press release				
No	129 (43.3)	169 (56.7)	1	—
Yes	26 (63.4)	15 (36.6)	2.85	1.31–6.21
Article type				
Original	76 (44.4)	95 (55.6)	1	—
Brief original	15 (37.5)	25 (62.5)	0.64	0.29–1.40
Review	10 (58.8)	7 (41.2)	1.29	0.43–3.87
Editorial	9 (60.0)	6 (40.0)	1.69	0.49–5.92
Editorial note	6 (42.9)	8 (57.1)	1.80	0.31–10.34
Special article	16 (72.7)	6 (27.3)	3.74	1.19–11.73
Methodological note	6 (46.2)	7 (53.8)	1.24	0.35–4.41
Field note	4 (33.3)	8 (66.7)	0.56	0.14–2.28
Letter	4 (36.4)	7 (63.6)	0.85	0.19–3.69
Comment	1 (16.7)	5 (83.3)	0.40	0.03–5.11
Other types	8 (44.4)	10 (55.6)	1.03	0.33–3.21

* Multivariable analysis includes all variables included in the table.
† Continuous variable, the 95% CI without rounding is 0.997–1.029.
‡ Median number of published articles in the last 5 years.

Table 3 shows the results of exclusively cited articles comparing those cited three or more times versus those cited one or two times. Only four variables appear to have a statistically significant or marginally association on the OR of having being cited 3 times or more: year of publication, number of articles published by the corresponding author in the 5 years previous to the publication ($P = .1$), having been selected for a press release ($P = .01$), and article type with special articles having more OR of being highly cited than other article types ($P = .02$).

Discussion

This research shows the citation pattern of a Spanish Journal of Public Health. Interestingly, we have observed for the first time to our knowledge that the number of published articles by the corresponding author increases the odds of being cited, an OR that is also higher for the articles selected for a press release. Unexpectedly, publication language did not show an association with the OR of being cited.

A possible explanation for the publication language finding is that authors tend to cite articles written in their mother language, and therefore, *Gaceta Sanitaria* articles published in English could be undercited, whereas articles in Spanish overcited [10,11]. We also expected reviews being more cited than original articles but we have not observed such association. In both analyses, only 19 and 17 reviews have been included, although a trend for a higher number of citations is present for reviews. We have observed that the topic of the article might influence on the number of citations, a finding also observed by other researchers [12].

A very interesting and novel result is that articles selected for a press release have more odds of being cited. Articles selected for a press release have an OR of 2.8 of being cited and of receiving three or more citations (when we restricted the analyses to cited papers). We should not disregard a selection bias because the articles selected for a press release are usually those with high novelty, attractive, or important results. It is difficult to disentangle whether the higher number of citations is due to the press release or to the interest of the article itself. Press releases are intended for general public information, not for scientists, but publication of scientific news in the lay press might influence the citation of the articles [13]. Some editors of important journals recognize using media promotion to raise the visibility of their journals [2].

The number of articles published by the corresponding author in the last 5 year influences significantly on the odds of being cited and also the number of citations received. This observation could have different explanations. The most prolific authors have more recognition in their field and, therefore, could be more likely elected to be cited by other authors and perhaps are publishing better investigations with in turn a higher odds of being cited. Probably, these authors also self-cite their own work, but we are not aware of any other study which has analyzed this variable.

Our study has some limitations. We have not been able to analyze some variables such as sample size of the studies published, presence or absence of statistically significant results, or the association with self-citations (from authors or to the analyzed journal). The self-citation rate for *Gaceta Sanitaria* has been constant for the analyzed period (20%), and for this reason, we think that it should have not affected the odds of citations within that period. Authors' self-citations could not be analyzed because it was extremely difficult to retrieve this figure, specially for articles with many coauthors. We had a low number of observations for some variables such as articles published in English or reviews (43 and 19, respectively), and therefore, the conclusions of this analysis involving those variables should be cautiously considered.

Two articles can be published in the same journal while one can receive many citations and the other no citations [14]. A recent study has observed that BIF of the journal where a work is published could reflect adequately its quality, even better than the number of citations received by the article [15]. This means that the quality of the journal should reflect the quality of the articles it publishes and vice versa. However, BIFs are not the only indicator of a journal's impact, and alternative indicators (known as "altmetrics") based on the article performance in the social networks and the media have emerged in the last years [16]. We have not measured the influence that can have being published by a strong editorial group such as Elsevier, which has its own diffusion channels that probably reach more audience than other publishers.

The present study has some strengths. We have analyzed citations within the same journal with the same BIF in a given year, and this favors comparability of the results. BIF is perhaps the main variable influencing the OR of citation [17]. We have included variables that have not been analyzed before when predicting the number of citations such as being selected for a press release and the number of articles published by the corresponding author. This is an important novelty of our work. Finally, we have used a multivariate analysis which allows adjusting the results for many covariables and a relatively large sample size with more than 500 articles included.

In conclusion, despite our results could not be generalizable to other journals, specially those published exclusively in English and with a wider scope than a national audience, we have observed that being selected for a press release and the publishing experience of corresponding authors are important determinants of citations, while the publication in English was not associated with an increased citation. These two factors might be considered externalities, and editors should learn how to manage them to increase the number of citations received by their journals.

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