Research Metrics: Responsible Use & Impact

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HSICT Professional Practices Subcommittee Research Cafe
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Material in support of a verbal presentation, not intended as a stand-alone document: July 2018

Problems with h-index

Pros
• Balance of quality & quantity of research output
• More accurate than total # papers or # citations
  • #papers – quality?
  • #citations – skewed?

Cons
• Order of authors?
• Status of journals?
• Self-citations can inflate
• Retracted articles still get citations
• Excludes non-article outputs

(data as of April 20, 2018)

<table>
<thead>
<tr>
<th></th>
<th>Web of Science</th>
<th>Scopus</th>
<th>Google Scholar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheryl Regehr</td>
<td>21</td>
<td>27</td>
<td>33</td>
</tr>
</tbody>
</table>

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Problems with JIF

• Often used as a surrogate measure for quality of article, researcher, etc. (It only evaluates journals in conjunction with other criteria)
• Discipline-specific
• Can be gamed
• Data not transparent nor available to public
• Includes retracted articles
• Mostly English language journals
• Not all journals indexed by Web of Science
• Linked to higher APCs
• Not a predictive measure
• Mean not a median; Distribution of citations are skewed
Journal Impact Factor Calculation

\[
\text{Journal Impact Factor} = \frac{53103}{670} = 79.258
\]

How is Journal Impact Factor Calculated?

\[
\text{JIF} = \frac{\text{Citations in 2017 to items published in 2015 (32543) + 2016 (20560)}}{\text{Number of citable items in 2015 (342) + 2016 (328)}} = \frac{53103}{670}
\]

Citation distribution of items cited in 2017

Legend:
- Article
- Review
- Other
- Review citation median
- Article citation median

1679 Unlinked citations

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It has come to the attention of the editorial and management team for the *Journal Citation Reports* that there has been a problematic pattern of citations amongst the journals *Nanoscience and Nanotechnology Letters*, *Journal of Biobased Materials and Bioenergy*, *Journal of Biomedical Nanotechnology* and *Journal of Nanoscience and Nanotechnology* (all published by American Scientific Publishers), and including a particular concentration of citations to the journal *Bone Research* (published by SpringerNature, in partnership with the West China School of Stomatolgy, Sichuan University, and the International Chinese Musculoskeletal Research Society).

The possibility of manipulation of citation metrics is a serious matter, and Clarivate Analytics remains the only bibliometrics provider to monitor, survey and curate our data to identify anomalies that lead to distorted rankings.

We have initiated a process of investigation of the journals named above, along with affiliated publications. When we have completed a thorough review, we will take any appropriate action; this may result in one or more journals being removed from the JCR, with a possible further action of removal from indexing in *Web of Science*.

Because these citations have affected the published metrics for several journals, Clarivate Analytics is publishing this Editorial Expression of Concern to alert our users to this information.
Advantages of JIF

• Discount at Lancet Restaurant in Beijing, China

Under the rules of the restaurant, scientists, medical professionals and social scientists are eligible for a discount if they have recently published papers in journals that are included on internet databases such as the Science Citation Index and the Social Sciences Citation Index. The paper's impact factor is multiplied by 10 to determine the discount, which can account for as much as 30 percent of the bill.

Your (real) Impact Factor

\[
\text{Impact Factor (corrected)} = \frac{\# \text{ times your work is cited} - \# \text{ citations that actually trash your work}}{\# \text{ times you cited yourself (nice try)}} - \# \text{ times you were cited just to pad the introduction section} - \# \text{ citations the editor pressured the author to include to increase the journal's impact factor} + \# \text{ original articles you've written} + \# \text{ articles you were included in out of pity or politics} + \# \text{ not-so-original articles you've written copied and pasted}
\]

Jorge Cham © 2008

WWW.PHDCOMICS.COM
<table>
<thead>
<tr>
<th>Field</th>
<th>Criteria</th>
<th>Outcome</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomedicine</td>
<td>Image duplications</td>
<td>Higher ranking journals show a lower incidence of image duplications</td>
<td>Bik et al. (2016)</td>
</tr>
<tr>
<td>Crystallography</td>
<td>Quality of computer models</td>
<td>Five high-ranking journals significantly below average quality</td>
<td>Brown and Ramaswamy (2007)</td>
</tr>
<tr>
<td>Molecular psychiatry</td>
<td>Sample sizes and effect sizes</td>
<td>Higher ranking journals overestimated effect sizes with smaller sample sizes</td>
<td>Munafò et al. (2009)</td>
</tr>
<tr>
<td>Neuroscience, psychology</td>
<td>Statistical power</td>
<td>Either no correlation of journal rank with statistical power or a negative correlation</td>
<td>Brembs et al. (2013)</td>
</tr>
<tr>
<td>Genomics, cognitive neuroscience and psychology and medicine</td>
<td>Gene name and p-value errors</td>
<td>More errors in higher ranking journals</td>
<td>Ziemann et al. (2016)</td>
</tr>
<tr>
<td>Medicine</td>
<td>Criteria for evidence-based medicine</td>
<td>Two studies found that higher-ranking journals met more criteria, while two failed to detect such an effect</td>
<td>Obrenskaya et al. (2005) and Lau and Samman (2007)</td>
</tr>
<tr>
<td>Psychology</td>
<td>Three reliability metrics: P-Curve, TIVA and R-index</td>
<td>All three metrics indicate that the higher ranking of two journals publishes less reliable work</td>
<td>Bittner and Schönbrodt (2017)</td>
</tr>
<tr>
<td>Biomedicine</td>
<td>Reproducibility of experiments</td>
<td>Reproducibility is low, not even “top” journals stand out</td>
<td>Scott et al. (2008), Prinz et al. (2011) and Begley and Ellis (2012)</td>
</tr>
</tbody>
</table>

Applying criteria such as peer-review, methodology and spread of journal rank covered, the studies cited in the top six rows would be considered as better supported than the bottom three rows.

51% of respondents said that they have changed their behaviour because of the way they are evaluated.

“It discourages me from doing important research work that may be of null association.”

“I am more likely to accept an article for review if I want to verify that it is citing a paper of mine that is near the cusp of being counted for my h-factor.”

71% of respondents said that they are concerned their colleagues can ‘game’ or ‘cheat’ the systems for evaluation in their institutions.

“These metrics can be skewed by people if they know that their performance will be evaluated on metrics alone.”

“A great deal of politics are involved and a focus on numbers over quality with regard to publications.”

Responsible use of metrics

• San Francisco Declaration on Research Assessment: DORA (2012)
  https://sfdora.org/

• Leiden Manifesto (2015)
  http://www.leidenmanifesto.org/

• Metric Tide (2015)
  https://responsiblemetrics.org/the-metric-tide/
Responsible metrics guidelines

• Quantitative evaluation should support & not replace qualitative, expert assessment
• Keep data collection and analytical processes open and transparent, so those being evaluated can test and verify the results
• One size does not fit all: different fields/disciplines have different publication & citation practices
• Inappropriate indicators create perverse incentives
• Encourage responsible authorship practices & provision of information about specific contributions of each author.
• Cite primary literature in favour of reviews in order to give credit to author(s) who first reported a finding.
• Value all research outputs: articles, data, policy, code, etc.
• Suite of indicators is preferred – reduces gaming
Caution about JIF from the JCR

Using the Journal Impact Factor wisely

Clarivate Analytics does not depend on the Journal Impact Factor alone in assessing the usefulness of a journal, and neither should anyone else. The Journal Impact Factor should not be used without careful attention to the many phenomena that influence citation rates, as for example the average number of references cited in the average article. The Journal Impact Factor should be used with informed peer review. In the case of academic evaluation for tenure it is sometimes inappropriate to use the impact of the source journal to estimate the expected frequency of a recently published article. Again, the Journal Impact Factor should be used with informed peer review. Citation frequencies for individual articles are quite varied.

Source: https://clarivate.com/products/journal-citation-reports/

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Research impact

• Eye of the beholder
• Impact stories
• Quantitative & qualitative
• Context, background, caveats
• Academic, societal, economic
• Time delay

Source: https://pixabay.com/en/drop-of-water-water-drip-close-up-2135792/
Research Impact – steps for researchers

• Common use of name
• Author identifier (e.g. ORCID)
• Research outputs
• Distribution (Figshare, F1000, OSF, Slideshare, etc.)
• Collaboration
• Tell your own story:
  • Becker Model
  • Impactstory
THE MODEL FOR ASSESSMENT OF RESEARCH IMPACT IS A FRAMEWORK FOR TRACKING DIFFUSION OF RESEARCH OUTPUTS AND ACTIVITIES TO LOCATE INDICATORS THAT DEMONSTRATE EVIDENCE OF BIOMEDICAL RESEARCH IMPACT.

https://becker.wustl.edu/impact-assessment

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Figure 4: RCUK ‘Pathways to Impact’ typology diagram\textsuperscript{336}
Research impact - Impactstory

Ethan White
University of Florida Associate Professor

https://profiles.impactstory.org/u/0000-0001-6728-7745

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Research assessment & impact – 2 main takeaways

• Quantitative evaluation should support & not replace qualitative, expert assessment

• Researchers can use Becker Model as checklist/framework to tell their own research impact story
Thank-you & questions