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Assessing the Publication Productivity of Clinical Psychology Professors in Canadian Psychological Association-Accredited Canadian Psychology Departments

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Canadian clinical psychology professors in programs accredited by the Canadian Psychological Association (CPA) are generally expected to perform in 3 major domains–research, teaching, and service. Measurement of performance in these domains is complicated. Research productivity, as measured by publication and citation counts, are often touted as objective metrics for evaluating professorial research performance; however, such quantifications can be problematic. Despite concerns, evaluators continue to use publication and citation counts for evaluating psychology professors. Use of these metrics without normative data is extremely problematic; moreover, without ceiling reference points or identification of outliers, new professors and those evaluating them have no perspective on reasonable expectations. The current study provides normative data and ceiling reference points using publically available data for the 255 professors currently in CPA-accredited Canadian clinical psychology programs, as well as submissions from an invited subset of those same professors. The data were stratified by professorial rank and sex, with the men and women having the highest publication and citation counts identified to create ceiling references. The results suggest that most CPA-accredited Canadian clinical psychology professors publish between 0 and 4 articles annually. Men publish significantly more than women at the Assistant and Full professorial ranks ($p < .05$), but not at the Associate rank ($p > .10$). Evidence also suggests that professors cannot be appropriately rank-ordered based on any single research index. Comprehensive results, implications, limitations, contextually based caveats, and directions for future research are discussed.

Keywords: psychology, Canadian psychology research, publications, h-index, CPA-accredited psychology programs

Modern society is such that we are observers of rapid change in many dimensions of life. Advances in technology and an increasingly globalized economy have led to great achievement as well as certain economic and societal instabilities. The Canadian government has placed an emphasis on higher learning and education to strengthen Canadian society in response to this social evolution (Government of Canada, 2002). As such, the mission statements of virtually all Canadian universities issue a mandate of lifelong learning and scholarship for all (Kreber & Mhina, 2005). This mandate includes objectives such as excellence in research, teaching, and the maintenance of high quality programs for students (University of Alberta, 2000). Achievement of such objectives is arguably dependent on many factors (e.g., a strategic plan, financial resources, administration); however, it has been implicitly suggested that Canadian institutions have placed an inordinate focus on individual professorial achievement as measured by objective rankings (Cramer & Page, 2007; Symons, 2011). Indeed, a survey of the Presidents and Board Chairs of 50 Canadian universities indicated that institution administrators rate the effort to enhance institutional reputation—which is dependent on professorial performance—as the most important university directive (Cyrenne & Grant, 2009; University of Alberta, 2000).

Most academic decision makers have several metrics they use to measure performance (Cyrenne & Grant, 2009; Feist, 1997; Matson et al., 2005). This presumes that performance can be objectively measured, the debate about which greatly exceeds the scope of this article. In short, measuring performance in teaching, service, and research—the three broad areas of responsibility described as performance indicators for academics (University of Alberta, 2000)—is complicated. Even basic quantification of these areas, such as number of students taught, number of public lectures given, and publication counts, require contextually based caveats because not all classes, service contributions, and publications are readily made comparable. Furthermore, such quantifications do not necessarily speak to "quality." For example, there is massive literature debating how teaching should be evaluated (Marsh, 2007; Marsh & Dunkin, 1997). There is also, intuitively, great difficulty quantifying contributions made in the domain of service, such as quantifying the contributions made by a director of clinical training relative to those made by the chair of a budget committee. Quantifying research contributions is similarly complex. For example, a publication can have a substantial impact on a field while

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being rarely cited (Carleton, Peluso, & Asmundson, 2010, 2011). Similarly, book chapters and textbooks, which may have a substantial impact, have not typically been included as part of indexing databases (Carleton et al., 2010, 2011; Feist, 1997; Page & Cramer, 2003; Symons, 2011). Quantitative indices typically provide insight into only one part of a professor's research performance and, as such, there are several valid objections to use of these metrics (Cramer & Page, 2007; Sonnert, 1995; Symons, 2011).

Objections to metrics of academic productivity certainly have merit (Cramer & Page, 2007; Page, 1998; Page & Cramer, 2003; Symons, 2011); nevertheless, these metrics continue to be considered important elements for psychology departments and represent key determinants for job allocations, attracting graduate students, and funding distributions for subsequent research (Feist, 1997; Matson et al., 2005). Research performance has been considered by some as a primary criterion for distinguishing which professors are deserving of tenure and promotion (Park, 1996). Research performance has also been associated with grant success, including decisions about the allocation of major awards such as Canadian Research Chairs (Program details and eligibility, 2011). In any case, the utility of research performance as a metric for making such decisions is contingent on the availability of discipline-specific normative data.

The field of psychology has not established normative data—or even ceiling reference points (floor points being logically established as zeros)—for peer-reviewed journal article counts and citations by which research productivity can be fairly gauged. This is problematic, because unrealistic research performance expectations may be imposed on psychology professors of all distinctions. Such normative data is not unprecedented in other academic fields. For example, a recent study analysed the research productivity of Canadian nursing academics as measured by publication counts and citations (Hack, Crooks, Plohman, & Kepron, 2010). The same publication highlighted researchers with the highest publication counts and citations to acknowledge their contributions and therein provide a tangible ceiling for current research productivity expectations. There has also been a recent effort to provide normative data and rankings for American Psychological Association and Canadian Psychology Association (CPA)-accredited clinical psychology programs (Carleton et al., 2011; Matson et al., 2005); however, there have not been similar efforts to provide such normative data for individual Canadian psychology professors.

Given the aforementioned dependence on peer-reviewed journal article counts and citations for job allocations, promotion, and tenure (Feist, 1997; Matson et al., 2005; Park, 1996), it seems critical to provide a normative context for these indices of research performance. As such, the purpose of the current study was to conduct an assessment of research activities for clinical psychology professors in CPA-accredited Canadian psychology programs as indicated by peer-reviewed journal article counts and citations from the Web of Knowledge database. The current assessment was designed to serve two important functions. First, the resulting data would provide norms for publication counts and citations, allowing for a variety of values for several comparative purposes. Second, the resulting data would provide details to identify CPA-accredited Canadian clinical psychology program professors who have had the largest impact on the field as measured by these indices, recognising that such persons represent a subset of contributing psychologists across the country.

Method

Participants

The current study included data from all 255 professors (55% women) who are core faculty members (i.e., not adjunct professors, emeritus professors, external clinical supervisors, or sessionals) in CPA-accredited clinical psychology programs (Canadian Psychological Association, 2011) across Canada. All were professors during the fall semester (i.e., September-December) of 2011. Data for the current study was acquired from several sources. The current study was approved by the university research ethics board.

Procedure

Research productivity can be conceptualised in several ways, the primary being peer-reviewed journal article counts (i.e., original research articles and review articles) and subsequent citations (Campanario, 1993). Publication and citation counts have been rated as crucial for many disciplines (e.g., biology, chemistry, physics; Feist, 1997) and have been used to estimate professors' impact on their field (Feist, 2000; Simonton, 1988). Highly cited articles may be exemplars (Shadish, Tolliver, Gray, & Gupta, 1995) that mediate negative consequences associated with publication quantity over quality (Park, 1996). Repeated citation of an article generally indicates significance and utility. While citations may be used for alternate reasons (e.g., for personal gain or as a negative exemplar; Shadish et al., 1995), research has not supported such rationales as pervasive (Feist, 1997; Sonnert, 1995). The importance of citation rates is further underscored by the increasing popularity of the Hirsch index or *h*-index (Hirsch, 2005). The *h*-index is based on the list of publications by an author ranked in descending order by the times cited, where the value of *h* is equal to the number of articles (*N*) in the list that have *N* or more citations. In psychology, the *h*-index provides an increasingly and widely recognised index for publication impact and therein a proxy for publication quality, despite its limitations (Wendl, 2007).

Several databases are available for indexing journal counts and citations (e.g., PsycInfo, Science Direct); however, data for the current study was collected from the Web of Knowledge database (http://www.webofknowledge.com/). Reviews have supported the Web of Knowledge as providing the most comprehensive coverage of peer-reviewed journal articles and reviews relative to other databases (Jacsó, 2006; Meho & Yang, 2007). The Web of Knowledge provides analytic tools for calculating the number of publications, the number of citations, and the *h*-index associated with each researcher. By way of a contrasting example, while Google Scholar and the associated Publish or Perish program can be more comprehensive overall (i.e., includes books, chapters, published abstracts, letters, and other documents) and still provide various bibliometric indices, there is currently no functional capacity for locating only peer-reviewed articles. That said, all current databases demonstrate some restrictions in capacity and researchers must, in effect, choose where the error margins will occur. In the current study, we opted to err on the side of

conservative numbers and use the Web of Knowledge database rather than more inclusive databases.

First, all CPA-accredited clinical psychology program professors, including Assistant Professors on term positions (otherwise indistinguishable from tenure-track positions), were identified by searching CPA-accredited clinical program websites for core faculty members (i.e., not adjunct professors, emeritus professors, external clinical supervisors, or sessionals). It is important to underscore that many outstanding psychology professors exist outside of CPA-accredited clinical psychology programs. Accordingly, our current interest was in professors from CPA-accredited clinical psychology programs, and we were able to capitalize on standardized record-keeping and generally clearly defined faculty within such programs. This allowed us to establish a clearly defined population of faculty, something that may have been more difficult if examining other areas of psychology with broader focus (e.g., "cognition," "developmental," "neuroscience"). Publically available data regarding professors' education history (i.e., graduating institutions for each degree and year of Ph.D. as provided on university/professor websites) were also located and recorded. Subsequently, we confirmed the professors were registered clinical psychologists by conducting searches on the websites of provincial colleges of psychologists. Second, all professors were invited, by e-mail, to provide any details regarding their education history not publically available.

Third, a search was conducted for each professor's publication productivity using the public access archival data provided by Thomson Reuters' Web of Knowledge database (also referred to as Web of Science, which is the search function for the Web of Knowledge database). The publications associated with each professor were located within the Web of Knowledge database using their names. Disambiguation was done manually for each publication by cross-referencing each name with the subject area (e.g., psychology, experimental psychology, clinical psychology, multidisciplinary psychology, applied psychology, mathematical psychology, social psychology, developmental psychology, biological psychology, educational psychology) and by removing search results belonging to different authors with the same or similar name. The Web of Knowledge allows searches to include only peer-reviewed journal research articles and reviews, thereby excluding conference proceedings, letters to the editor, and other published materials; as such, those exclusions were made for the current searches. At the time of this study, the Web of Knowledge was updated every Thursday morning and our search was conducted with this in mind. The initial searches were conducted between the afternoon of September 1, 2011 and the evening of September 7th, making the number of publications and citations valid up to that Web of Knowledge update. The Web of Knowledge is also not a static database, as even historical data may appear to change subtly as the database shifts and new citations are included. Therefore, these data were only valid at the time of the download and will slowly become increasingly disparate from subsequent database searches as time elapses.

Fourth, based on the publication indices produced by the Web of Science searches of the Web of Knowledge database, the 23 men and 23 women professors with the highest number of publications, citations, and *h*-indices were contacted and invited to provide their full curriculum vitae (CV). There are specific complications in performance measurement that are associated with disproportionate challenges faced by women in academia (Armenti, 2004; Fothergill, & Feltey, 2003; Probert, 2005), which is why we decided to assess the publication metrics for women and men separately to check for any disparity. As noted above, the Web of Knowledge is not comprehensive; therefore, more than the anticipated final number of professors were invited in an attempt to increase the probability of accurately selecting the top 10 women and the top 10 men. The full CV was used for disambiguation, to ensure no substantive omissions occurred in identifying the most productive professors, and to provide a margin of error for the Web of Knowledge data. All but one professor agreed and participated, with the one exception declining to provide a CV when requested and explicitly requesting anonymity in the present study.

Fifth, the 23 men and 23 women professors were ranked based on the number of publications in their full CV, their citations from Web of Knowledge, their *h*-indices from the Web of Knowledge, and a composite score of their full CV publication count and their citations from the Web of Knowledge. The original intent was to identify an overall top 20; however, when significant differences were identified between women and men, the intent changed to identify the top 10 women and the top 10 men using the aforementioned criteria, with the initial assumption that the indices would readily coalesce for each group into a consistent set of 10 professors.

Analyses

Descriptive and comparative statistics regarding professorial demographics (i.e., years since Ph.D., current rank, sex) were calculated using the data gathered from the initial searches ($N = 255$). Not all demographic data was available for all participants (i.e., Ph.D. year was only available for participants who provided their academic history as public information or through the provision of their CV). A partial correlation was performed to assess the relationship between publication counts and citations after controlling for sex and the number of years since a Ph.D. was received. Descriptive statistics, specifically normative data, were also calculated for publication counts, citations, and *h*-indices based on faculty rank (i.e., Assistant, Associate, Full) and sex (i.e., women and men) using the data gathered from the initial searches. Publication counts, citations, and *h*-indices were then compared across men and women using independent *t* tests. An average annual publication count—and the associated standard deviation—was calculated by averaging the number of publications per professor per year since receiving their Ph.D.

Results

Demographic Descriptive and Comparative Data for All Professors

There were significant and substantive differences in the proportions of women and men within each professorial rank, $\chi^2(2) = 12.84$, $V = .22$. Specifically, there were more women than men in the Assistant (i.e., $n = 56$; 68% women) and Associate (i.e., $n = 90$; 62% women) ranks, but more men than women in the Full rank (i.e., $n = 109$; 42% women). Across all ranks, professors for whom a Ph.D. year was available ($n = 185$; 73%) reported an average of 19.29 ($SD = 10.72$; range 1–43) years since receiving their Ph.D.

There were no statistically significant differences in the proportion of Assistant, Associate, and Full professors who made their Ph.D. year publically available, $\chi^2(2) = 1.63$, V = .08. Similarly, there were no statistically significant differences in the proportion of men and women who made their Ph.D. year publically available, $\chi^2(2) = .19$, V = .03.

Not surprisingly, when controlling for sex and years since receiving their Ph.D., there was a positive, statistically significant and substantial relationship between publication counts and citations, $r(181) = .84$, $p < .01$, $r^2 = .70$. Also not surprisingly, there were statistically significant differences in years since receiving a Ph.D. based on professor rank, $F(2, 179) = 101.99$, $p < .01$, $\eta^2 = .12$. Using Tukey's post-hocs, Full professors reported significantly more years since receiving their Ph.D. ($M = 27.90$, $SD = 7.44$) relative to Associate professors ($M = 15.31$, $SD = 7.44$; $p < .01$), who reported significantly more years since receiving their Ph.D. relative to Assistant professors ($M = 7.97$, $SD = 6.05$; $p < .01$). In contrast, there were no statistically significant differences in years since receiving a Ph.D. between men and women, $F(1, 179) = 1.76$, $p > .05$, $\eta^2 < .01$, and there was no statistically significant interaction between rank, women, and men, $F(1, 179) = .24$, $p > .05$, $\eta^2 < .01$, for years since receiving a Ph.D.

There were statistically significant differences on publication counts, citations, and *h*-indices between those who did and those who did not make their Ph.D. year publically available. Across all professorial ranks, those who did make their Ph.D. year available scored higher on all such measures (all *p*s $< .01$, all r^2s $> .05$). Despite overall differences, specific differences were not identified when comparing only Assistant or Associate professors who did and did not make their Ph.D. year publically available (all *p*s $> .10$, all r^2s $< .02$). Differences were found only when comparing Full professors who did make their Ph.D. year publically available with those who did not, such that those who did make it available scored statistically significantly higher (degrees of freedom values corrected for significantly unequal variances) on publication counts, $M_D = 28.01$, $t(98.99) = 5.27$, $p < .01$, $r^2 = .22$, citations, $M_D = 919.92$, $t(99.30) = 6.39$, $p < .01$, $r^2 = .29$, and *h*-index, $M_D = 8.01$, $t(91.37) = 5.69$, $p < .01$, $r^2 = .26$.

Publication Counts, Citations, and *h*-Indices Data for All Professors

Normative data for each of the values (i.e., publication counts, citations, and *h*-indices) were calculated separately for sex (i.e., men and women) and rank (i.e., Assistant, Associate, and Full). Outliers were identified (using SPSS box plot extreme values) within each subset for each of the unmodified and annual average value sets (see Table 1) and excluded from the presented data and for all subsequent analyses. As expected based on previous research and theory (Monroe, Ozyurt, Wrigley, & Alexander, 2008; Probert, 2005; van Anders, 2004), women and men did differ across publication counts, citations, and *h*-indices. In all cases, men had higher publication counts, citation counts, and *h*-indices (Tables 2–4). The differences were statistically significant at the Assistant rank, i.e., publication counts, $M_D = 4.98$, $t(51) = 2.36$, $p < .05$, $r^2 = .10$; citations, $M_D = 129.26$, $t(51) = 2.59$, $p < .05$, $r^2 = .12$; *h*-indices, $M_D = 2.46$, $t(51) = 2.47$, $p < .05$, $r^2 = .11$, and at the Full rank, i.e., publication counts, $M_D = 15.29$, $t(103) = 2.83$, $p < .01$, $r^2 = .07$; citations, $M_D = 428.52$, $t(103) = 2.59$, $p < .05$, $r^2 = .06$; *h*-indices, $M_D = 4.01$, $t(103) = 2.55$, $p < .05$, $r^2 = .06$; however, no such differences were found at the Associate rank, i.e., publication counts, $M_D = 3.45$, $t(82) = 1.54$, $p > .10$, $r^2 = .03$; citations, $M_D = 9.06$, $t(82) = .11$, $p > .10$, $r^2 < .01$; *h*-indices, $M_D = .84$, $t(82) = .88$, $p > .10$, $r^2 = .01$.

We also wanted to have a proxy for the margin of error between the Web of Knowledge publication counts and the actual number of publications. As such, we calculated the difference scores between the Web of Knowledge counts and the CVs we received from our requests. As expected, in almost all cases, the CV contained more articles than the Web of Knowledge (in only one case did the CV and the Web of Knowledge contain the same number of articles). For women, there was an average of 21.90 more articles in their CV ($SD = 16.93$, min = 0.00, max = 54.00). For men, there was an average of 39.55 more articles in their CV ($SD = 15.32$, min = 7.00, max = 60.00). The differences are likely the result of professors choosing to publish in journals not indexed in the Web of Knowledge, which may be due to the age of the journal (i.e., some journals are too new to be included in the Web of Knowledge, which requires three years of data for indexing), the mission of the journal (i.e., being indexed in the Web of Knowledge may not be a goal for the journal), or even the journal parameters (i.e., some journals are missing one or more of the inclusion requirements for Web of Knowledge). The extreme nature of the values is likely reflective of the error being calculated using data from Full professors with the highest publication counts, and is highly unlikely to be comparably reflected for Assistant and Associate rank professors or for those with more median publication counts. In other words, the proxy for error is likely only accurate for those with extremely high publication counts, relative to what the average error would be for most professors.

Top Ten Women and Top Ten Men

Identifying each of the "top 10" based on the number of publications in their full CV, their citations from the Web of Knowledge, their *h*-indices from the Web of Knowledge, and a composite score of their full CV publication counts and citations from the Web of Knowledge was somewhat more complicated than expected. The rank orders for many of the persons with the highest publication counts shifted, often dramatically, depending on which "objective" index was used. After extensive debate, the top 11 women and top 11 men professors were selected for presentation because the indexes that would assign a person to position 8, 9, 10, or 11 had become equivocal. For example, one person may have had more publications, fewer citations, a higher *h*-index, and a lower composite score, whereas another had fewer publications, more citations, a lower *h*-index, and a higher composite score. The details for each of the top 11 women and men professors are presented in Tables 5 and 6. Please note that written permission to present identifying information was provided by all but one of the professors listed and, in the case of the exception, only information regarding indexes available from the Web of Knowledge are presented.

There were several noteworthy statistics associated with the demographics for each of the top 11 women and men professors. First, there were no statistical differences between men and women in years since they received their Ph.D., $M_D = 3.36$, $t(20) = 1.01$,

Table 1
Outliers From Web of Knowledge Data and Annual Average Data

Outliers for Web of Knowledge data												
	Women						Men					
	Assistant professors		Associate professors		Full professors		Assistant professors		Associate professors		Full professors	
Count	1	KS (37) = .18**	3	KS (51) = .15**	1	KS (44) = .16**	2	KS (16) = .13	1	KS (33) = .09	2	KS (61) = .134**
Values	≥48		≥40		≥95		≥37		≥67		≥170	
Citations	2	KS (36) = .19**	12	KS (44) = .15*	7	KS (39) = .16*	1	KS (17) = .15	3	KS (31) = .15	1	KS (62) = .146**
Values	≥752		≥708		≥1717		≥831		≥1167		≥7368	
h-index	1	KS (37) = .15*	2	KS (52) = .14*	4	KS (41) = .12	N/A	KS (18) = .15	N/A	KS (34) = .11	1	KS (62) = .082
Values	≥27		≥18		≥26						≥46	
Outliers for annual averages												
	Women						Men					
	Assistant professors		Associate professors		Full professors		Assistant professors		Associate professors		Full professors	
Count	1	KS (25) = .19*	1	KS (38) = .26**	2	KS (31) = .16*	N/A	KS (11) = .14	3	KS (25) = .21**	N/A	KS (46) = .100
Values	≥9		≥9		≥3.7				≥4.4			
Citations	N/A	KS (25) = .18*	1	KS (32) = .34**	N/A	KS (26) = .11	1	KS (13) = .23	1	KS (23) = .18	N/A	KS (47) = .109
Values			≥188				≥227		≥117			
h-index	N/A	KS (24) = .10	2	KS (39) = .26**	N/A	KS (28) = .10	1	KS (13) = .39**	2	KS (25) = .20	N/A	KS (47) = .076
Values			≥1.3				≥9		≥2			

Notes. KS - Kolmogorov-Smirnov with Lilliefors significance correction.
* $p < .05$. ** $p < .01$.

Table 2
Normative Publication Data From Web of Knowledge for Assistant Professors (n = *56) From CPA-Accredited Clinical Psychology Programs*

	Women						Men					
	Count		Citations				Count		Citations		*h*-index	
	Value	Annual average	Value	Annual average	*h*-index	Annual average	Value	Annual average	Value	Annual average	Value	Annual average
Mean	9.46	1.58	87.47	15.06	4.35	.79	14.44	1.90	228.53	32.33	7.39	.93
Mean *SE*	1.14	.22	14.98	3.04	.53	.11	1.83	.35	47.03	8.52	.89	.16
Mean 95% CI	[7.14, 11.77]	[1.12, 2.04]	[57.05, 117.89]	[8.78, 21.35]	[3.27, 5.43]	[.57, 1.02]	[10.53, 18.34]	[1.12, 2.67]	[128.84, 328.22]	[13.58, 51.05]	[5.50 9.27]	[.58, 1.28]
Median	7.00	1.39	52.50	8.67	4	.78	15.00	1.70	186.00	24.50	7.50	.94
SD	6.94	1.10	89.90	15.22	3.24	.53	7.33	1.15	193.89	29.50	3.79	.55
Min/Max	0/24.00	0/4.00	0/304.00	0/53.25	0/13.00	0/1.80	3/27.00	.15/3.83	5.00/734.00	1.67/81.56	1.00/14.00	.11/1.83
Skewness (*SE*)	.61 (.39)	.48 (.47)	.94 (.39)	.95 (.46)	.71 (.39)	.34 (.47)	−.17 (.56)	.27 (.66)	1.14 (.55)	.62 (.64)	−.06 (.54)	.18 (.64)
Kurtosis (*SE*)	−.69 (.76)	−.42 (.92)	−.39 (.77)	.12 (.90)	−.02 (.76)	−.58 (.92)	−.86 (1.09)	−.96 (1.28)	1.35 (1.06)	−1.29 (1.23)	−1.03 (1.04)	−1.07 (1.23)

Note. CI = Confidence Interval.

Table 3
Normative Publication Data From Web of Knowledge for Associate Professors (n = *90) From CPA-Accredited Clinical Psychology Programs*

	Women						Men					
	Count		Citations				Count		Citations		*h*-index	
	Value	Annual average	Value	Annual average	*h*-index	Annual average	Value	Annual average	Value	Annual average	Value	Annual average
Mean	14.76	1.12	159.54	13.62	7.17	.53	18.21	1.20	278.13	21.90	8.38	.54
Mean *SE*	1.18	0.09	17.91	1.63	.54	.04	2.10	.21	40.68	4.47	.97	.08
Mean 95% CI	[12.40, 17.13]	[.93, 1.31]	[123.34, 195.73]	[10.30, 16.95]	[6.08, 8.26]	[.44, .62]	[13.94, 22.48]	[.76, 1.63]	[195.04, 361.21]	[12.61, 31.19]	[6.41, 10.35]	[.37, .71]
Median	13.00	1.00	143.00	12.33	6.00	.53	19.00	1.10	241.00	14.92	8.50	.53
SD	8.42	.57	114.66	9.07	3.909	.26	12.05	.98	226.51	20.96	5.64	.40
Min/Max	3.00/35.00	.20/2.50	0/409.00	0/36.45	0/17.00	0/1.21	1.00/44.00	.03/3.75	1.00/757.00	.03/67.29	1.00/25.00	.03/1.38
Skewness (*SE*)	.68 (.33)	.42 (.39)	.60 (.37)	.39 (.42)	.62 (.33)	.26 (.39)	.34 (.41)	.92 (.49)	.52 (.42)	.77 (.49)	.80 (.40)	.57 (.48)
Kurtosis (*SE*)	−.37 (.66)	−.49 (.76)	−.55 (.72)	−.27 (.82)	.06 (.65)	.10 (.76)	−.65 (.80)	.60 (.95)	−.74 (.82)	−.61 (.95)	.90 (.79)	−.58 (.94)

Note. CI = Confidence Interval.

Table 4
Normative Publication Data From Web of Knowledge for Full Professors (n = 109) From CPA-Accredited Clinical Psychology Programs

	Women						Men					
	Count		Citations				Count		Citations		*h*-index	
	Value	Annual average	Value	Annual average	*h*-index	Annual average	Value	Annual average	Value	Annual average	Value	Annual average
Mean	32.05	1.23	419.92	19.13	9.63	.42	47.33	1.99	1080.55	49.18	15.10	.65
Mean *SE*	3.15	.13	61.32	2.97	.91	.05	3.98	.18	124.80	5.83	1.11	.06
Mean 95% CI	[25.68, 38.41]	[.97, 1.49]	[295.79, 544.06]	[13.02, 25.24]	[7.79, 11.48]	[.32, .52]	[39.36, 55.29]	[1.63, 2.35]	[831, 1330.10]	[37.45, 60.92]	[12.88, 17.31]	[.54, .76]
Median	27.00	1.16	304.00	18.62	9	.42	47.00	2.00	905.00	46.59	14.50	.69
SD	20.92	.68	382.93	15.13	5.851	.26	31.10	1.22	982.67	39.98	8.73	.39
Min/Max	7.00/84.00	.28/2.65	2.00/1444.00	.17/52.69	1.00/23.00	.03/1.06	0/114.00	0/4.75	0/3464.00	0/172.85	0/33.00	0/1.65
Skewness (*SE*)	.78 (.36)	.52 (.43)	1.18 (.38)	.74 (.46)	.64 (.37)	.64 (.44)	.34 (.31)	.17 (.35)	.86 (.30)	.88 (.35)	.11 (.30)	.44 (.35)
Kurtosis (*SE*)	−.45 (.70)	−.55 (.85)	.81 (.74)	−.11 (.89)	−.16 (.72)	.36 (.86)	−.88 (.60)	−.83 (.69)	−.23 (.60)	.70 (.68)	−1.04 (.60)	.17 (.68)

Note. CI = Confidence Interval.

Table 5
Top 11 Women Professors From CPA-Accredited Clinical Psychology Programs

Women	Current institution	Current rank	Ph.D. date	Undergrad institution	M.A. institution	Ph.D. institution	Articles in WoK	Articles in CV	WoK citations	*h*-index
N/A	N/A	Professor	1970s*	N/A	N/A	N/A	52	N/A	1772	20
Belleville, Sylvie	Montreal	Professor	1988	Québec à Trois-Rivières	Québec à Trois-Rivières	McGill	86	121	1962	23
Chambers, Christine T.	Dalhousie	Associate Professor	2001	Dalhousie	British Columbia	British Columbia	52	61	990	19
Irvine, M. Jane	York	Associate Professor	1983	York	Edinburgh	Oxford	64	78	1656	24
Morrongiello, Barbara A.	Guelph	Professor	1982	Rutgers University	Massachusetts	Massachusetts	111	135	2021	28
Moskowitz, D. S.	McGill	Professor	1979	Kirkland College	Connecticut	Connecticut	59	62	1460	23
Penhune, Virgina B.	Concordia	Associate Professor	1998	Wellesly	—	McGill	40	40	2260	22
Pepler, Debra J.	York	Professor	1979	Kingston	Dalhousie	Waterloo	64	87	1391	21
Serbin, Lisa A.	Concordia	Professor	1972	Reed College	—	SUNY - Stony Brook	63	81	1422	21
Stewart, Sherry H.	Dalhousie	Professor	1993	Dalhousie	—	McGill	142	196	3796	37
Tuokko, Holly A.	Victoria	Professor	1983	Lakehead	Lakehead	Victoria	70	109	2725	26

Note. Presented in alphabetical order by last name. WoK = Web of Knowledge Database; N/A = Not Available. * The date has been obscured to protect the person's identity. Data in this table accounts for individual CVs.

Table 6
Top 11 Men Professors From CPA-Accredited Clinical Psychology Programs

Men	Current institution	Current rank	Ph.D. date	Undergrad institution	M.A. institution	Ph.D. institution	Articles in WoK	Articles in CV	WoK citations	*h*-index
Asmundson, Gordon J. G.	Regina	Professor	1991	Manitoba	Manitoba	Manitoba	176	212	3375	32
Binik, Yitzchak M.	McGill	Professor	1975	New York	Pennsylvania	Pennsylvania	99	122	2286	30
Dobson, Keith S.	Calgary	Professor	1980	Alberta	Western Ontario	Western Ontario	86	139	3155	25
Hewitt, Paul L.	British Columbia	Professor	1988	Manitoba	Saskatchewan	Saskatchewan	81	127	2817	29
Linden, Wolfgang	British Columbia	Professor	1981	Muenster, Germany	Muenster, Germany	McGill	83	118	2084	25
McGrath, Patrick J.	Dalhousie	Professor	1979	Saskatchewan	Saskatchewan	Queens	180	228	4982	39
McMahon, Robert J.	Simon Fraser	Professor	1979	Virginia	Georgia	Georgia	114	146	3581	33
Morin, Charles M.	Laval	Professor	1986	Laval	Nova Southeastern	Nova Southeastern	114	174	4237	35
Neufeld, Richard W. J.	Western Ontario	Professor	1972	Alberta	Calgary	Calgary	135	189	2295	26
Sullivan, Michael J. L.	McGill	Professor	1988	McGill	Concordia	Concordia	75	116	3003	26
Zuroff, David C.	McGill	Professor	1977	Harvard	Connecticut	Connecticut	118	125	3666	33

Note. Presented in alphabetical order by last name. WoK = Web of Knowledge Database. Data in this table accounts for individual CVs.

$p > .05$, $r^2 = .05$. Second, all of the top 11 men were Full professors, whereas eight of the top 11 women were Full professors and three were Associate professors. Third, the top 11 men continued to have statistically significantly more CV publications, $M_D = 57.18$, $t(19) = 3.07$, $p < .01$, $r^2 = .33$, citations, $M_D = 1275.09$, $t(20) = 3.61$, $p < .01$, $r^2 = .39$, and *h*-indices, $M_D = 6.27$, $t(20) = 3.05$, $p < .01$, $r^2 = .32$. In all cases, the effect sizes were much larger than those from the full sample comparisons.

Discussion

Canadian clinical psychology professors are generally expected to perform in three major domains–research, teaching, and service (University of Alberta, 2000). The prevalent scientist-practitioner model for such professors includes a strong focus on research (Baker & Benjamin, 2000), and research is generally accepted as an expectation of professorial performance (University of Alberta, 2000). Counts of peer-reviewed publications, citations, and even *h*-indices have been accepted by many as metrics for research performance (Park, 1996) that determine job allocations and career advancement, attract graduate students, and influence funding distributions for subsequent research (Feist, 1997; Matson et al., 2005). Not without meritorious disagreement (Cramer & Page, 2007; Page, 1998; Page & Cramer, 2003; Symons, 2011), these metrics are current performance measures for many members of CPA-accredited clinical psychology departments. The current research was designed to caveat these metrics by developing normative data and identifying a ceiling by recognising those whose performance can be considered exceptional in these areas.

The normative data provided includes a conservative estimation of overall peer-reviewed research productivity as measured by publication counts, citations, and *h*-indices, after removing statistical outliers (many of which were identified in the top 11 women and men categories). The basis for the data is the Web of Knowledge database, which is currently considered the best combination of comprehensive coverage of peer-reviewed journal articles and reviews, as well as function for search parameters, relative to other databases (Jacsó, 2006; Meho & Yang, 2007), but still provides a substantial underestimation of actual productivity. The underestimation is underscored by our finding that professors producing the most publications had several more articles on their CV than were indexed in Web of Knowledge.

There was consideration given to the use of central tendency dependent statistics on non-normal data (Osborne, 2008; Tabachnick & Fidell, 2007). The data are certainly nonnormal (i.e., there is arguably substantial skew and kurtosis as well as substantial variance) even after removing statistical outliers; however, it could be argued that the current data represent a population rather than a sample, which makes the results mostly descriptive and central tendency less of an issue. We did explore transforming the data, but none of the standard transformations (i.e., square root and logarithmic) normalized the data and the transformations severely confounded interpretation. As such, we elected to present the data without transformation.

Most CPA-accredited clinical psychology professors appear to produce between 0 and 4 publications per year. It also appears that most have fewer than 22 publications during their time as Assistant professors, fewer than 31 before becoming Full professors, and fewer than 79 as Full professors; moreover, most Full professors

have *h*-indices below 16. These results should contrast any anecdotal misperceptions about productivity and output, while drawing into stark clarity what publication outputs can be realistically expected from CPA-accredited clinical psychology professors. That clarity needs to be further caveated by understanding that different types of research may result in substantially different publication counts because of design constraints (e.g., longitudinal relative to cross-sectional).

Hack and colleagues (2010) used their data and experience to offer suggested qualifiers for *h*-indices (e.g., higher than 15 indicates excellence). We suggest that it would be presumptuous for us to make similar recommendations from these data. Instead, we suggest that persons using these data to describe themselves or others do so judiciously, and consider all of the available statistics. Subjective connotations of excellence are problematic, as is demonstrated by the fact that even among the top 11 women and men categories the ordering of individuals changes depending on the metric used (i.e., publication counts, citations, *h*-indices). In any case, no professor should be evaluated on an area (e.g., research, teaching, and service) using only one data point or only one metric. There is no singular quantifiable metric that can be held as universally valid or reliable.

The proportions of Assistant, Associate, and Full professors, as well as women and men, who made their Ph.D. year publically available, was consistently comparable; however, Full professors who did not make their Ph.D. year publically available had on average substantially lower publication counts (i.e., 28 fewer), citations (i.e., 920 fewer), and *h*-indices (i.e., 8 lower). The same pattern was not found at the Assistant and Associate ranks when comparing those who did and did not make their Ph.D. year publically available. As such, it seems unreasonable to suggest broadly that professors at all ranks who publish less are less likely to update their public profiles or that there are consistent social biases driving decisions to make a Ph.D. year public or not. Instead, the difference at the Full professor rank is likely a complex interaction of several individual variables.

Each of the researchers listed in the current study as representing the proverbial publication productivity ceiling has a diverse academic background. Institutions of several sizes and financial supports are also represented in the lists, indicating that productivity is not isolated in a handful of major Canadian universities. Likewise, it does not appear that individual success is dependent on attending a variety of training institutions or working at an institution other than the one that provided academic training. Instead, it appears that such productivity can be fostered, developed, and maintained at a variety of Canadian institutions.

There was a clear and substantial difference between women and men on each of the metrics assessed. There were many more women than men at the ranks of Assistant and Associate professor, which is certainly in line with previous research demonstrating that men are increasingly less likely to become psychologists (Boatswain et al., 2001; Olos & Hoff, 2006; Ostertag & Mcnamara, 1991). At all ranks, men had higher publication counts, citation counts, and *h*-indices; however, based on comparing publication counts from CVs to those from the Web of Knowledge database, women appear more accurately represented in the Web of Knowledge database than men. Furthermore, it appears that women produce a declining number of average annual publications, whereas men decline temporarily during the Associate professor rank. There are several factors that could contribute to the differences observed in publication counts between women and men. The differences may be the result of latent sexism (Monroe et al., 2008; Probert, 2005) exacerbated because new faculty members (of which there are more women than men in CPA-accredited clinical psychology programs) perceive they have less power to decline teaching and service opportunities (Park, 1996). The differences could also be the result of the "mommy track," disproportionate socially driven child rearing responsibilities (Schwartz, 1989; Wallace, 2008), and other gendered divisions of labour (Luxton, 2007). It is also possible that differences could reflect divergent priorities of men and women that are unrelated to sexism. For example, women who are clinical psychologists may better model a balance between work and leisure, something that all psychologists espouse as critical for mental health. In any case, available evidence demonstrates no (or relatively small) differences between men and women in publication counts and citations during graduate school for clinical psychology students in CPA-accredited programs (Peluso, Carleton, Richter, & Asmundson, 2011), which suggests the differences either begin or become apparent at the professorial level. Comprehensive investigation of the apparent differences between men and women, their origins, and the impact of such differences is well beyond the scope of this work, which is intent on providing initial normative data; however, these data suggest there are several avenues related to women in academia that warrant additional research and extensive discussion.

The current study sought to provide normative data that could inform standards for professorial achievement with respect to research, using indices of peer-reviewed journal articles and citations. Quantification of such indices captures only one aspect of professorial responsibility and achievement, and is therefore limited in scope. Thompson-Reuters recently announced a new tool for quantifying books, book chapters, and associated citations, which will be an important advancement in such metrics for future evaluation. Achievement in other areas that can be normalized and compared awaits the development of tools for measuring teaching and service objectively. This may include, for example, course evaluations, samples of teaching materials, courses taught per year, completed student theses and dissertations, written documents emerging from committee service, or number of community presentations given (Park, 1996). Discussing the feasibility of establishing such measures as objective, quantifiable, and valid metrics of achievement is a necessity as we move forward.

There are several important limitations and caveats associated with the current project that warrant mention and consideration for future research. First, we were dependent on the accuracy of website data, as provided by the professors and the institutions, for several demographic data points. As such there is likely to be some presently unknowable margin of error with respect to demographics (e.g., years since Ph.D. due to website typos, current rank due to out-of-date websites). Despite these possibilities, we expect that most professors who allow such data to be posted would also maintain accurate public profiles as a matter of professionalism, thereby making these errors improbable and likely representing a very small proportion of the overall dataset. Second, several very prominent Canadian clinical psychologists were not included because we wanted to focus on those who were currently core faculty in CPA-accredited clinical psychology departments as opposed to

adjunct faculty of those on other departments or programs (e.g., Psychiatry Departments, Health Districts). As noted in the Methods section, many outstanding psychology professors exist outside of CPA-accredited clinical psychology programs. Our current interest was specifically in professors from CPA-accredited clinical psychology programs and we hope that this research will stimulate further investigations into other populations and groupings of psychologists. Third, there were also important Canadian clinical psychologists who were included but did not make the top 11 because of some anomalous number combinations. For example, some highly renowned psychologists who have contributed substantially to the discipline had published a relatively lower number of publications in the Web of Knowledge database, each of which was nonetheless associated with a relatively larger number of publications that produce a substantial *h*-index. This limitation serves to further underscore the challenges associated with identifying a single score that can be used to rank research productivity. Fourth, there are several types of publications and several publication venues that were not included in these analyses but, nonetheless, contribute substantially to Canadian psychology (e.g., clinical guidelines). Such works are critically important but not measured within current metrics. Fifth, the *h*-index metrics did not exclude self-citations. As such, the *h*-indices may be differentially inflated or deflated depending on researcher productivity and areas of inquiry. Future research could consider presenting *h*-indices with and without self-citations and across the different subfields of psychology. Sixth, we chose to use years since Ph.D. as our measure for calculating annual average publication rates; therefore, particularly productive graduate students or persons who had a substantial but productive delay between their M.A. and their Ph.D. may be skewing the data for the Assistant professor statistics. Whether an alternative method of averaging (e.g., using years since first publication or years since first tenure track position) would be more "fair" is debatable, particularly because such outliers would likely have been the same ones removed from the presented data. Seventh, the error margins calculated for the psychologists producing the most publications indicate that the numbers presented herein are likely underrepresentations. Such differences make a true estimation of publication output challenging to calculate; however, based on statistical theories related to central tendency, the amount of that underrepresentation is likely higher for persons with more publications than for persons with fewer publications, and also likely higher for persons with more years (i.e., Full professors) than persons with fewer years (i.e., Assistant and Associate professors). Furthermore, specific data is simply not available without a comprehensive comparative analysis of the CVs from all 255 CPA-accredited clinical psychology program professors. Nevertheless, many of the professors with very high publication counts were excluded as outliers from the current normative data, which suggests that the presented data, while undoubtedly an underestimation, is likely a closer representation than indicated by the current margin of error. Eighth, we did not distinguish between Assistant professors on term positions and those in tenure-track positions. As such, some Assistant professors may have been at a disadvantage with respect to publication capacity because they were not tenure-track; moreover, it is possible that women were disproportionately represented within Assistant professors who held term positions, which might explain some of the difference between women and men with respect to publication productivity.

The current data represent a snapshot of current productivity wherein the design makes a retrospective longitudinal analysis almost impossible. The advent of the Internet—with global communication and ready rapid access to research articles—and recent research suggests publication rates may well be increasing (Carleton et al., 2010). There is also an increasingly prominent perception of a "publish or perish" mentality in academia that may be prompting expedited publication rates. Such a mentality certainly has pros and cons that warrant explicit and extensive future discussion. Relatedly, as a snapshot, the results provide no perspective on "up and comers"; as such, research assessing individual productivity "slopes" based on the past 5 years would be a particularly interesting and useful direction. Accordingly, replication of this project in 5 and 10 years would facilitate the assessment of longitudinal data. Finally, there are a substantial number of Full Professors represented in the current sample and the average years since each has obtained a Ph.D. suggests many of these people are approaching retirement age. The retirements may result in a significant shortage of psychologists (Service Canada: Psychologists statistics, 2011)—a fact underscored by Dr. John Service and his team that, like research productivity, appears to warrant the proactive attention of administrators (Canadian Psychological Association, 2010).

Résumé

Au Canada, de façon générale, on s'attend à ce que les professeurs de psychologie clinique des programmes accrédités par la Société canadienne de psychologie (SCP) s'impliquent dans 3 grands domaines : la recherche, l'enseignement et le service. Il est compliqué de mesurer la performance dans ces domaines. Le nombre de publications et de citations pour mesurer la productivité en recherche est souvent présenté comme une mesure objective pour l'évaluation de la quantité de recherche des professeurs, mais cette quantification peut être problématique. En dépit des préoccupations, les évaluateurs continuent d'utiliser le nombre de publications et de citations pour évaluer les professeurs de psychologie. L'usage de ces mesures sans données normatives est extrêmement problématique. De plus, sans points de référence plafonds ni valeurs aberrantes, les nouveaux professeurs et les personnes qui les évaluent n'ont aucune idée de ce qui constitue des attentes raisonnables. La présente étude fournit des données normatives et des points de référence plafonds établis au moyen de données publiques pour les 255 professeurs des actuels programmes de psychologie accrédités par la SCP, ainsi que d'un sous-ensemble de données obtenues auprès de ces mêmes professeurs. Les données ont été stratifiées selon le rang dans le corps professoral et le sexe. Les hommes et les femmes comptant la plus grande quantité de publications et de citations ont été déterminés afin d'établir les points de référence plafonds. Les résultats suggèrent que la plupart des professeurs de psychologie clinique accrédités par la SCP publient de 0 à 4 articles par année. Parmi les professeurs adjoints et titulaires, les hommes publient davantage que les femmes ($p < 0,05$), ce qui n'est pas le cas chez les professeurs agrégés ($p > 0,10$). En outre, les données suggèrent que les professeurs ne peuvent être classés de façon appropriée suivant leur rang en se fondant sur un seul répertoire des publications, quel qu'il soit. Sont

présentés les résultats complets, les répercussions, les limites, les mises en garde liées au contexte ainsi que des pistes possibles pour des recherches futures.

Mots-clés : psychologie, recherche en psychologie au Canada, publications, indice-*h*, programmes de psychologie accrédités par la SCP.

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