

Does Self-Citation Influence The *h*-index Among Full-time Academic Hand Surgeons?

Joseph Lopez MD MBA, Srinivas M. Susarla DMD MD, Edward W. Swanson MD, JD Luck BA, Sami Tuffaha MD, Scott D. Lifchez MD
Johns Hopkins Hospital, Baltimore, MD



Abstract

Background and Aims:

Academic promotion is based, in part, on achievement in research. In recent years, numerous studies have linked the *h*-index (number of papers *h* with at least *h* citations each) to academic rank among various surgical specialists, including hand surgeons. One criticism of the *h*-index is its susceptibility to manipulation via self-citation. The purpose of this study was to estimate the magnitude of self-citation among a cohort of academic hand surgeons and estimate the effect of self-citation on the *h*-index.

Methods:

This was a cross-sectional study of full-time academic hand surgeons affiliated with fellowship programs in the United States. The primary predictor variable was the frequency of self-citation. The primary outcome of interest was the *h*-index. Descriptive, bivariate, and regression statistics were computed to assess the associations between self-citation and the *h*-index. For all analyses, a *p*-value ≤ 0.05 was considered significant.

Results:

The study sample was comprised of 364 full-time academic hand surgeons. Study subjects had an average of 45 ± 73 publications. The mean total number of citations was 800 ± 1738 , the median number of self-citations was 2.5 (IQR 0-14.8), and the average frequency of self-citation was $2.2 \pm 3.7\%$. The *h*-index increased as a result of self-citation in 57 surgeons (15.7%). After adjusting for ASSH status and academic rank, increasing rates of self-citation were associated with an increased in the *h*-index. Surgeons with 7 or more self-citations were more likely to have their *h*-index influenced by self-citation.

Conclusion:

The rate of self-citation among full-time academic hand surgeons affiliated with fellowship programs is fairly low. For the majority of surgeons, self-citation did not affect the *h*-index.

Methods

Eligibility Criteria

This was a cross-sectional study of full-time academic hand surgeons in the United States and Canada. The study sample was identified by querying the American Society for Surgery of the Hand (ASSH) website to obtain a list of all American Council of Graduate Medical Education (ACGME)-accredited hand surgery fellowships on April 2015. A total of 81 programs were identified across the United States and Canada. For each program, we queried the supporting department's website for the names of faculty members with primary appointments. The following inclusion criteria were utilized to determine the eligibility of a surgeon to be included in this cohort: 1) full-time faculty member with primary appointment as a hand surgeon in an orthopedic or plastic surgery department or division within the context of an associated ACGME-accredited fellowship in hand surgery, and 2) actively practicing as a hand surgeon. Surgeons who were part-time/adjunct faculty, not affiliated with a hand surgery fellowship program, or not actively engaged in the practice of hand surgery were excluded.

Data Extraction

The primary predictor variables were bibliometric measures which were assessed using a subscription bibliographic citation database (Scopus, Reed Elsevier, London, UK). The bibliometric measures included the Hirsch index (*h*-index, the number of publications *h* which are cited $\geq h$ times), total number of publications, and total number of citations. The *h*-index and total number of citations were collected with and without self-citations. Bibliometric measures with self-citations included were considered uncorrected, and those with self-citations removed were defined as corrected for self-citation. Demographic measures were used as secondary predictor variables, including: gender (male or female), research doctorate (Ph.D. or equivalent), other non-clinical degree (e.g. MS, MBA, etc.), fellowship training (hand surgery, other, none/not listed), years since completion of training, primary affiliation (orthopedic surgery or plastic surgery), and ASSH member status (yes or no). Academic rank was classified as clinical instructor/lecturer, assistant professor, associate professor, professor, and endowed professor. Demographic data were collected by assessing department/division websites and cross-referencing faculty lists with data from the ASSH and AAHS (American Association of Hand Surgeons).

Results

Predictor	Value ¹
ASSH Member	
Yes	249 (68.4)
No	115 (31.6)
Primary Academic Affiliation	
Orthopedic Surgery	260 (71.4)
Plastic Surgery	104 (28.6)
Sex	
Male	311 (85.4)
Female	53 (14.6)
Fellowship Training (Yes)	362 (99.5)
Years Since Completion of Training	17.4 \pm 11.0
Academic Rank	
Lecturer	14 (3.8)
Assistant Professor	151 (41.5)
Associate Professor	97 (26.6)
Professor	85 (23.3)
Endowed Professor	17 (4.7)
Total Citations	800 \pm 1738
Total Citations, adjusted	763 \pm 1616
Total # Self-Citations	
Mean	36.5 \pm 165.6
Median	2.5
Total Publications	45.0 \pm 72.5
H-index	10.6 \pm 10.2
H-index, adjusted	10.4 \pm 9.8
% Change in Citations	2.2 \pm 3.7
Change in H-index	57 (15.7)

Table 1. We identified 364 hand surgeons who were full-time faculty affiliated with hand surgery fellowship programs. Among the cohort, 311 surgeons (85.4%) were male, and 249 surgeons (68.4%) were ASSH members. The frequency of self-citation was $2.2 \pm 3.7\%$. The mean *h*-index among the cohort was 10.6 ± 10.2 . After adjusting for self-citation, there was a small, but statistically significant decrease in the *h*-index to 10.4 ± 9.8 ($p \leq 0.001$). Fifty-seven surgeons (15.7%) had a decrease in their *h*-index as a result of removing self-citations. Among these surgeons, the mean unadjusted *h*-index was 22.4 ± 14.8 and the adjusted *h*-index was 21.0 ± 14.3 , corresponding to a mean change of 1.4 units ($p \leq 0.001$). ¹Categorical measures are listed as number (percent).

*Continuous measures are listed as mean \pm SD

Variable	Self-Citation Frequency	P-value ¹
ASSH Member		0.38
Yes	2.3 \pm 3.8	
No	1.9 \pm 3.5	
Primary Academic Affiliation		0.05
Orthopedic Surgery	2.0 \pm 3.2	
Plastic Surgery	2.8 \pm 4.6	
Sex		0.33
Male	2.1 \pm 3.6	
Female	2.7 \pm 4.4	
Fellowship Training		0.58
Yes	2.2 \pm 3.7	
No	0.5 \pm 0.2	
Years Since Completion of Training	$r = -0.08$	0.15
Academic Rank		0.003
Lecturer	1.8 \pm 2.5	
Assistant Professor	1.9 \pm 4.3	
Associate Professor	1.7 \pm 2.4	
Professor	2.7 \pm 3.3	
Endowed Professor	5.3 \pm 5.5	
Total Publications	$r = 0.47$	< 0.001
H-index	$r = 0.34$	< 0.001

Table 2. This table summarizes the bivariate associations between the predictors and the frequency of self-citation. In bivariate analyses, primary academic affiliation, years since completion of training, academic rank, total # of publications, and *h*-index were associated with the frequency of self-citation.

Variable	OR	95% CI	P-value ¹
ASSH Member	1.9	0.6-6.1	0.26
Primary Academic Affiliation	0.9	0.4-2.1	0.86
Years Since Completion of Training	1.0	0.9-1.1	0.43
Academic Rank	1.0	0.6-1.7	0.85
Total # of Publications	1.0	1.0-1.1	0.15
h-index	1.0	1.0-1.1	0.34
Self-citations (≥ 7)	3.3	1.2-8.8	0.02

Table 4. After adjusting for the effects of ASSH status, primary academic affiliation, years since completion of training, academic rank, total number of publications, and *h*-index, surgeons who self-cited at least 7 times were 3.3 times more likely to have their *h*-index change as a result of self-citation (OR 3.3, 95% CI 1.2-8.8, $p = 0.02$). Among surgeons who self-cited ≥ 7 times, the unadjusted and adjusted *h*-indexes were 20.4 ± 10.8 and 19.9 ± 10.3 , respectively ($p < 0.001$). Among surgeons who self-cited < 7 times, the unadjusted and adjusted *h*-indexes were not significantly different (5.30 ± 4.1 versus 5.28 ± 4.1 , $p = 0.34$).

Variable	Coefficient	P-value ¹
Primary Academic Affiliation	-0.487	0.211
Years Since Completion of Training	-0.065	0.001
Academic Rank	0.251	0.321
Total Publications	0.034	< 0.001
h-index	-0.079	0.065

Table 3. After adjusting for the effects of multiple covariates, the number of years since completion of training and total number of publications remained associated with the frequency of self-citation. Older surgeons were slightly less likely to self-cite (coefficient -0.07, $p = 0.001$). As the total number of publications increased, the frequency of self-citation increased (coefficient 0.03, $p < 0.001$).