Research productivity, quality, and impact metrics of Australian psychology academics

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Abstract

Objective: The aim of this project was to provide up-to-date normative data on the research outputs of Australian psychology academics including metrics of quantity, quality, and impact from SciVal. Normative data are presented by academic level, university network, and estimated career stage. Additional analyses are also conducted to identify which SciVal metrics (which are measured over a short time window) predict lifetime performance indicators.

Method: Data from 749 psychology academics in Australia across 24 universities belonging to the various Australian university networks were extracted from Scopus and Scopus's SciVal (a tool including a range of metrics of recent research quantity, quality, and impact). Metrics included number of outputs and citations, citations per output, Field Weighted Citation Impact, percentage of outputs in the top 10% by citations or journal rank, and percentage of articles with international or corporate collaborators.

Results: Metrics related to quantity of outputs and citations increased with academic level and career stage. For other SciVal metrics, academics at the more senior levels (D and/or E) often outperformed Level B academics. Academics at Group of Eight universities tended to outperform academics affiliated with other networks by overall outputs and citations, but differences across networks were less consistent for other SciVal metrics. A range of SciVal metrics predicted lifetime metrics.

Conclusion: These data provide further up-to-date norms to facilitate evaluation of Australian psychology academics using SciVal.

Keywords: Academic psychologists, citations, impact, productivity, quality, metrics

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What is already known about this topic?

Metrics of research quantity, quality, and impact are increasingly influential in research evaluation.

Recent norms for Australian psychology academics stratified by academic level and university affiliation were published by Mazzucchelli, Burton, and Roberts (2019).

These norms documented significant differences in publications, citations, and h-index for staff at different academic levels and across academics affiliated with different university networks.

What this topic adds?

This study provides up-to-date norms broken down by academic level, university network, and estimated career stage for a range of new metrics of research quantity, quality, and impact available from SciVal.

Analyses are also conducted to identify which SciVal metrics (which are based on publications in the recent past) predict lifetime performance indicators.

Senior academics generally outperformed junior academics on most metrics. Group of Eight academics outperformed academics affiliated with other university networks on metrics of raw outputs and citations, but not as consistently for other metrics. A number of SciVal metrics predict lifetime performance indicators.

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Research Productivity, Quality, and Impact Metrics of Australian Psychology Academics

Research performance and research impact are becoming increasingly important in Australia. With the introduction of the Excellence in Research for Australia (ERA) exercise, the focus has moved from quantity of outputs as the key metric of research performance towards consideration of research quality and impact. At this point in time, universities are assigned ERA rankings based on the relative number of citations received by outputs over a particular period of time compared to the world wide average for that field (Australian Research Council [ARC], 2019a).

As such, metrics indicating the quality and impact of an academic's outputs, in addition to output quantity, can be an important consideration when selecting candidates for academic positions and awarding promotions. Quality and impact of outputs is also an important consideration when awarding research fellowships and project grants (ARC 2019b; National Health and Medical Research Council [NHMRC], 2019). Having up-to-date normative data for Australian academics at different career stages is useful to provide a benchmark for making these judgements. To this aim, a few previous studies have provided averages for lifetime outputs, citations, and h-index (the number of an academic's outputs that have obtained at least that number of citations) for psychology academics at different academic levels across Australian tertiary institutions (Haslam, Stratemeyer, & Vargas-Saenz, 2017; Malouff, Schutte, & Priest, 2009; Mazzucchelli, Burton, & Roberts, 2019; McNally, 2010).

Malouff and colleagues (2009) took a sample of academics from 12 Australian universities and located their number of outputs in the PsycINFO database. At a similar time, McNally (2010) produced norms for outputs and citations for academics at Group of Eight (Go8) universities between 2001 and 2008. Across these two studies, results indicated that the number of outputs and citations increased with academic level. Malouff et al. also found that academics at Go8 universities had a higher number of outputs than academics at non-Go8 universities. McNally compared research quality across academic levels using the ERA journal rankings in use at the time and did not find evidence that research quality increased with academic level.

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Subsequently, Haslam et al. (2017) extracted lifetime outputs, citations, and h-index from Scopus and Google Scholar for 279 Go8 psychology academics. Most recently, Mazzucchelli et al. (2019) extracted lifetime publications, citations, and h-index from the Scopus database for a cross-section of psychology academics from 21 Australian tertiary institutions (732 psychology academics) stratified by Australian university network (i.e., Go8,ustralian Technology Network (ATN), Innovative Research Network (IRN), Regional Universities Network (RUN), and unaffiliated universities (UU)). Average lifetime outputs, citations, and h-index increased with academic level. Consistent with Malouff et al. (2009), academics at Go8 universities tended to outperform academics at all other universities on these quantity metrics.

These past studies have produced relatively consistent normative data regarding the number of outputs and citations achieved by Australian academics at various academic levels, across different university networks; however, an increase in outputs and citations has been observed over time (Haslam et al., 2017; Malouff et al., 2009; Mazzucchelli et al., 2019; McNally, 2010). More recently, new metrics tools like Scopus's SciVal (https://scival.com/home) have started to provide further metrics of quantity, quality, and impact that academics can use to quantify their research performance. SciVal provides a range of metrics for fixed time periods (such as the last 2, 3, or 4 years) to provide indicators of recent research quantity, quality and impact. Although SciVal metrics are not available for periods covering the entire academic career of more senior researchers, these metrics are of relevance in contexts where recent research productivity is evaluated (e.g., granting bodies are often interested in research performance over a shorter period of time rather than an academic's entire academic career (e.g. NHMRC, 2019) and promotions panels at some institutions consider an academic's productivity since last promotion). The metrics available also provide a richer picture of an academic's productivity by including number of outputs, number of citations, citations per output, Field-Weighted Citation Impact (FWCI; a metric that indexes the number of citations received by an academic's outputs from the year of publication and the following three years compared to other outputs of the same age, type, and topic area), percentage of outputs in the top 10% most cited in their field, percentage of outputs in journals ranked in the top 10% in their field, and percentage of outputs including international collaborators or corporate collaborators.

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These metrics could provide further indicators of research quality and potential impact, or other indicators of interest to promotions and granting panels. For example, top 10% journals tend to be those with high submission volume and high rejection rates, a marker of perceived journal prestige (Wellington & Torgerson, 2005). With high submission rates, these journals can publish a higher proportion of work that is well conducted and rigorous. A researcher with a high proportion of outputs published in highly ranked journals may indicate that their body of work is of high quality. Other metrics provided by SciVal also predict future impact. For example, outputs resulting from international collaboration tend to attract more citations (Abramo, D'Angelo, & Solazzi, 2011) and outputs including corporate co-authors suggests the academic is conducting work with the aim of having impact on end-users outside of academia.

These metrics provide further data for academics to quantitatively describe their research performance and how their work aligns with the priorities of relevant institutions or granting bodies in contexts such as applying for promotions or grants. While norms for productivity derived from SciVal have been published for other disciplines overseas (e.g. Boudreaux et al., 2019), what is 'average' for an Australian academic in regards to these new metrics is not known. Even though some metrics like FWCI are adjusted in comparison to world-wide averages for that research area (with a value of 1 as average), what is typical in the context of the facilities and resources available to Australian academics is not known. Further, what is typical of these metrics at different academic levels is not yet clear.

Additionally, studies of Australian academics' productivity and impact to date, have overlooked a critical piece of information to contextualise these metrics—time as an active researcher. Across Australian universities, a level B academic (the most junior level reported in previous research) can be a recent PhD graduate or a more experienced researcher coming to the position after years of postdoctoral work. Considering averages at any career stage without any index of time as an active researcher makes it more difficult to determine the relevance of a given average to an individual, in the context of applying for early and mid-career fellowships (e.g. Discovery Early Career Researcher Award, Future Fellowship) which have eligibility requirements based on time as an active researcher (years post PhD) rather than academic level. As such, year of first publication was also collected in this study to provide a proxy of time as an active researcher. Finally, to our knowledge no research to date has investigated whether these SciVal metrics, which index performance over short time periods, predict longer term research performance. This is important to determine, as the utility of SciVal metrics depends on them providing a useful signal of research performance, such as predicting research performance over the longer term.

The aim of this project was to provide an up-to-date summary of normative data as well as providing normative data for recently available metrics of impact and quality such as FWCI, and outputs published in top ranked journals for Australian psychology academics as well as including norms broken down by career stage. In addition, analyses were conducted to determine which SciVal metrics uniquely predict longer term research performance metrics.

Method

Data Collection

Consistent with the approach of Mazzucchelli et al., (2019), the list of 41 tertiary providers that currently offer an accredited sequence in psychology was separated by Australian university network. Half of the universities from each network were randomly selected for inclusion (i.e., 4 of 8 Go8 universities, 2 of 4 ATN universities, 4 of 7 IRN universities, 4 of 7 RUN universities, and 7 of 15 UUs). Psychology academics employed at these universities in mid-January 2020 were identified through lists located online for each psychology school, department, or discipline. Where a school included multiple disciplines, only psychology academics were included where this distinction was possible. The initial list included 780 academic staff (this excluded staff listed as honorary, adjunct, associate, sessional, casual, or emeritus). Academic level was recorded based on listed job title. Academics with senior appointments (e.g., head of school) were included if they were listed on the academic staff list. We did not attempt to identify whether the academics were teaching focused, balanced, or research focused or whether they were employed on a full time or part time basis.

All listed names were searched using the google search engine and located, where possible, on other platforms (e.g., LinkedIn) in an attempt to confirm their continued appointment and academic level (in cases of discrepancy, the higher academic level was assumed). If there was good evidence that an academic was no longer affiliated with their

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listed institution (e.g., through a new position listed on LinkedIn), the academic was not included in analysis (*n*=13). Academics were excluded if it was not possible to determine their academic level. This was most often the case for research focused academics who were listed using non-traditional titles (e.g., 'NHMRC fellow') or professional training related positions like 'Clinic Director' (*n*=18), that do not consistently correspond with an academic level. For demographic purposes, each academic's gender was estimated based on information in the academic's profile. The distribution of academics at each academic level across the different university networks including median year of first output (from Scopus) is presented broken down by assumed gender in Table 1.

Procedure

All SciVal and Scopus data were extracted over a three week period starting in late January 2020. Each academic was located in SciVal and Scopus by first and last name and affiliation. Where this provided ambiguous results, we made further attempts to locate an academic's complete set of research outputs. Approaches included searching with additional information like middle initial, searching Scopus for publication titles to locate an academic's ScopusID, and by merging two ScopusIDs when it could be verified through the academic's other research profiles that two separate records belonged to that academic.

Using SciVal, the most recent complete four-year time window available was selected to generate all metrics (2016-2019). SciVal only provides a set list of time windows to select from (and these windows change periodically). This window was selected as it was a defined period (a complete number of years that had passed), intermediate in the range of options, and also short enough that it would be likely to encompass all researchers' windows of research activity (including early career researchers). For this time period, we extracted metrics including number of outputs, FWCI, citation count, citations per publication, percentage of outputs in top 10% by citations, percentage of outputs in top 10% ranked journals (based on CiteScore Percentiles), percentage of outputs with an international collaboration, and percentage of outputs with a corporate affiliation. These are all default metrics that are provided on the overview page. For each academic, the Scopus author profile was also accessed to extract lifetime outputs, citations, and h-index, and to locate the year of first output in Scopus.

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In order to estimate career stage for subsequent analysis, the time window between first publication and PhD conferral was ascertained in a random subset of 100 level B academics. In more recent times, Google Scholar has started to index theses allowing us to approximate the average time between first publication and PhD conferral for recent graduates. The selected academics were searched in Google Scholar to identify the year of PhD conferral. Where conferral year was not available in Google Scholar, other sources such as LinkedIn were used. Year of conferral could be located for 74 of these 100 academics. The year of first publication was subtracted from the year of PhD conferral. The mean (-1.44), median (-1.5) and mode (-2.00) indicated that the average level B academic had their first output published in the calendar year two years prior to PhD conferral. Given that eligibility cut offs for Australian fellowships generally occur early in the calendar year, we selected time windows of 3-7 years since first publication to represent the average early career academic (up to 5 years post PhD), 8-12 years since first publication to represent the average early stage mid-career academic (5-10 years post PhD), and 13-17 years since first publication to represent the average later stage mid-career academic (11-15 years post PhD).

Data Processing an Analysis

All data were initially collated in SPSSv 25. SciVal presents some metrics (including outputs in the top 10% by citations, outputs in top 10% ranked journals, and outputs with an international or corporate collaboration) as a percentage of the total number of outputs during the selected time window rather than as a raw number of outputs. Percentage values are useful for comparison of quality and impact across academic level, career stage, and university network (as they take output quantity into account). They can provide information on the proportion of these kinds of outputs being produced at a particular career stage or university network. Analyses using percentage of outputs in the top 10% by citations, in top 10% ranked journals, and with an international or corporate collaboration will be reported in the main document. As there are some circumstances were norms on the raw number of outputs may be more informative, analysis using the raw number of outputs in the top 10% by citations, in top 10% ranked journals, and with and international or corporate collaboration are reported in the online supplementary materials. To do

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so, percentage based metrics were converted into a raw number of outputs by multiplying each percentage by the academic's total number of outputs (2016-2019).

As the distribution of variables was positively skewed (due to the presence of genuine exceptional cases), with unequal sample sizes in some groups and violations of the assumption of homogeneity for a number of tests, Kruskal-Wallis H tests were used for comparisons across academic level, university network, and career stage. Dunn's post hoc tests with Bonferroni corrected p-values were used to follow up significant omnibus analyses.

To investigate which of the SciVal metrics predict lifetime performance indicators, robust regression analyses were run using the R essentials extension in SPSS 25 which uses the mass package (Ripley et al., 2013) in R (R Core team, 2019). This method was selected over the classical least squares regression method as it adjusts for the possible influence of genuine extreme data points in the model (Alma, 2011). Separate analyses were conducted with lifetime outputs, lifetime citations and lifetime h-index athe dependent variable and all SciVal metrics (SciVal outputs, SciVal citations, FWCI, Citations per output, percentage of international and corporate collaborators, and percentage of outputs in the top 10% by citations and journal rank) as well as years since first publication were entered simultaneously as predictors. For these analyses, academics whose first publication was within the 2016-2019 SciVal window were not included so that relationships were not inflated by these participants' SciVal and lifetime metrics being based on an identical set of outputs.

There were 39 academics for whom no Scopus record could be identified, and a further 39 academics had a Scopus record but no outputs between 2016 and 2019. Academics with no outputs (ever or within the SciVal time window) were only included in analysis of lifetime outputs, citations, and h-index.

These academics were not included in the analyses of SciVal metrics. As such, the norms presented for SciVal metrics are representative of research active academics and slightly overestimate the true average. Density plots created using ggplot2 (Wickham, 2011) in R (R core team, 2019) depicting the distribution of all metrics by academic level, university network, and career stage are provided in the online supplementary materials. Deidentified data are available at https://osf.io/xbysh/.

Results

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Scopus and SciVal metrics are presented broken down by academic level, university network, and career stage. As lifetime citations, outputs, and h-index have recently been analysed by academic level and university network in detail (Mazzucchelli et al., 2019), these analyses are not repeated here, but summary descriptive statistics can be found in the online supplementary materials to contextualise the remaining analyses.

Academic Level

Years since first publication. Years since first publication tended to increase by academic level, $\chi^2(4)=396.96$, $p<.001$. Level A academics did not differ from Level B academics, $z=1.88$, $p=.597$, but Level B academics' first publication was more recent than level C academics', $z=9.25$, $p<.001$, level C than level D, $z=3.91$, $p=.001$, and level D than level E, $z=4.44$, $p<.001$ (see Table 1).

Outputs (4 years). The number of outputs in the past four years tended to increase by academic level, $\chi^2(4)=224.01$, $p<.001$. Levels A and B did not significantly differ, $z=0.31$, $p>.999$, but the number of outputs increased significantly between levels B and C, $z=5.13$, $p<.001$, levels C and D, $z=4.73$, $p<.001$, and levels D and E, $z=3.61$, $p=.003$ (see Table 2).

Citations (4 years). The number of citations between 2016 and 2019 tended to increase by academic level, $\chi^2(4)=187.87$, $p<.001$. Levels A and B did not significantly differ, $z=0.85$, $p>.999$, but the number of outputs increased significantly between levels B and C, $z=4.80$, $p<.001$, levels C and D, $z=4.52$, $p<.001$, and levels D and E, $z=3.27$, $p=.011$ (see Table 2).

FWCI. FWCI differed by academic level, $\chi^2(4)=24.32$, $p<.001$. Level E academics outperformed academics at each of Levels B and C, all $zs>3.22$, $ps<.012$. Level D academics also outperformed Level B academics, $z=3.51$, $ps=.004$ No other effects were significant, $zs<2.61$, $p<.089$.

Citations per output (4 years). Citations per output differed by academic level, $\chi^2(4)=44.94$, $p<.001$. Academics at Level E significantly exceeded academics at Levels B as well as C, $zs>4.66$, $ps<.001$. Academics at Level D also outperformed academics at level B, $z=3.82$, $p=.001$. No other differences were significant, $zs<2.54$, $ps>.110$.

Outputs in top 10% by citations. The percentage of outputs in the top 10% by citations differed by academic level, $\chi^2(4)=27.92$, $p<.001$ (see Table 2). Academics at each of

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Levels D and E outperformed academics at each of Levels B and C, all *zs*>2.81, *ps*<.049. No other differences were significant, *ts*<1.94, *ps*>.528.

Outputs in top 10% ranked journals. Percentage of outputs in top 10% ranked journals differed by academic level, $\chi^2(4)=11.67$, *p*=.020, though no post hoc comparisons were significant after adjustments for multiple comparisons, *zs*<2.67, *ps*>.075.

International collaboration. Percentage of outputs with an international collaborator differed by academic level, $\chi^2(4)=12.55$, *p*=.014. Academics at Level D exceeded academics at Level B, *z*=3.02, *p*=.026. No other differences were significant, *zs*<2.72, *ps*>.065.

Corporate collaboration. Outputs with a corporate collaborator differed by academic level, $\chi^2(4)=31.48$, *p*<.001. Level E academics had a higher percentage of outputs with a corporate co-author than academics at each of Levels A, B, C, and D, *zs*>=3.50, *p*<.005. No other differences were significant, *ts*<2.11, *ps*>.353.

University Network

Years since first publication. Years since first publication differed by university network, $\chi^2(4)=18.81$, *p*=.001. Academics at Go8 universities published their first output significantly earlier than academics affiliated with the UU, *z*=4.20, *p*<.001. No other differences were significant, *zs*(705)<2.47, *ps*>.134 (see table 1).

Outputs (4 years). Outputs between 2016 and 2019 differed by university network, $\chi^2(4)=42.85$, *p*<.001. Go8 academics had significantly more outputs than each of the other networks, *zs*>2.92, *ps*<.035. No other differences were significant, *ts*<2.21, *ps*>.270.

Citations (4 years). Citations between 2016 and 2019 differed by university network, $\chi^2(4)=39.35$, *p*<.001. Go8 academics had the highest number of citations, exceeding academics at all other institutions, *z*>2.89, *p*<.039. No other differences were significant, *z*<2.73, *ps*>.064.

FWCI. FWCI did not significantly differ by university network, $\chi^2(4)=5.33$, *p*=.256.

Citations per output (4 years). Citations per publication differed by university network, $\chi^2(4)=10.53$, *p*=.032, though no post hoc tests were significant once correcting for multiple comparisons, *zs*<2.79, *p*>.053.

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Outputs in top 10% by citations. Outputs in the top 10% by citations differed across university networks, $\chi^2(4)=15.47$, *p*=.004. Go8 academics significantly outperformed both RUN and IRN academics, *zs*>2.93, *ps*<.034. No other differences were significant, *zs*<2.20, *ps*>.278 (see Table 3).

Outputs in top 10% ranked journals. Percentage of outputs in top 10% ranked journals differed by university network, $\chi^2(4)=26.16$, *p*<.001. Academics at Go8 universities had the highest percentage of outputs in highly ranked journals, significantly exceeding academics affiliated with IRN, RUN, and UU networks, *zs*>3.07, *p*s<.021. No other differences were significant, *z*s<2.67, *p*s>.076.

International collaboration. Percentage of outputs with an international collaborator differed by university network, $\chi^2(4)=27.59$, *p*<.001. Go8 universities had span style="font-family:'Times New Roman'">a greater percentage of outputs with international collaborators than RUN, and UUs, *z*s>4.07, *p*s<.001. No other differences were significant, *z*<2.56, *p*s>.106.

Corporate collaboration. The analysis of whether percentage of outputs with a corporate collaborator differed by university network was significant, $\chi^2(4)=13.72$, *p*=.008. Go8 academics outperformed IRN and RUN academics, *z*s>2.83, *p*s<.046. No other differences were significant, *z*<2.02, *p*>.431.

Career Stage

Lifetime outputs. Total outputs increased with career stage, $\chi^2(2)=110.84$, *p*<.001. Early career academics (approx. 0-5 years post PhD) had fewer outputs than early and late stage mid-career academics (approx. 6-10 years post PhD), *zs*>6.90, *ps*<.001, and early stage mid-career academics had fewer outputs than late stage mid-career academics (approx. 11-15 years post PhD), *z*=3.82, *p*<.001 (see Table 4).

Lifetime citations. Lifetime citations increased with career stage, $\chi^2(2)=149.66$, *p*<.001. Early career academics had fewer citations than early and late stage mid-career academics, *zs*>8.12, *ps*<.001, and early stage mid-career academics had fewer citations than late stage mid-career academics, *z*=4.32, *p*<.001.

Lifetime h-index. Lifetime h-index increased with career stage, $\chi^2(2)=139.25$, *p*<.001. Early career academics had lower h-indices than early and late stage mid-career

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academics, *zs*>7.81, $p<.001$, and early stage mid-career academics had lower h-indices than late stage mid-career academics, $z=4.19$, $p<.001$.

Outputs (4 years). Number of outputs increased with career stage, $\chi^2(2)=34.90$, $p<.001$. Early career academics had fewer outputs than both early and late-stage mid-career academics, $z>4.87$, *ps*<.001, but early and late stage mid-career academics did not differ, $z=0.64$, $p<.999$, (See table 5).

Citations (4 years). Citations between 2016 and 2019 differed by career stage, $\chi^2(2)=30.64$, $p<.001$. Early career academics had fewer citations in the time period than early and late stage mid-career academics, *zs*>4.59, *ps*<.001, but early and late stage mid-career academics did not differ, $z=0.56$, $p<.999$.

FWCI. FWCI differed with career stage, $\chi^2(2)=6.20$, $p=.045$, but no post hoc comparisons were significant once adjusting for multiple comparisons, *z*s<2.12, *p*s>.086.

Citations per output (4 years). Citations per output differed as a function of career stage, $\chi^2(2)=7.20$, $p=.027$. Early career academics had fewer citations per output than late stage mid-career academics, $z=2.41$, $p=.048$. No other differences were significant, *zs*<2.23, *ps*>.078.

Outputs in top 10% by citations. Outputs in the top 10% by citations differed by career stage, $\chi^2(2)=8.55$ 0, $p=.014$. Early career academics had a smaller proportion of outputs in the top 10% by citations than late stage mid-career academics, $z=2.78$, *ps*=.017. No other differences were significant, *zs*<2.18, *ps*>.087.

Outputs in top 10% ranked journals. Percentage of outputs in top 10% ranked journals did not differ with career stage, $\chi^2(2)=0.72$, $p=.698$.

International collaboration. Percentage of outputs with an international collaborator increased with career stage, $\chi^2(2)=14.53$, $p=.001$. Early career academics had a lower percentage of outputs with an international collaborator than both early and late stage mid-career academics, *zs*>2.95, *ps*<.009, but early and late stage mid-career academics did not differ, $z=0.72$, $p>.999$.

Corporate collaboration. Percentage of outputs with a corporate collaborator did not differ by career stage, $\chi^2(2)=5.83$, $p=.054$.

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SciVal Metrics as Predictors of Lifetime Metrics

Lifetime outputs. When predicting lifetime outputs based on SciVal metrics (2016-2019) and years since first publication, using robust regression, outputs over 4 years, B=1.74, $t(594)=41.79$, $p<.001$, 95% CI [1.65,1.81], citations over 4 years, B=0.01, $t(594)=2.68$, $p=.008$, 95% CI [0.00,0.02], and years since first output, B=1.41, $t(594)=26.81$, $p<.001$, 95% CI [1.31, 1.52], were unique positive predictors of lifetime outputs. Corporate collaboration, B=-0.43, $t(594)=-2.40$, $p=.017$, 95% CI [-0.78, -0.08] and percentage of outputs that are in the top 10% by citations, B=-0.08, $t(594)=-1.98$, $p=.048$, 95% CI [-0.15, -0.00] negatively predicted lifetime outputs. No other predictors were significant, *p*s>.055, see table 6.

Lifetime citations. When predicting lifetime citations based on SciVal metrics (2016-2019) and including years since first publication, outputs over four years, B= 5.14, $t(594)=3.92$, $p<.001$, 95% CI [2.57, 7.71], SciVal citations, B= 3.97, $t(594)=27.21$, $p<.001$, 95% CI [3.69, 4.26]), and years since first publication, B=33.52, $t(594)=20.08$, $p<.001$, 95% CI [30.24, 36.80] were unique positive predictors of lifetime citations. Percentage of outputs in the top 10% by citations negatively predicted lifetime citations, B=-2.80, $t(594)=-2.27$, $p=.024$, 95% CI [-5.23, -0.38]. No other predictors were significant, *ps*>.063, see table 6.

Lifetime h-index. When predicting lifetime h-index based on SciVal metrics (2016-2019) and years since first publication, outputs over 4 years, B=0.39, $t=24.17$, $p<.001$, 95% CI [0.36,0.42]), Citations per output, B=0.41, $t=4.28$, $p<.001$, 95% CI [0.22,0.60]), proportion of outputs with an international collaborator, B=0.03, $t=4.09$, $p<.001$, 95% CI [0.02, 0.04]), and years since first publication, B=0.54, $t=26.28$, $p<.001$, 95% CI [0.50,0.58]) all positively predicted lifetime h-index. SciVal citations, B=-0.01, $t=-3.94$, $p<.001$, 95% CI [-0.01, -0.00]), negatively predicted h-index. No other metrics accounted for unique variance in the model, *p*s>.269, see table 6.

Discussion

The aim of the current project was to produce up to date normative data for metrics of quantity, quality, and impact from Scopus and Scopus's SciVal, presented by academic level, university network, and career stage. Further, the current project aimed to identify which SciVal metrics (which are based on recent research activity) predict lifetime performance

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indicators. Results suggest that metrics related to raw outputs and citations tended to increase with academic level (though not between levels A and B) andcareer stage. This is consistent with previous studies (Malouff et al., 2009; Mazzucchelli et al. 2019; McNally et al., 2010; Haslam et al., 2017).

Though it was not always the case, Level D and E academics tended to outperform more junior academics (Level B) on SciVal metrics that are more relevant to quality and/or impact, but these differences were not always mirrored in the analyses broken down by career stage. This may be because career stage analyses only focussed on early and mid-career academics. Finding that some metrics of quality (e.g., publications in top ranked journals) tended not to differ with career stage, is consistent with McNally (2010) who indexed quality using ERA journal classifications and found that quality publications were produced by academics at all academic levels. However, on the whole, results do suggest that the greater time, resources, eminence and/or skill associated with academics at the highest levels does correspond with superior performance on SciVal metrics. It is also possible that better performance by Level D and E academics could reflect their greater representation at universities in the Go8 network, though promotion is based on an individual's research (as well as teaching and service) acumen, so this alternative explanation is unlikely.

Consistent with the findings of Malouff et al. (2009) and Mazzucchelli et al. (2019), Go8 academics outperformed academics affiliated with the other research networks on metrics related to raw output and citation quantity. Go8 academics also significantly outperformed academics affiliated with the majority of other networks on percentge of outputs in a top ranked journal. This suggests that Go8 academics may more strategically target publication in well regarded journals, or are more successful in achieving publication in these journals. As analyses compared the different networks collapsed across academic levels, it is also possible that better performance by Go8 academics, where observed, could reflect the greater proportion of Level D and E academics at universities in this network. Past research has found that academics at more prestigious universities in North America tend to outperform academics at other universities as these prestigious universities tend to hire more senior academics who have already

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achieved eminence elsewhere rather than because they provide an environment that facilitates productivity (Joy, 2006). It is possible that this is also occurring in the current data set.

When considering other metrics, the differences between the networks was less distinct. The networks did not differ on FWCI or citations per output. On other metrics, the Go8 outperformed RUN and sometimes IRN academics, while other networks tended not to differ. This suggests the Go8 advantage in raw outputs and citations does not necessarily translate to superior performance on other metrics that are less sensitive to accumulation of outputs and citations over time. This suggests that the greater number of citations accrued by Go8 academics compared to all other networks may be due to a greater number of outputs accruing citations, not due to these academics producing outputs that are more highly cited on average. This finding is consistent with Haslam and Laham (2010), who also reported that quantity of outputs was more indicative of number of citations accrued by an academic than quality of outputs. This finding also suggests that targeting publication in top ranked journals, may not reliably result in more citations (this finding is also reflected in the robust regression analyses). These findings suggest that impactful work is being produced by academics at institutions affiliated with various networks across Australia. On average, the increased resources (funds, research students, etc.) and reputation that come with affiliation with a prestigious institution may result in more outputs accruing citations and a higher proportion of outputs in highly ranked journals, but these do not necessarily result in more individual outputs that are highly cited.

The second aim of this investigation was to identify which (if any) SciVal metrics which are measured across a short time period of recent research activity predict lifetime performance indicators. SciVal outputs positively predicted unique variance in lifetime outputs, lifetime citations, and lifetime h-index. This finding is consistent with past research demonstrating that citations are a metric that indexes an academic's quantity of outputs better than the quality of their outputs (Haslam & Laham, 2010). Lifetime citations were not predicted by a metric related to journal quality (percentage of outputs in top 10% ranked journals), which suggests that a publication strategy of producing outputs targeted at well-regarded journals at the expense of producing more outputs is unlikely to result in higher impact as measured by citations. SciVal citations over the time window positively predicted unique variance

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in lifetime outputs and citations. International collaborations uniquely predicted lifetime h-index. Citations per output was also a unique positive predictor of lifetime h-index. Unsurprisingly, years since first publication was also a unique predictor of lifetime outputs, citations, and h-index.

These results suggest that those who produce a larger number of outputs over the short term, have tended to produce a larger number of outputs over their careers and those who accrue a large number of citations in the short term have also accrued a large number of citations over their career, even when taking into account variance explained by career length and the other SciVal metrics. Finding that academics' short term and lifetime productivity is related is consistent with the findings of Joy (2006) that rate of outputs is a relatively stable individual difference across time. As the current data are cross sectional and correlational, we cannot infer the direction of causality or pinpoint the mechanism. It is possible that the relationship between outputs over the short term and lifetime is due to those people working in large teams or having many students. It does suggest that, on average, those who are research active and productive in the short term tend to be consistently so throughout their careers. The relationship between citations over the short and long term may be due to particular researchers working in more or less active areas, or consistently generating cutting-edge research, or publication types that are more highly cited (e.g., review papers, meta-analyses).

Consistent with previous research (Abramo, D'Angelo, & Solazzi, 2011), percentage of outputs with an international collaborator also uniquely predicted h-index (with non-significant trends also present for lifetime outputs and citations). This relationship could be because these academics are better at developing productive collaborations, because international collaborators are attracted to them due to an already outstanding track record, or because these articles reach a wider audience due to outputs gaining attention and citations from a wider range of researchers due to individual members of the authorship team being well known in the field in their own region/country. The results of the current study also indicate that the SciVal metric, Citations per output, predicts lifetime h-index. This suggests international collaboration and Citations per Output are two SciVal metrics measured over the short term that may predict future research productivity; however, a longitudinal investigation would be necessary to determine such a causal link.

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It should also be noted that some metrics did not positively predict lifetime outcomes. Proportion of journals in the top 10% by citations negatively predicted lifetime outputs and citations, and SciVal citations negatively predicted h-index. These relationships are likely to be a consequence of including some relatively early career academics with few publications in the analysis. One may more easily achieve a very high proportion of outputs in the top 10% when one has only a couple of outputs, and they have attracted a relatively high number of citations over the short term, even though lifetime outputs and citations are relatively low. When the analyses were conducted including only more senior researchers, these negative relationships disappeared.

Additionally, FWCI and percentage of journals in the top 10% by journal ranking did not uniquely predict lifetime outputs, citations, or h-index. This suggests that publishing a high proportion of outputs in journals that tend to be highly cited on average is not a guarantee that the individual outputs will be highly cited leading to the researcher accruing a large number of citations. This is, again, consistent with the findings of Haslam and Laham (2010), who also reported that quantity of outputs was more indicative of number of citations accrued by an academic than quality of outputs. Future research may investigate whether a narrower band of highly ranked journals (e.g., top 5% or top 1%) carry more signal in predicting citations or h-index.

Finding that FWCI did not relate to lifetime metrics, and did not differentiate between university networks or career stage, may also be an indication that the metric itself is not so informative. The formula for its calculation is also opaque as the field the outputs are compared against and how the age of the outputs are measured are not made clear. Despite its intent, FWCI may not be a useful metric for the purposes of identifying impactful researchers.

While this study provides a wider range of norms for Australian academics, limitations of SciVal and the current approach should be recognised. Scopus creates records of new outputs and links them to authors autonomously. This means it is unlikely to capture all academics' outputs accurately, especially when an academic has not corrected errors in their Scopus record. Though attempts were made to capture a true representation of each academic's work (e.g., by merging Scopus records and searching for anomalies in outlying cases), it is possible that records containing errors were included in this study. Scopus also tracks citations from a narrower set of sources than other databases so citation based metrics reported may underestimate impact (Haslam et al., 2017).

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Some of the metrics tracked are also likely to underestimate actual activity. For example, the metric tracking corporate collaborations only includes publications with both academic and corporate author affiliations. Work conducted in consultation with industry, but eventually published with only university affiliated authors would not be counted. Results should also be interpreted and used with consideration of the broader context of the academic's outputs. The collated data provide no insight into the contribution of the academic to each output (e.g., whether the majority are first author works). The career stage time windows selected based on year of first output is an approximation only (based on averages) and may not be applicable for academics who take non-standard paths to or through their research career (e.g., those with research activity prior to doctoral studies, part time work or study, or career interruptions). The averages reported represent a snapshot in time and these metrics can also fluctuate substantially over time (e.g., when one highly cited output falls out of the window of analysis).

Metrics are also averaged across academics working fulltime and part time with teaching focused, balanced, and research only positions. When considering an individual's research performance against norms, this context must be considered. Overall, our data demonstrate that time is a key factor in accruing outputs and citations. Higher performance should be expected of academics who have had more time to produce outputs (i.e., through periods of research focussed employment) and accrue citations (i.e. through longer periods of time since first output). SciVal metrics also overlook alternative but important types of impact and engagement (e.g., attention in the popular media and influence on policy or practice). Other indices like h-Fa (first author h-index; Butson & Yu, 2010) and m-value (h-index divided by years since first publication; Hirsch, 2005) or other alternative metrics like altmetrics (www.altmetric.com) may provide useful insights here.

In conclusion, the current study provides normative data including new metrics now available for researchers to track the quantity, quality, and impact of their outputs. Norms are based on a cross section of Australian academics and are presented by academic level, career stage, and university network. This study also indicates which SciVal metrics (measured over the short term) are unique predictors of lifetime metrics. Results must be interpreted taking into account limitations of the database and the academic's broader context. These data can provide information for

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academics as well as promotions and granting panels to evaluate research performance against up-to-date averages across a range of metrics for psychology academics in Australia.

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Table 1. *Estimated number of men and women, and median year of first publication (Scopus) for Australian psychology academics at each academic level and university network.*

	Go8			ATN			IRN			RUN			UU			Total		
	M	F	Year	M	F	Year	M	F	Year	M	F	Year	M	F	Year	M	F	Year
A																12	44	2014 (4.35)
B	12	33	2011 (6.09)	6	10	2013 (6.17)	17	30	2011 (4.57)	12	23	2012 (8.89)	35	79	2013 (5.92)	82	175	2012 (6.18)

C	23	30	2004 (7.27)	4	8	2001 (8.74)	15	21	2005 (8.93)	9	17	2007 (7.28)	20	53	2006 (6.01)	71	129	2005 (7.42)
D	21	27	2001 (4.78)	2	2	2002 (4.65)	6	8	2001 (9.22)	3	6	1998 (10.46)	20	26	2000 (6.08)	52	69	2001 (6.39)
E	31	23	1992 (7.41)	2	1	1989 (5.13)	7	7	1989 (11.87)	6	4	1995 (9.76)	21	13	1994 (7.42)	67	48	1992 (8.27)
Total	97	130	2003 (10.04)	14	26	2007 (9.74)	45	75	2007 (10.52)	31	50	2008 (10.26)	97	184	2008 (8.80)	284	465	2006 (9.79)

Note. Academics at level A are not presented broken down by university network due to insufficient numbers at some networks.

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Table 2. *Medians and standard deviations of Total outputs in 4 years (Outputs), Citations in 4 years, FWCI, and Citations per output (Cites/Output), from SciVal between 2016 and 2019 from SciVal presented by academic level and university network.*

	Go8			ATN			IRN			RUN			UU			Total		
	n	*Med*	*SD*	*n*	*Med*	*SD*	*n*	*Med*	*SD*	*N*	*Med*	*SD*	*n*	*Med*	*SD*	*n*	*Med*	*SD*
Level A																		
Outputs																48	5.00	6.22
Citations																	28.00	51.85
FWCI																	1.13	0.97
Cites/Output																	4.80	3.40
Level B																		
Outputs	42	9.00	12.00	11	4.00	5.03	37	4.00	6.25	25	4.00	3.60	91	6.00	8.15	206	5.50	8.528
Citations		32.00	1629.38		17.00	15.11		11.00	34.62		11.00	13.28		18.00	56.42		17.50	739.38
FWCI		1.18	8.99		0.99	0.76		0.89	0.78		0.98	1.24		0.86	1.15		0.98	4.17
Cites/Output		3.25	35.15		2.60	1.77		3.90	2.87		2.40	2.51		3.20	4.07		3.15	16.22
Level C																		
Outputs	52	13.00	10.39	10	10.50	8.11	34	12.50	11.62	22	8.50	9.01	67	10.00	16.28	185	11.00	12.78
Citations		52.50	78.22		33.00	52.89		43.00	79.54		34.00	60.09		40.00	157.74		44.00	112.22
FWCI		1.08	0.66		0.98	0.52		1.03	1.00		1.10	0.84		1.12	1.06		1.08	0.90
Cites/Output		3.70	2.80		4.20	2.37		3.95	4.85		3.65	2.80		5.00	3.79		4.20	3.59
Level D																		
Outputs	47	22.00	15.06	4	18.50	12.31	14	10.00	10.15	9	20.00	9.14	45	17.00	17.31	119	20.00	15.44
Citations		110.00	126.93		77.50	115.74		36.00	153.16		105.00	79.22		107.00	819.18		99.00	514.72
FWCI		1.23	0.64		0.93	0.94		1.13	1.05		1.26	1.31		1.40	5.93		1.26	3.71
Cites/Output		4.90	2.71		4.05	3.25		3.75	4.16		6.60	3.07		5.50	18.25		4.90	11.52
Level E																		
Outputs	54	36.50	29.04	3	22.00	15.57	13	26.00	14.81	9	14.00	10.62	34	33.00	21.58	113	32.00	25.10
Citations		202.00	308.31		121.00	729.77		143.00	75.97		67.00	79.48		200.50	206.96		172.00	274.76
FWCI		1.39	0.66		1.54	14.94		1.56	1.08		0.87	0.48		1.33	0.89		1.33	2.53
Cites/Output		6.00	2.75		7.00	32.74		4.40	3.10		3.00	2.39		4.70	3.86		5.00	6.10
Total																		
Outputs	222	16.00	21.33	33	9.00	9.73	104	9.00	12.00	66	6.50	9.01	246	10.00	17.62	671	11.00	17.81
Citations		78.00	730.03		32.00	234.10		35.00	86.02		21.50	61.66		40.00	378.31		45.00	484.75
FWCI		1.23	3.96		1.12	4.56		1.04	0.94		1.02	1.04		1.16	2.73		1.16	3.02
Cites/Output		4.60	15.49		4.30	10.29		4.05	3.83		2.95	2.74		4.45	8.63		4.30	10.72

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Note. Academics at level A are not presented broken down by university network due to insufficient numbers affiliated with some networks.

Table 3. *Medians and standard deviations for Percentage of outputs in the top 10% by citations (Top citations), Percentage of outputs in top 10% ranked journals (Top journals), Percentage of outputs with an international collaborator (International), and Percentage of outputs with a corporate collaborator (Corporate) between 2016 and 2019 from SciVal presented by academic level and university network.*

	Go8			ATN			IRN			RUN			UU			Total		
	n	*Med*	*SD*	*n*	*Med*	*SD*	*n*	*Med*	*SD*	*N*	*Med*	*SD*	*n*	*Med*	*SD*	*n*	*Med*	*SD*
Level A																		
Top Citations																48	19.40	25.85
Top Journals																	34.85	27.18
International																	26.50	30.02
Corporate																	0.00	3.61
Level B																		
Top Citations	42	12.15	16.43	11	0.00	17.45	37	0.00	14.36	25	0.00	24.24	91	9.10	23.10	206	7.30	20.47
Top Journals		40.00	28.42		9.10	30.08		25.00	31.55		33.30	32.05		25.00	26.26		27.30	28.93
International		44.95	25.44		33.30	26.59		14.80	33.44		0.00	28.22		20.00	28.87		21.05	29.39
Corporate		0.00	5.82		0.00	0.00		0.00	0.00		0.00	0.00		0.00	2.10		0.00	2.98
Level C																		
Top Citations	52	12.15	12.01	10	13.80	14.66	34	11.80	24.17	22	9.15	17.59	67	12.50	15.18	185	11.80	16.61
Top Journals		31.65	25.57		28.25	18.11		30.10	24.45		25.00	16.06		31.60	25.40		29.40	23.93
International		32.85	28.39		24.30	17.85		34.30	28.68		13.85	31.36		27.30	30.08		28.60	29.07
Corporate		0.00	5.07		0.00	1.52		0.00	0.00		0.00	0.00		0.00	5.10		0.00	4.11
Level D																		
Top Citations	47	16.00	11.83	4	15.45	13.40	14	11.80	14.99	9	10.00	10.20	45	21.70	15.42	119	17.90	13.63
Top Journals		39.50	15.90		34.40	27.33		36.65	19.81		27.80	18.55		40.00	21.24		39.10	19.32
International		40.00	19.96		33.80	21.34		35.70	20.02		12.00	27.73		32.30	25.19		36.40	22.72
Corporate		0.00	1.02		0.00	0.00		0.00	0.00		0.00	0.00		0.00	6.24		0.00	3.90
Level E																		
Top Citations	54	20.90	10.29	3	22.20	20.33	13	14.70	15.42	9	8.30	11.96	34	14.60	12.26	113	16.70	12.01
Top Journals		39.85	14.21		44.40	0.70		31.00	17.89		20.00	16.94		30.65	16.13		36.60	16.40
International		37.50	21.71		59.10	15.15		24.30	19.79		19.20	28.16		25.00	27.47		32.80	24.02
Corporate		0.00	2.38		0.00	10.51		0.00	0.64		0.00	0.00		0.00	1.77		0.00	2.55
Total																		
Top Citations	222	16.70	14.68	33	9.10	16.27	104	10.15	21.12	66	7.55	18.74	246	14.30	18.47	671	13.30	17.70
Top Journals		39.10	21.52		27.30	26.73		29.00	26.97		25.00	23.94		30.45	23.86		33.30	24.08

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International	38.15	24.80	33.30	22.20	25.00	29.61	10.15	28.74	25.00	28.19	28.60	27.46
Corporate	0.00	4.07	0.00	3.25	0.00	0.23	0.00	0.00	0.00	4.04	0.00	3.47

Note. Academics at level A are not broken down by university network due to insufficient numbers at some networks.

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Table 4. *Central tendency and variance statistics for Lifetime outputs, citations, and h-index from Scopus presented by career stage.*

Career Stage	*n*	*M*	*SD*	Percentiles				
Lifetime Outputs				10	25	50	75	90
ECR	136	10.28	9.76	2	4	8	13	24
E-MCR	149	26.74	24.80	5	8	20	37	60
L-MCR	124	40.36	30.68	9	16	35	59	91
Total	409	25.40	26.14	4	7	17	37	60
Lifetime Citations								
ECR	136	81.94	117.81	5	15	45	92	190
E-MCR	149	464.43	1019.06	31	72	226	523	996
L-MCR	124	813.40	862.22	67	197	490	1194	1896
Total	409	443.05	831.11	15	47	155	500	1251
Lifetime H-index								
ECR	136	3.88	2.74	1	2	3	5	7
E-MCR	149	8.91	5.83	3	4	8	12	18
L-MCR	124	12.98	7.33	4	7	12	18	23
Total	409	8.47	6.653	2	3	7	12	19

Note. ECR=early career researchers (approx. 0-5 years post PhD), E-MCR=early stage mid-career researchers (approx. 6-10 years post PhD), L-MRC=late stage mid-career researchers (approx. 11-15 years post PhD).

Table 5. *Central tendency and variance statistics for Outputs, FWCI, Citations, Citations per output, Percentage of outputs in top 10% by citations or journal rank, and Percentage of outputs with an international or corporate collaboration from SciVal between 2016 and 2019 presented by career stage*

Career Stage	*N*	*M*	*SD*	Percentiles				
SciVal Outputs (4 Years)				10	25	50	75	90
ECR	126	8.50	8.30	2	3	6	10	19
E-MCR	134	16.67	15.59	2	5	12	23	40
L-MCR	116	17.53	14.56	2	6	14	27	36
Total	376	14.20	13.81	2	4	1	20	33
SciVal Citations (4 Years)								
ECR	126	45.96	68.75	3	9	22	52	116
E-MCR	134	185.78	918.26	3	19	60	127	321
L-MCR	116	106.11	116.37	7	18	55	160	295
Total	376	114.35	555.16	4	13	40	111	248
FWCI								
ECR	126	1.26	0.95	0.28	0.63	0.95	1.89	2.44
E-MCR	134	1.87	5.10	0.48	0.89	1.28	1.75	2.48
L-MCR	116	1.41	0.77	0.57	0.86	1.21	1.76	2.43
Total	376	1.52	3.12	0.39	0.76	1.19	1.82	2.43
Citation per Output								
ECR	126	4.63	3.59	1	2	3	6	10
E-MCR	134	7.18	19.87	1	3	5	7	11
L-MCR	116	5.56	3.76	2	3	5	7	11
Total	376	5.83	12.24	1	3	4	7	10
Percentage of Outputs in Top 10% by Citations								
ECR	126	15.15	19.54	0	0	7	28	45
E-MCR	134	18.75	15.72	0	3	19	29	42
L-MCR	116	18.66	18.60	0	1	16	29	40
Total	376	17.51	17.99	0	0	14	29	42
Percentage of Outputs in Top 10% by Journal Rank								
ECR	126	36.78	26.92	0	17	33	55	75
E-MCR	134	37.40	24.08	0	20	36	55	66
L-MCR	116	35.16	24.04	0	20	33	50	64
Total	376	35.81	25.25	0	17	33	52	67
Percentage of Outputs with an International Collaboration								
ECR	126	25.74	26.93	0	0	20	43	70
E-MCR	134	35.03	27.39	0	13	32	54	74
L-MCR	116	37.71	27.80	0	17	33	58	77
Total	376	32.74	27.76	0.00	6	29	50	75
Percentage of Outputs with a Corporate Collaboration								
ECR	126	0.20	2.23	0	0	0	0	0
E-MCR	134	0.84	4.48	0	0	0	0	0
L-MCR	116	0.16	1.08	0	0	0	0	0
Total	376	0.42	3.04	0	0	0	0	0

Note. ECR=early career researchers (approx. 0-5 years post PhD), E-MCR=early stage mid-career researchers (approx. 6-10 years post PhD), L-MRC=late stage mid-career researchers (approx. 11-15 years post PhD).

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Table 6. *Results of robust regression analysis predicting Lifetime outputs, Lifetime citations, and Lifetime H-index from SciVal metrics*

Lifetime Outputs	Unstandardized				
Predictors	*B*	Std. error	*t*	*p* value	95% CI
Career Length	1.41	0.05	26.81	<.001	[1.31,1.52]
SciVal Outputs	1.73	0.04	41.79	<.001	[1.65,1.81]
SciVal Citations	0.01	0.00	2.68	.008	[0.00,0.02]
FWCI	0.72	0.56	1.29	.199	[-0.38,1.82]
Cites/Output	0.23	0.25	0.96	.340	[-0.25,0.72]
Top Citations	-0.08	0.04	-1.98	.048	[-0.15,-0.00]
Top Journals	0.01	0.02	0.36	.716	[-0.04,0.05]
International	0.04	0.02	1.92	.055	[0.00,0.07]
Corporate	-0.43	0.18	-2.40	.017	[-0.78,-0.08]

Lifetime Outputs	Unstandardized				
Predictors	*B*	Std. error	*t*	*p* value	95% CI
Career Length	33.52	1.67	20.08	<.001	[30.24,36.8]
SciVal Outputs	5.14	1.31	3.92	<.001	[2.57,7.71]
SciVal Citations	3.97	0.15	27.21	<.001	[3.69,4.26]
FWCI	14.59	17.72	0.82	.411	[-20.21,49.39]
Cites/Output	-8.21	7.79	-1.05	.293	[-23.51,7.1]
Top Citations	-2.80	1.24	-2.27	.024	[-5.23,-0.38]
Top Journals	0.76	0.70	1.09	.278	[-0.62,2.15]
International	1.08	0.58	1.86	.063	[-0.06,2.21]
Corporate	-5.42	5.63	-0.96	.337	[-16.49,5.65]

Lifetime Outputs	Unstandardized				
Predictors	*B*	Std. error	*t*	*p* value	95% CI
Career Length	0.54	0.02	26.28	<.001	[0.50,0.58]
SciVal Outputs	0.39	0.02	24.17	<.001	[0.36,0.42]
SciVal Citations	-0.01	0.00	-3.94	<.001	[-0.01,0.00]
FWCI	-0.15	0.22	-0.70	0.483	[-0.58,0.28]
Cites/Output	0.41	0.10	4.28	<.001	[0.22,0.60]
Top Citations	0.02	0.02	1.05	0.296	[-0.01,0.05]
Top Journals	0.01	0.01	1.11	0.269	[-0.01,0.03]
International	0.03	0.01	4.09	<.001	[0.02,0.04]
Corporate	-0.02	0.07	-0.33	0.739	[-0.16,0.11]

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