The research impact of school psychology faculty

Marley W. Watkins [a,*], Christina Y. Chan-Park [b]

[a] Department of Educational Psychology, Baylor University, USA
[b] University Libraries, Baylor University, USA

ABSTRACT

Hirsch's (2005) h index has become one of the most popular indicators of research productivity for higher education faculty. However, the h index varies across academic disciplines so empirically established norms for each discipline are necessary. To that end, the current study collected h index values from Scopus and Google Scholar databases for 401 tenure-track faculty members from 109 school psychology training programs. Male faculty tended to be more senior than female faculty and a greater proportion of the male faculty held professorial rank. However, female faculty members outnumbered males at the assistant and associate professor ranks. Although strongly correlated ($rho = .84$), h index values from Google Scholar were higher than those from Scopus. h index distributions were positively skewed with many faculty having low values and a few faculty having high values. Faculty in doctoral training programs exhibited significantly larger h index values than faculty in specialist training programs and there were univariate differences in h index values across academic rank and sex, but sex differences were not significant after taking seniority into account. It was recommended that the h index be integrated with peer review and diverse other indicators when considering individual merit.

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1. Introduction

There are approximately 315 school psychology training programs in the United States, of which 59 are accredited by the American Psychological Association (APA) and around 225 are approved by the National Association of School Psychologists (NASP; Rossen & von der Embse, 2014). In total, these programs serve more than 9500 students and are staffed by more than 600 faculty (Merrell, Ervin, & Peacock, 2012).

Faculty in school psychology programs, similar to faculty in other disciplines, are regularly evaluated, both pre- and post-tenure (Fagan & Wise, 2007). Those evaluations traditionally encompass research, teaching, and service activities (Fagan & Wise, 2007; McCormick & Barnes, 2008). However, research productivity often dominates the promotion and tenure process (Carter, 1989; Green, 2008), and administrators typically agree that it would be difficult to achieve tenure in the absence of publications in refereed journals (Balogun, Sloan, & Germain, 2007; Marchant & Newman, 1994). Research productivity has also been shown to affect salary (Mittal, Feick, & Murshed, 2008), research support (McGrail, Rickard, & Jones, 2006), and hiring decisions (Fuerstman & Lavertu, 2005; Martínez, Floyd, & Erichsen, 2011).

Given that journal articles are the most prestigious form of publication in most of the social sciences (Byrnes, 2007; Whitley & Kite, 2013), the research productivity of school psychology faculty has typically been quantified by their number of peer-reviewed journal

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* Corresponding author at: Department of Educational Psychology, Baylor University, Waco, TX 76798-7301, USA. Tel.: +1 254 710 4234.
  E-mail address: Marley_Watkins@baylor.edu (M.W. Watkins).
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publications. To that end, publication rankings of school psychology faculty have periodically been reported (Carper & Williams, 2004; Grapin, Kranzler, & Daley, 2013; Little, 1997; Roberts, Davis, Zanger, Gerrard-Morris, & Robinson, 2006; Wagner, Lail, Viglietta, & Burns, 2007). These reports have consistently revealed that school psychology faculty members publish, on average, 1 to 2 peer-reviewed journal articles per year with considerable variability among authors. The most recent report indicated that faculty in APA-accredited school psychology programs published an average of 1.2 journal articles per year but more than 50% of them published fewer than 1 article per year (Grapin et al., 2013). This pattern is consistent with surveys of the research productivity of academic psychologists in other specialty areas (Joy, 2006; Stewart, Roberts, & Roy, 2007) and of academics in other disciplines (Ruiz-Castillo & Costas, 2014), which seems to roughly follow Lotka's (1926) inverse square law where the proportion of persons making n contributions is about $1/n^2$ of those making one contribution.

The peer review process with its high rejection rates (e.g., 70% to 90% in the social sciences) would seem to ensure that published research papers are of high quality and will positively impact scientific theory, research, and practice (Lee, 2012). Unfortunately, peer review cannot detect studies that are based on inadequate or fraudulent data, report inaccurate results, etc. (Bornmann & Daniel, 2008; Fanelli & Ioannidis, 2013; Flaherty, 2011; Kepes & McDaniel, 2013). Additionally, peer reviews might be unreliable, biased, or invalid (Bohannon, 2013; Bornmann, 2011; Lee, Sugimoto, Zhang, & Cronin, 2013; Triggle & Triggle, 2007), making the total number of publications a potentially misleading measure of research productivity (Aguinis, Suárez-González, Lannelongue, & Joo, 2012).

Given these limitations, peer usage (the citation of a published research paper by other researchers) has been recommended to supplement or replace publication numbers as an index of research productivity (Bornmann & Marx, 2014; Charlton, 2007; Duffy, Jadidian, Webster, & Sandell, 2011). The most obvious quantification of peer usage is total citation count (Hargens, 1990), i.e., the total number of times that a publication has been cited in other publications. It is assumed that high quality publications will generate more citations from scientific colleagues than low quality or flawed publications (Bornmann & Daniel, 2008). To that end, one recent report of the research productivity of school psychology faculty included citation counts (Grapin et al., 2013). In general, citation counts for school psychology faculty follow the same pattern as publication counts, with many faculty members having few citations and a few faculty members accumulating a large number of citations.

Unfortunately, the total number of citations may not reflect sustained or programmatic impact. For example, a student may co-author an influential paper with a mentor but never author another cited paper. In this and other situations, the total citation count is too sensitive to highly cited publications and may be inflated by a small number of influential papers. Thus, total citation count may also be an imperfect indicator of research productivity (Coupe, 2013; Cronin & Meho, 2006).

Hirsch (2005) recognized the limitations of publications and citations as quantitative measures of research productivity and proposed a new bibliographic index to quantify "the scientific output of a researcher" (p. 16569). His h index is computed as the h number of N papers that have at least h citations. For example, a researcher has published 8 papers with 3, 11, 2, 1, 9, 14, 10, and 1 citations, respectively. After being rank ordered from highest to lowest, the citation counts for the 8 papers are **14, 11, 10, 9**, 3, 2, and 1. The first four papers have at least 4 citations each but the paper at rank 5 has fewer than 5 citations (e.g., 3), resulting in an h of 4. Thus, an h index of 4 means that the researcher has authored at least 4 papers that have each been cited at least 4 times. Those 4 papers make up the h core for this hypothetical scholar.

Although more than 50 variants of the h index have subsequently been proposed (Bornmann, 2014), analyses of quantitative indices of research productivity have found that most are redundant with the h index (Bornmann & Marx, 2011) and that "the easiest of the valid measures to understand and calculate is the h index" (Ruscio, Seaman, D'Oriano, Stremlo, & Mahalchik, 2012, p. 142). Consequently, the h index has become one of the most popular indicators of research productivity (Egghe, 2010). It combines an indicator of quantity (publications) and an indicator of quality (citations) into a single metric. Although not universally endorsed (Waltman & van Eck, 2011) and not without limitations (Bornmann & Marx, 2011; Egghe, 2010), the h index has exhibited several important strengths: (a) agreement with other measures of research productivity; (b) robustness to erroneous or missing publications; (c) prediction of future research productivity; (d) discriminant validity with groups of known high performers, (e) insensitivity to rarely cited as well as infrequent but highly cited publications; (f) computational simplicity; and (g) resistance to self-citations and multi-authored publications (Egghe, 2010; Engqvist & Frommen, 2008; Hirsch, 2005; Ruscio et al., 2012; Wainer & Vieira, 2013).

Although robust, the h index is dependent on the bibliographic database from which it was computed (Egghe, 2010). h values and rankings for the same individual have been shown to vary across Scopus, Web of Science, and Google Scholar databases because the coverage of each database is different (Bar-Ilan, 2008). For example, Scopus does not index citations before 1996 and does not include books or conference presentations whereas Google Scholar includes over 30 different document sources in its coverage, including books and conference presentations (Meho & Yang, 2007; Ruscio et al., 2012). Additionally, the h index is field dependent: it varies across academic disciplines due to different publication and citation practices in those disciplines (El Emam, Arbuckle, Jonker, & Anderson, 2012). For example, Hirsch (2005) applied the h index to physicists at research universities and found that highly productive physicists had h values of around 45. In contrast, highly productive life scientists had h values of around 57. Subsequent research has found widely varying h index levels across other academic disciplines (Barner, Holosko, & Thyer, 2014; Duffy et al., 2011; Egghe, 2010; Ponterotto, Fingerhut, & McGuinness, 2012; Wainer & Vieira, 2013).

Ruscio et al. (2012) concluded that "to evaluate individuals' scholarly impact we believe that in most cases Hirsch's (2005) h index should be seriously considered" (p. 143). However, the discipline-specific sensitivity of the h index requires that h index values "be accompanied by empirically established norms to contextualize their meaning objectively" (p. 125). Accordingly, the purpose of this study is to provide h index norms for school psychology faculty.

2. Method

2.1. Participants

Participants in this study were core faculty members in school psychology programs: 261 from 59 doctoral programs accredited by APA and another 140 from 50 specialist programs (47 approved by NASP). The demographic characteristics of those 401 faculty are presented in Table 1.

2.2. Procedures

There were 59 APA accredited school psychology programs in the U.S. at the end of 2012 as listed on the web pages of the APA Office of Program Consultation and Accreditation (http://www.apa.org/ed/accreditation/programs/accred-school.aspx). At the same time, details on the faculty of approximately 175 specialist school psychology programs were listed by NASP (http://www.nasponline.org/graduate-education/grad-edu.aspx). Based on the NASP list, one specialist program was randomly selected from 39 of the states plus the District of Columbia and two programs were randomly selected from each of the four most populous states (CA, TX, NY, FL) for a total of 50 specialist programs. Five states had no program or only an APA accredited doctoral program (AK, HI, MS, VT, WY).

The names of 401 core school psychology faculty were subsequently extracted from the web pages of those 109 school psychology programs. Those with titles of lecturer, visiting, clinical, supervisory, teaching, retired, adjunct, instructor, emeritus, etc. were excluded leaving only tenure-track or tenured faculty. Rank, doctoral granting institution, and graduation year were collected for each faculty member. The Proquest Dissertation and Theses database was consulted when the doctoral granting institution or year were not found on program web pages or in online curriculum vita. Sex was inferred from names and online pictures and descriptions. Data for each participant was independently collected by the authors and disagreements were resolved by consensus.

Two non-overlapping additional samples of school psychology faculty were selected for validation purposes: 17 senior scientist award recipients of the school psychology division of APA and 25 randomly selected members of the Society for the Study of School Psychology (SSSP). Given their elected status, these faculty were expected to exhibit h values considerably higher than the average school psychology faculty member.

2.3. Sources

There are a number of bibliographic databases that might serve as the source of h index values for school psychology faculty including ERIC, Scopus, Google Scholar, PsycINFO, and the Web of Science, which includes both the Social Sciences Citation Index (SSCI) and the Science Citation Index (SCI). Each database has a distinct scope of subject coverage, retrospective span, type of publication included in the database (e.g., books, book chapters, dissertations, articles, etc.), and searchable fields (e.g., abstracts, full text, authors, citations, etc.). Several databases were ruled out due to these factors. For example, ERIC does not report citations and PsycINFO only began to report citations in 2002 (Reed & Baxter, 2009). Likewise, the natural and life sciences coverage of the SCI is not compatible with the typical research topics investigated by school psychology faculty.

The SSCI includes subject coverage appropriate for school psychology. However, it covers fewer than 3000 journals across more than 50 disciplines. In contrast, Scopus indexes more than 21,000 titles in the life, social, physical, and health sciences with most journal content going back to 1995 (Harzing, 2014). Additionally, the Scopus database provides a unique identification number for each author and it has been shown to be more accurate and reliable than other databases (Bornmann & Marx, 2014; Jacso, 2008, 2011, 2012; Meho & Rogers, 2008; Meho & Yang, 2007). Given these strengths, the Scopus database was selected as one source of h index values for school psychology faculty.

Although considered to be less accurate than Scopus (Jacso, 2008, 2012; Meho & Yang, 2007) and vulnerable to manipulation (Beel & Gipp, 2010), Google Scholar has become popular, does not require a subscription fee, contains data prior to 1996, indexes a wide range of sources, and may therefore offer better coverage for some academic disciplines (Amara & Landry, 2012). Although the ratio of journal to non-journal entries in Google Scholar is unknown, one study found that 92% of Google Scholar citations were from journal articles (Vaughan & Shaw, 2008). Thus, there is substantial journal content in Google Scholar and it was selected as

Table 1
Number of school psychology faculty and median years since doctorate by sex, rank, and level of training program.

	Specialist				Doctoral				Total			
	Male		Female		Male		Female		Male		Female	
Rank	N	Years	N	Years	N	Years	N	Years	N	Years	N	Years
Assistant	8	5.5	33	5	17	5	39	6	25	5	72	6
Associate	26	16.5	29	15	38	14	50	15	64	15	79	15
Professor	26	27.5	18	23.5	66	31.5	51	25	92	30	69	24
Total	60	21	80	13.5	121	23	140	16	181	22	220	15

Note. Years = years since award of doctoral degree.

the second source for school psychology faculty *h* index values. Google Scholar was accessed through the Scholarometer program (http://scholarometer.indiana.edu/).

Data were collected from both Scopus and Google Scholar during the second quarter of 2014 to ensure that all 2013 citations were posted. For Scopus, first and last names were used in its author search option. Author middle initial and affiliation were subsequently used to identify the target author if multiple authors with the same name were initially selected. The Scopus citation view was selected and publications through 2013 for each faculty member were sorted in descending citation order. After deletion of incorrect entries, the *h* index was extracted from each sorted citation list. Scholarometer author searches were conducted with first and last names. If known, a middle initial was also used. Data were restricted to the years of 1960 through 2013 and four discipline 'tags' were applied to focus the search: educational and educational research, psychology, psychiatry, and medicine. Author affiliation was subsequently used to identify the target author if multiple authors with the same name were initially identified. After deletion of incorrect entries, citation values were extracted from the sorted citation lists. For both Scopus and Google Scholar, data for each participant was independently collected by an author and a research assistant with agreement of *rho* = .91. Disagreements were resolved by consensus of the authors.

2.4. Analyses

Given the non-normality of the *h* index (skew = 1.88 and kurtosis = 8.24), non-parametric statistical tests were employed. Depending on the number of samples and the nature of their relationships, these tests included the Kruskal–Wallis test for comparison of multiple independent samples and the Wilcoxon signed ranks test for comparison of related samples (Fahoome, 2002). Relationships were quantified with the Spearman rank order correlation coefficient and complex relationships were analyzed with quantile regression.

Quantile regression tries to minimize the sum of the absolute residuals and makes no assumptions about the distribution form of variables (Petscher & Logan, 2014). In its most basic form, quantile regression estimates the median of the dependent variable conditional on the values of the independent variables. Uniquely, quantile regression allows for the estimation of the relationship between dependent and independent variables at multiple locations of the independent variable. Analyses for this study were conducted with the simultaneous-quantile regression routine in Stata to estimate the 25th, 50th, and 75th percentile locations and standard errors computed with 100 bootstrap replications (Petscher & Logan, 2014). Sample sizes were too small to allow convergence on precise and stable estimates of more extreme locations (Koenker & D'Orey, 1987). Each regression was followed by an omnibus test of the statistical significance of the difference of the three slopes. If not significant, only results for the median regression were reported.

3. Results

3.1. Demographics

School psychology faculty members tended to be experienced (Range = 1–48, *Md* = 18.8 years since doctoral degree) and disproportionately of full professor rank (40%). As expected (see Table 1), years since doctoral degree were significantly different across assistant, associate, and professor ranks (X^2 = 245.5, *df* = 2, *p* < .001). Years since doctoral degree were also significantly different for males and females (X^2 = 27.6, *df* = 1, *p* < .001) in favor of males (*Md* = 22 years for males and 15 years for females). In contrast, the senior scientist awardees were on average 34 years post-doc and SSSP members were 29 years post-doc, significantly longer than all APA and NASP faculty (X^2 = 35.6, *df* = 1, *p* < .001), but not significantly different from APA and NASP full professors (X^2 = 2.4, *df* = 1, *p* = .12). Faculty web pages and online curriculum vita revealed that a number of school psychology faculty held post-doctoral or clinical practice positions before assuming an academic appointment. Thus, years after receiving a doctoral degree were not always congruent with years of professorial experience.

Consistent with demographic trends in school psychology (Castillo, Curtis, & Tan, 2014), female faculty members outnumbered male faculty members at the assistant (72 vs. 25, respectively) and associate (79 vs. 64, respectively) professor ranks. Although male faculty members were more numerous at the full professor rank, they received their doctoral degrees around 5 years prior to the female full professors. Thus, it appears that academic school psychology will become more female over the coming decade as the current assistant and associate professors advance in rank and the current full professors retire.

Doctoral training programs typically were housed in institutions with Carnegie classifications (http://classifications.carnegiefoundation.org/) of high (22%) to very high (63%) research whereas the specialist training programs were predominantly housed in institutions with doctoral or lower research classifications (70%). Taken at the individual level, training program research classification was strongly related to *h* index values (*rho* = .51 and .56 for Scholarometer and Scopus databases, respectively).

3.2. Scholarometer h index

3.2.1. Specialist training faculty

Means, medians, and standard deviations of Scholarometer *h* index values of the 140 school psychology faculty in specialist training programs are presented in Table 2. There was a significant difference across ranks (X^2 = 134.8, *df* = 2, *p* < .001). Likewise, there was a significant difference between males and females (X^2 = 10.2, *df* = 1, *p* = .001) in favor of males (*Md* = 4 for males and 2.5 for females). However, sex was no longer significant after years since doctoral degree was covaried via quantile regression (*t* = −0.82,

Table 2
Median (95% standard error) and mean (standard deviation) h index values from scholarometer and scopus of school psychology faculty by rank and level of training.

Rank	Specialist		Doctoral		Total	
	Median	Mean (SD)	Median	Mean (SD)	Median	Mean (SD)
Scholarometer						
Assistant	1 (0.33)	1.97 (2.27)	4 (0.77)	4.93 (3.97)	3 (0.65)	3.68 (3.65)
Associate	4 (0.52)	4.05 (3.27)	10 (0.56)	10.45 (6.13)	7 (0.95)	7.99 (6.07)
Professor	5.5 (1.13)	8.70 (8.09)	17 (1.15)	19.22 (11.51)	14 (1.00)	16.35 (11.65)
Total	3 (0.50)	4.91 (5.77)	11 (0.59)	13.20 (10.42)	8 (0.70)	10.30 (9.89)
Scopus						
Assistant	1 (0.22)	1.66 (2.16)	3 (0.46)	3.39 (2.91)	2 (0.54)	2.66 (2.75)
Associate	2 (0.46)	2.40 (2.30)	6 (0.74)	6.77 (4.34)	4 (0.38)	5.09 (4.26)
Professor	3 (0.64)	3.57 (3.27)	7 (0.54)	8.69 (5.80)	6 (0.52)	7.29 (5.70)
Total	2 (0.43)	2.55 (2.70)	6 (0.48)	6.91 (5.21)	4 (0.29)	5.39 (4.95)

$p = .41$). Nor were there significant differences between the slopes at the 25th, 50th, and 75th percentiles of the Scholarometer h index distribution for males and females, $F(2,137) = 0.19$, $p = .83$, after seniority was considered.

3.2.2. Doctoral training faculty

Means, medians, and standard deviations of Scholarometer h index values of the 261 school psychology faculty in doctoral training programs are presented in Table 2. There was a significant difference across ranks ($X^2 = 106.1$, $df = 2$, $p < .001$). Likewise, there was a significant difference between males and females ($X^2 = 13.7$, $df = 1$, $p < .001$) in favor of males ($Md = 12$ for males and 10 for females). However, sex was no longer significant after years since doctoral degree was covaried via quantile regression ($t = -1.70$, $p = .09$). Nor were there significant differences between the slopes at the 25th, 50th, and 75th percentiles of the Scholarometer h index distribution for males and females, $F(2, 258) = 0.95$, $p = .39$, after seniority was considered.

3.2.3. Combined doctoral and specialist training faculty

A histogram of Scholarometer h index values for all 401 school psychology faculty is provided in Fig. 1 and box plots of Scholarometer h index values for male and female faculty across assistant, associate, and professor ranks are included in Fig. 2. Table 3 provides a cumulative frequency distribution of h index values for faculty in training programs at both doctoral and specialist levels. Faculty from doctoral training programs exhibited significantly larger Scholarometer h index values than faculty from specialist training programs ($X^2 = 95.9$, $df = 1$, $p < .001$).

There were significant differences across ranks ($X^2 = 134.8$, $df = 2$, $p < .001$) and between males and females ($X^2 = 22.8$, $df = 1$, $p < .001$) in favor of males ($Md = 10$ for males and 6 for females). However, sex was no longer significant after years since doctoral degree was covaried via quantile regression ($t = -1.76$, $p = .08$). Nor were there significant differences between the slopes at the 25th, 50th, and 75th percentiles of the Scholarometer h index distribution for males and females, $F(2, 398) = 0.46$, $p = .63$, after seniority was considered.

3.2.4. Validity sample

As expected, the Scholarometer h index values of the validity sample (senior scientists and SSSP members) were significantly higher ($Md = 29.5$) than those of the total school psychology training faculty ($Md = 8.0$, $X^2 = 78.6$, $df = 1$, $p < .001$) and the school psychology training faculty with the rank of full professor ($Md = 14.0$, $X^2 = 41.6$, $df = 1$, $p < .001$).
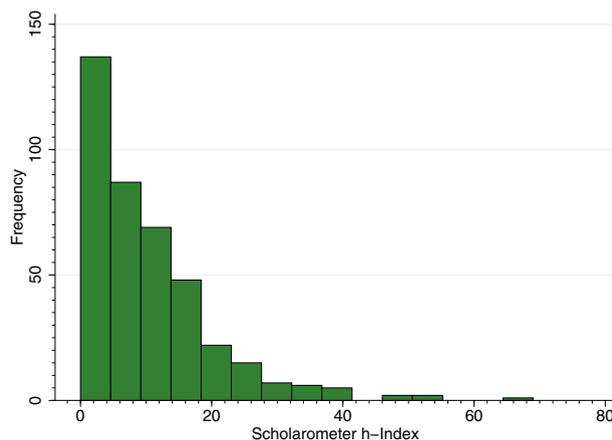
Fig. 1. Histogram of h index values from Scholarometer for 401 faculty in school psychology training programs.
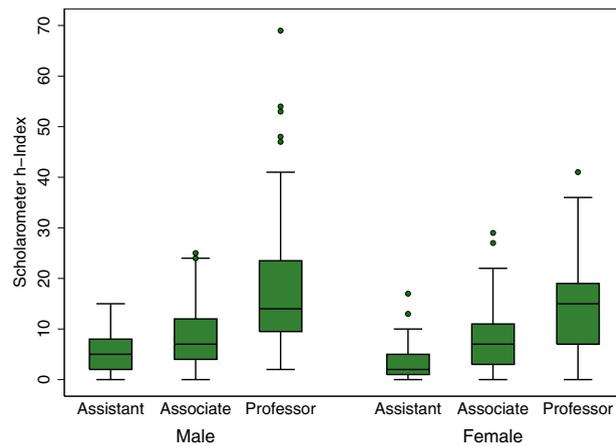
Fig. 2. Box plots of *h* index values from Scholarometer for 401 male and female faculty in school psychology training programs across assistant, associate, and professor ranks.

3.3. Scopus h Index

3.3.1. Specialist training faculty

Means, medians, and standard deviations of Scopus *h* index values for the 140 school psychology faculty in specialist training programs are presented in Table 2. There was a significant difference across ranks ($X^2 = 10.5, df = 2, p = .005$). Likewise, there was a significant difference between males and females ($X^2 = 6.6, df = 1, p = .010$) in favor of males ($Md = 2$ for males and 1 for females). However, sex was no longer significant after years since doctoral degree was covaried via quantile regression ($t = -1.25, p = .21$). Nor were there significant differences between the slopes at the 25th, 50th, and 75th percentiles of the Scopus *h* index distribution for males and females, $F (2, 136) = 0.15, p = .86$, after seniority was considered.

3.3.2. Doctoral training faculty

Means, medians, and standard deviations of Scopus *h* index values of the 261 school psychology faculty in doctoral training programs are presented in Table 2. There was a significant difference across ranks ($X^2 = 48.8, df = 2, p < .001$). Likewise, there was a significant difference between males and females ($X^2 = 7.7, df = 1, p = .005$) in favor of males ($Md = 6$ for males and 5 for females). However, sex was no longer significant after years since doctoral degree was covaried via quantile regression ($t = -1.41, p = .16$). Nor were there significant differences between the slopes at the 25th, 50th, and 75th percentiles of the Scopus *h* index distribution for males and females, $F (2, 258) = 0.51, p = .60$, after seniority was considered.

3.3.3. Combined doctoral and specialist training faculty

A histogram of Scopus *h* index values for all 401 school psychology faculty is provided in Fig. 3 and box plots of Scopus *h* index values for males and females across assistant, associate, and professor ranks are included in Fig. 4. Table 3 provides a cumulative frequency distribution of Scopus *h* index values for faculty in training programs at both doctoral and specialist levels. Faculty from doctoral training programs exhibited significantly larger Scopus *h* index values than faculty from specialist training programs ($X^2 = 95.8, df = 1, p < .001$).

There was a significant difference across ranks ($X^2 = 63.6, df = 2, p < .001$) with median Scopus *h* indexes of 2, 4, and 6 for assistant, associate, and professors, respectively. Likewise, there was a significant difference between males and females ($X^2 = 11.9, df = 1, p = .001$) in favor of males ($Md = 5$ for males and 3.5 for females). However, sex was no longer significant after years since doctoral degree was covaried via quantile regression ($t = -1.11, p = .27$). Nor were there significant differences between the slopes at the 25th, 50th, and 75th percentiles of the Scopus *h* index distribution for males and females, $F (2, 398) = 1.11, p = .33$, after seniority was considered.

3.3.4. Validity sample

As expected, the Scopus *h* index values of the validity sample (senior scientists and SSSP members) were significantly higher ($Md = 12.5$) than those of the total school psychology training faculty ($Md = 4.0, X^2 = 59.1, df = 1, p < .001$) and the school psychology training faculty with the rank of full professor ($Md = 6.0, X^2 = 34.0, df = 1, p < .001$).

3.3.5. Scholarometer and Scopus h index comparison

Summary statistics for the *h* index values from both Scholarometer and Scopus are presented in Table 2. Frequency distributions are reported in Table 3. The *h* index values derived from Scopus and Google Scholar via Scholarometer were strongly correlated ($rho = .84$) but values from Scholarometer were significantly higher than the values from Scopus ($Z = -14.75, p < .001$). For example, an *h* index value of 8 would be at the 53rd percentile for Scholarometer but the 79th percentile for Scopus. These results are

Table 3

Distribution of h index values for faculty in school psychology training programs at both doctoral and specialist levels.

Scholarometer percentiles				Scopus percentiles		
h Index	Specialist	Doc	Combined		Specialist	Doc	Combined
0	15	2	6		21	3	10
1	29	6	14		46	11	24
2	39	11	20		61	18	33[e]
3	51	15	28[ae]		74	28	44[a]
4	64	18	34		84	36	53[f]
5	73	23	41		87	49	62[b]
6	77	26	44		91	58	70[g]
7	82	31	49[f]		92	64	74[c]
8	84	36	53[b]		95	70	79
9	86	40	56		96	73	81
10	87	47	61		98	78	85
11	88	53	65		99	83	89
12	89	58	69		99	88	92
13	91	63	73		99.9	89	93[h]
14	94	66	76[g]			92	95[d]
15	95	69	78			94	96
16	96	71	79[c]			95	97
17	97	74	82			96	98
18	97	79	85			97	98
19	97	80	86			98	98
20	98	83	88			98	99
21	98	84	89			99	99
22	98	87	90			99	99
23	98	88	91			99	99
24	99	89	92			99	99
25	99	89	93			99	99
26	99	90	93			99	99
27	99	92	94			99	99.5
28	99	92	94			99	99.5
29	99	93	95			99	99.5
30	99	93	95[h]			99.6	99.75
31	99	94	96[d]			99.9	99.9
32	99	94	96				
33	99	95	97				
34	99.9	95	97				
35		96	97				
36		97	98				
37		97	98				
38		97	98				
39		98	98				
40		98	98				
41–47		98	99				
48 +		99.9	99.9				

Note.
[a] Mean of assistant professors
[b] Mean of associate professors.
[c] Mean of professors.
[d] Mean of validity sample.
[e] Median of assistant professors.
[f] Median of associate professors.
[g] Median of professors.
[h] Median of validity sample.

illustrated in Fig. 5. Discrepant results between these databases are consistent with studies in other disciplines (Bar-Ilan, 2008; Meho & Yang, 2007; Mikki, 2010) and may reflect the influence of duplicate records, false-positives, and inaccuracies previously reported for Google Scholar as well as its coverage of a wider range of sources (El Emam et al., 2012; Jacso, 2008, 2012; Ruscio et al., 2012).

4. Discussion

The purpose of this study was to provide h index norms for faculty in both doctoral and specialist school psychology training programs. Accordingly, the h index of 401 school psychology faculty members were extracted from the Scopus and Google Scholar (via Scholarometer) databases for those faculty. Male faculty tended to have more years of post-doctoral experience than female faculty and a greater proportion of the male faculty held professorial rank. h index values were significantly different between male and female faculty, in favor of the males, when tested univariately. However, sex was no longer a significant predictor of h index values after faculty seniority was taken into account.
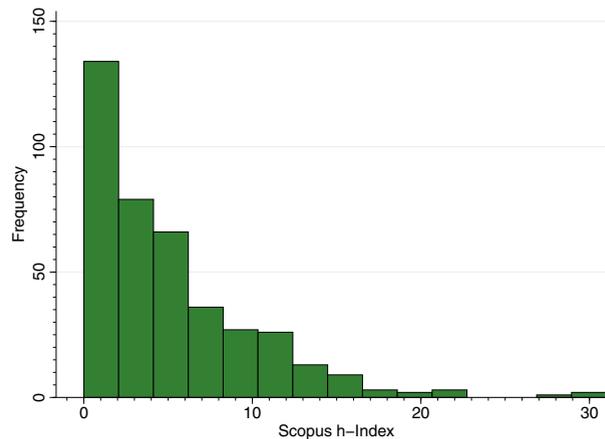
Fig. 3. Histogram of *h* index values from Scopus for 401 faculty in school psychology training programs.

As expected, *h* index values were significantly different across assistant, associate, and professor ranks. The rank distinction was most apparent with *h* indexes from the Google Scholar database, but variability among faculty caused index values from both databases to overlap. In contrast, superior research productivity was clearly delimited with the validity sample of senior scientists and SSSP members that performed significantly above the school psychology training program faculty.

Also expected, the *h* index values for school psychology faculty derived from Scopus and Google Scholar via Scholarometer were strongly correlated but values from Scholarometer were higher than the values from Scopus. Google Scholar indexes more journals and sources than Scopus and may contain more errors, but *h* index values are relatively robust to bibliographic errors and missing information (Egghe, 2010; Ruscio et al., 2012) and, consequently, tend to rank order authors similarly with Scopus (Meho & Yang, 2007). Some evidence suggests that Google Scholar has become more accurate in recent years (Harzing, 2013, 2014), and its broader source coverage may more accurately reflect the contributions of some researchers. For example, scholars who are invested in solving practical problems may disseminate their results via outlets that are more likely to be used by practitioners, which may impact on public policy or clinical practice without extensive citation in traditional journals (Amara & Landry, 2012). Consequently, selection of an appropriate database is dependent on context.

Previous surveys of the scholarly productivity of school psychology faculty have tended to focus on the number of scholarly publications and none have reported *h* index values. The most recent survey of publications found that the number of papers was positively skewed with many faculty publishing few papers and a few faculty publishing many papers (Grapin et al., 2013). A similar skewed distribution was found for the number of citations. The current study also found a positively skewed distribution of *h* index values (see Figs. 1 and 3).

Grapin et al. (2013) did not consider years of experience nor rank and found significant differences between male and female school psychology faculty members in favor of males, but the amount of variance explained by sex differences was small (≈2–4%). Other studies of academic psychologists have found that seniority or rank accounted for most of the difference in male–female research productivity (Duffy et al., 2011; Nosek et al., 2010). In the current study, sex differences were not statistically
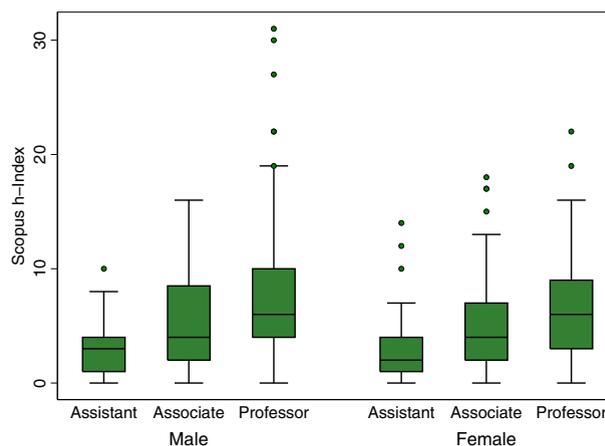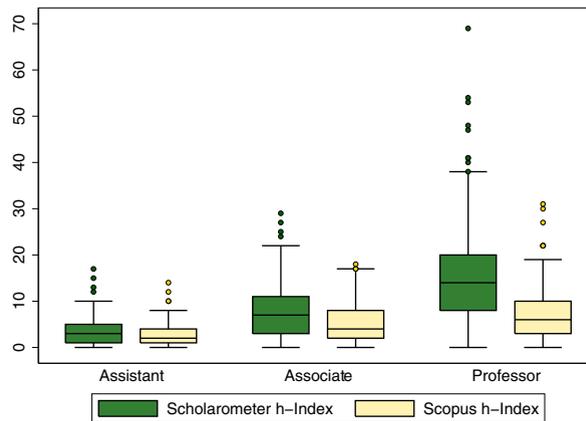

Fig. 4. Box plots of *h* index values from Scopus for 401 male and female faculty in school psychology training programs across assistant, associate, and professor ranks.

Fig. 5. Box plots of *h* index values from Scopus and Google Scholar (via Scholarometer) for 401 faculty in school psychology training programs across assistant, associate, and professor ranks.

significant after seniority was considered. Thus, sex differences may not be a major influence on the research productivity of school psychology faculty.

4.1. Limitations

Although we tried to fairly sample the population of school psychology faculty, it is always possible that those faculty not included in our sample are somehow different and would have produced disparate results. It is also possible that program websites from which we extracted information were out of date or inaccurate. Additionally, significant changes may have occurred in publication or citation patterns since 2013. For instance, the recent proliferation of open-access journals and "predatory" publishers (Beall, 2014; Bohannon, 2013). It is also possible that the increasing number of journals, articles, and researchers as well as enhanced bibliographic database coverage will make the current *h* index norms inaccurate at some point in time (Michels & Schmoch, 2012). Consequently, these norms should be updated periodically to ensure validity.

Quantile regression has less power to detect differences than linear regression and the relatively small number of school psychology faculty made it difficult to reliably estimate stable results for extremely high performers. Consequently, there may be differences between male and female scholars at some extreme but this study was unable to detect them. For example, small gender differences were found when the research productivity of the entire population of more than 58,000 Italian university professors was analyzed (Abramo, Cicero, & D'Angelo, 2015).

Only two prior studies of academic psychologists have utilized the Google Scholar database and none have used the Scopus database. The first study analyzed the scholarly productivity of 611 social and personality psychologists and found a mean *h* index value of 21.3 (Nosek et al., 2010). The second study computed the *h* index for 1080 academic psychologists in selected departments and found a mean value of 11.32 (Barner et al., 2014). The current study found a mean *h* index of 10.3 and a median index of 8 with Google Scholar for school psychology faculty. It is unclear if these widely varying *h* index values among academic psychologists are due to differences in rank and years in the field for each sample, different publication and citation practices in specialty areas of psychology, different databases, or a combination of all these factors. In any case, it is clear that both the reference database and the scholarly discipline exert a major influence on *h* index values. Therefore, any comparison of *h* index values must take those factors into consideration.

Finally, the validity of the *h* index must be considered. The *h* index is only one metric and one number cannot conceivably capture all the information that exists about an individual's career-long research productivity (Adler, Ewing, & Taylor, 2009). Books, book chapters, grants, software, articles in non-English journals, etc. could be overlooked by this metric. Likewise, a particular sub-field may be too small to produce frequent citations (Nosek et al., 2010). Conversely, an *h* index might be inflated by several ill-conceived articles that generated numerous refutations by other authors (Blyth, Shardlow, Masson, Lyons, Shaw, & White, 2010) or by faulty citation practices (Simkin & Roychowdhury, 2003). Additionally, there may be a ceiling effect where two authors with the same *h* index may differ substantially. For example, one author with an *h* index of 10 may have published 10 papers with 10 citations each whereas a second author with an identical *h* index of 10 may have published 10 papers with 100 citations each.

5. Conclusions

The *h* index is easy to calculate and understand. Given these attributes, Selek and Saleh (2014) recommended that rank normative median *h* index values be used as standards for academic promotion. The current study found significant differences in median *h* index values between assistant, associate, and professors in school psychology training programs. These values might be used as national norms for the discipline (see Tables 2 and 3). However, *h* index values vary between specialist and doctoral programs as well as across bibliographic databases. Values and standards may also differ across departments and institutions (Lazaridis, 2010) so local *h* index norms might be useful supplements to national norms. Previous researchers have described the perils of relying too heavily on one

source or one measure when making high stakes decisions and recommended that bibliographic metrics be supplemented with other indicators (Adler et al., 2009; Bornmann & Marx, 2011, 2014; Costas & Bordons, 2007; Ruscio et al., 2012; Sahel, 2011; Waltman, Costas, & van Eck, 2012). Following this advice, the *h* index values found in Tables 2 and 3 should not be used in isolation to judge an individual school psychologist's research productivity. Although many quantitative measures of research productivity are highly correlated (Duffy et al., 2011; Grapin et al., 2013; Nosek et al., 2010), each accounts for unique variance and should be integrated with peer review and other diverse indicators when considering individual merit.

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