The Association of the H-Index and Academic Rank Among Full-Time Academic Hand Surgeons Affiliated With Fellowship Programs

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Purpose To evaluate the association between the Hirsch index (a measure of publications and citations) and academic rank among hand surgeons.

Methods This was a cross-sectional study of full-time academic hand surgeons within Accreditation Council for Graduate Medical Education–approved hand surgery fellowship programs in the United States and Canada. The study variables were classified as bibliometric (h-index, I-10 index, total number of publications, total number of citations, maximum number of citations for a single work) and demographics (gender, training factors). The outcome was academic rank (instructor, assistant professor, associate professor, professor, endowed professor). Descriptive, bivariate, and multiple regression statistics were computed.

Results The sample was composed of 366 full-time academic hand surgeons; 86% were male and 98% had formal hand surgery fellowship training. The mean time since completion of surgical training was 17 ± 11 years. The distribution of primary faculty appointments was orthopedic surgery (70%) and plastic surgery (30%). Two hundred fifty surgeons (68%) were members of the American Society for Surgery of the Hand. The mean h-index was 10.2 ± 9.9 and was strongly correlated with academic rank. Gender was not associated with academic rank. Distribution of academic ranks was as follows: instructor (4%), assistant professor (28%), associate professor (40%), professor (22%), and endowed professor (5%). The h-index, years since completion of training, and American Society for Surgery of the Hand membership were associated with academic rank. The h-index had a high sensitivity and specificity for predicting academic rank.

Conclusions The h-index is a reliable tool for quantitatively assessing research productivity and should be considered for use in academic hand surgery.

Clinical relevance When evaluating candidates for academic promotion in hand surgery, the h-index is a potentially valuable tool for assessing research productivity and impact. *(J Hand Surg Am. 2015;40(7):1434–1441.*

Key words Academic productivity, academic rank, h-index, I-10 index, number of citations.

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Research productivity remains one of the hallmarks of achievement in academic medicine.[1–3] Promotion in most academic centers is based on some combination of demonstrated ability in teaching, service (clinical, administrative, or community), and research. Classically, assessment of productivity in research has been based on straightforward numerical data (eg, number of publications, number of plenary presentations, total grant funding). One shortcoming of using simple count

metrics for assessment, particularly with regard to publications, is the lack of objective assessment of quality.[1–8]

Recently, several well-defined quantitative metrics have emerged for assessing the value of a scientist's contributions to their field. The most widely validated among these is the Hirsch index (h-index), a geometric measure of a researcher's impact. Devised by Hirsch in 2005, the h-index is "the number of papers *h* from a researcher with citation counts of *h* or greater for each paper."[4,5] For example, an author with 20 publications may have an h-index of 20 if each of her or his publications has been cited 20 times. Authors with 20 publications have an h-index of 10 if only 10 articles have been cited 10 times (ie, their works are not frequently cited). Finally, an author with 20 publications may have 15 publications that have been cited at least 10 times, also resulting in an h-index of 10. The objective measure of citations is one potential method for assessing impact and offers advantages over simple count metrics. In the era of electronic journal submission/publication processes and open-access journals, there are an ever-increasing number of avenues through which scientists can publish their works. In such an environment, the use of simple count metrics may have poor prognostic value for assessing the quality of work produced. Citations are a proxy measure for impact because a work that is more profoundly impactful will likely be cited more frequently, which is the basis for journal impact factors that are related to citations.[8,9] Although the h-index was primarily developed for assessment of research productivity in the natural sciences, its association with academic advancement has been demonstrated for anesthesiology, emergency medicine, otolaryngology, radiology, urology, neurosurgery, oral and maxillofacial surgery, and plastic and reconstructive surgery.[10–26] These studies have found a strong relationship between h-index and academic rank, and many have advocated for its inclusion in assessment of research productivity among academic clinicians and for decisions regarding promotion, tenure, and grant support. Although these studies have demonstrated the internal consistency of the h-index within a specialty, there is wide variability in the h-index between specialties. As such, the h-index for a given specialty may be unique to that specialty.

The purpose of this study was to assess the association of the h-index with academic rank among a national cohort of full-time academic hand surgeons affiliated with Accreditation Council for Graduate Medical Education (ACGME)–accredited hand surgery fellowship programs. We chose to focus on academic hand surgeons affiliated with fellowship programs under the empirical assumption that these programs may be more academically focused. Our hypothesis was that the h-index would be positively correlated with academic rank and would predict academic rank after adjusting for potential confounders/effect modifiers. With regard to this hypothesis, our specific aims were to identify a cohort of full-time academic hand surgeons; record demographic, bibliometric, and academic rank data for each surgeon; and identify associations between demographic and bibliometric parameters and academic rank.

MATERIALS AND METHODS

Study design

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) Web site to obtain a list of all ACGME-accredited hand surgery fellowships. A total of 81 programs were identified. For each program, we queried the supporting department's Web site for the names of faculty members with primary appointments. The inclusion criteria used to determine the eligibility of a surgeon to be included in this cohort were an actively practicing full-time faculty member with primary appointment as a hand surgeon in an orthopedic or plastic surgery department within the context of an associated ACGME-accredited fellowship in hand surgery. 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.

Study variables—predictors

The primary predictor variables were bibliometric measures of academic productivity. These included the h-index, I-10 index (number of publications with at least 10 citations), total number of publications, total number of citations, and maximum number of citations for a single work. Bibliometric data were collected using a commercially available citation index (SCOPUS, Reed-Elsevier, London, UK). Secondary predictor variables were demographic measures potentially related to academic rank. These included gender (male or female), research doctorate (PhD or equivalent), 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). Demographic data were collected by assessing