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## From Impact Factors to Altmetrics: What numbers are important in publishing your paper?

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The volume of published research articles has increased exponentially over the past number of years, especially since many journals have transitioned to online open (free) access journal articles only. For this reason, it is important that academics, clinicians and researchers can quantify the impact and quality of the articles they are reading and publishing.<sup>1</sup> It can become challenging to keep up to date with all of the terminology used to capture article and journal metrics. In this editorial we will present an overview of traditional metrics and newer, alternative metrics (Altmetrics) of article success and impact.

### How to quantify the impact of research articles

One metric commonly used is **Journal Impact Factor** (JIF). The JIF is calculated by [Clarivate Analytics](#), a company that uses intelligence to provide data to make informed decisions and planning. The formula to calculate JIF is total number of citations received by the journal in that year to articles published over the previous two years, divided by the total number of citable items published by the journal in that two year period. The JIF score is a measure of journal impact, however it has also traditionally been considered to be the most accurate measure of an author's impact and influence. Having high-impact factor publications has been an integral component of securing academic tenure positions and promotions as well as research funding grants.<sup>1</sup> There are advantages and disadvantages to using JIF.

Advantages include simplicity in calculating JIF and that it is widely used across the world so many researchers and funding agencies are familiar with this metric. There are limitations to be aware of with JIF, one of which is that not all journals are included with many non-English language journals being excluded, as well as the inclusion of self-citations.<sup>2</sup> Despite these limitations, JIF is still considered to be an important metric used by researchers when deciding where to publish. Many researchers will want to publish their work in the journal with the highest JIF in their field. However, having a manuscript accepted in such a journal is influenced by many factors, including the quality of the manuscript, the reviewers' comments and ultimately the editors' decision.

**CiteScore** is another metric used by academics and researchers and this is a measure of the citation impact of an article. CiteScore is based on the number of citations received over a 3-year period and is calculated by *Scopus*, a citation database. For many academic researchers, the CiteScore of a journal is important because it provides a transparent way of assessing the quality and impact of journals. Editors of journals usually observe the CiteScore of their journal annually to demonstrate the performance and quality of their journal. The standardised formula of the CiteScore is accepted world-wide and can be a transparent benchmarking tool. Editors of journals can use this score to make strategic decisions to increase the quality and impact of their journal. Also, universities, academic institutions and research funding agencies are increasingly using the CiteScore as a quality indicator for individual researchers. In some countries and institutions, these metrics can

make or break your career when progressing on the academic ladder. However, this does not affect everyone because the requirements and assessment of academic progression varies between country and institution. Thus, check out you local requirements of how and what metrics are important if you are progressing in a clinical academic career.

One other traditional journal metric is the **H-index**. H-index is the most widely used measure of an author's level of productivity and impact, based on the number of publications and citations they have.<sup>3-4</sup> H-index is therefore considered by many to be a measure of quantity and quality. One point to consider with H-index that has been highlighted is the challenge in comparing researchers during different stages of their careers. It has been suggested that there is a correlation between the age of a researcher and their H-index.<sup>5</sup> Some researchers have suggested that early career researchers are at a disadvantage when it comes to H-index. Senior or late stage career researchers will often have a higher H-index than early-mid career researchers simply due to the fact that they have had more time to publish.<sup>6</sup>

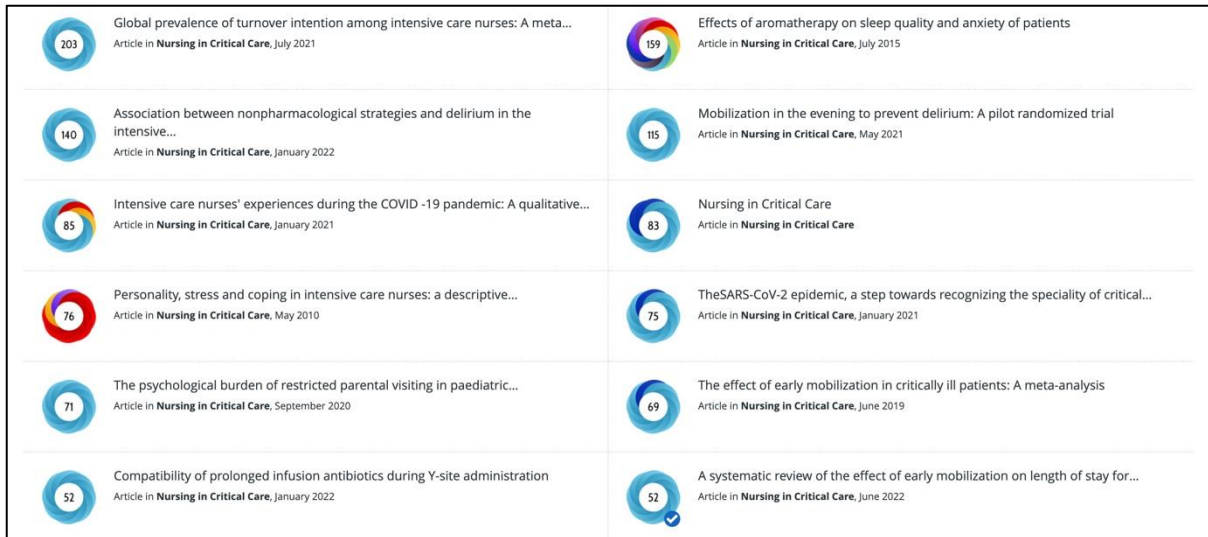
### **What are Altmetrics and how are they measured?**

Altmetrics, also known as alternative metrics, are often used to measure impact of research articles and outputs. They are usually used as an adjunct to traditional journal metrics (JIF, CiteScore, H-index). In today's data driven world, social media has become a platform to disseminate research to the wider scientific community.<sup>7</sup> Twitter and LinkedIn are probably the most used social media platforms to share research findings, and some researchers have demonstrated that there is a correlation between the number of tweets an article has and the number of article citations.<sup>8</sup>

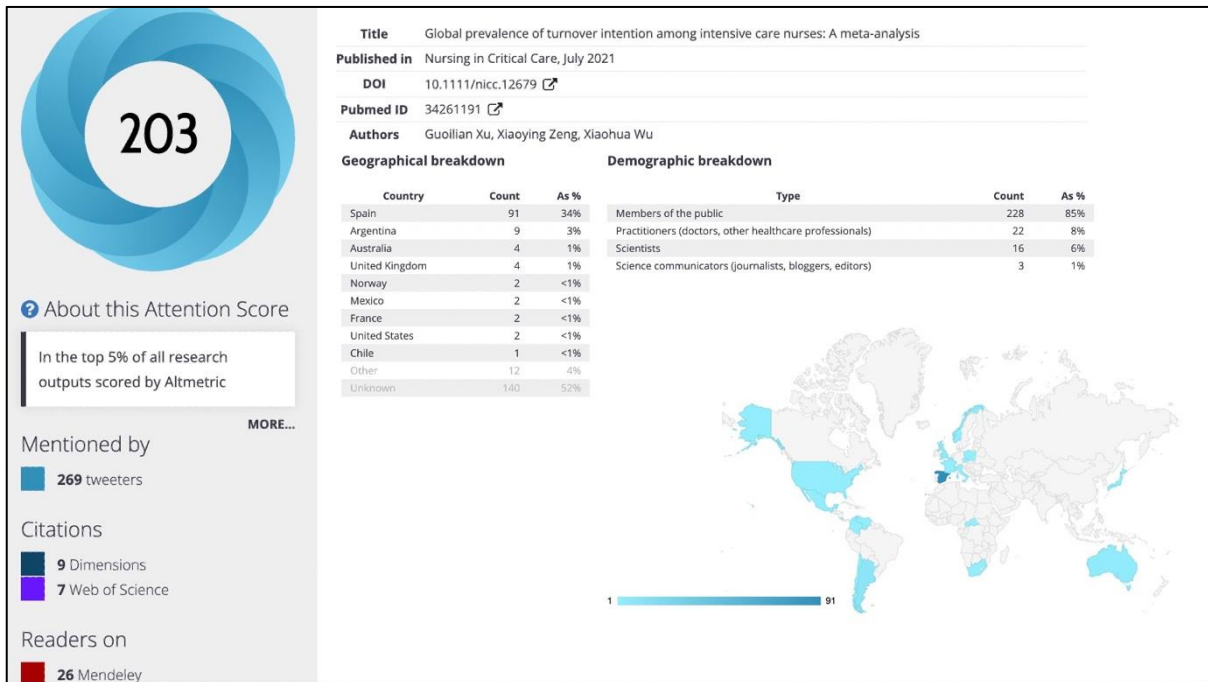
Public engagement with research has traditionally been difficult to measure. However, with Altmetrics, this has become easier to determine. Altmetric allow us to quantify public engagement with research outputs.<sup>9</sup> This is important to capture, because typically the general public will not be citing your work, but they may be engaging with research articles online in another way through blog posts etc. Altmetrics compile data from thousands of online sources including social media (Twitter, Facebook, etc), traditional mainstream media (online newspaper articles), blogs and online reference managers.

### *Altmetric Attention Score*

The most commonly used platform to capture alternative metrics is [Altmetric.com](https://www.altmetric.com). The Altmetric measures the impact of research outputs through Altmetric Attention Score (AAS). Like traditional metrics, the higher the number, the better. In figure 1, we present the articles with the highest AAS score published in *Nursing in Critical Care*. As can be seen, each article is accompanied by a donut shaped badge comprised of by different colours. Each colour signifies a different source of attention; specifically, Twitter and LinkedIn are blue, Blogs are yellow, News outlets are red, Facebook is dark-blue, Pinterest is amber, Google+ is light purple, policy documents as dark purple, etc. When an Altmetric badge is clicked, this allows you to see who is talking about your research, where they are in the world, and what they are saying. The article with the highest AAS published in *Nursing in Critical Care* journal can be seen in figure 2.<sup>10</sup> As illustrated in figure 2, the source of online attention, and geographical location can be easily visualised.



**Figure 1: List of the Highest Altmetric Attention Score papers published in Nursing in Critical Care**



**Figure 2: Nursing in Critical Care Journal Highest Altmetric Attention Score Paper with breakdown**

### How can I increase my Altmetric Attention Score?

There are a number of tips to increase your Altmetric Attention Score.

- Summarise your work in lay terms. This will allow you to share your work in a way that can be understood by academics, researchers, and clinicians and also the wider public.
- Share links to your research on social media platforms including Twitter, LinkedIn, and Facebook. Sharing links to your work at events such as conferences can maximise reach by using trending hashtags and tagging others. You might also consider sharing QR codes to your full text articles to increase exposure.

- Set up an ORCID ID or ResearchGate or any other academic profile/account so that your outputs are discoverable to others.

### **Why should we pay attention to Altmetrics?**

Altmetrics are becoming increasingly recognised as a reliable indicator of article reach and success. Many funding agencies are now looking at Altmetrics to provide additional information about a research article. Universities are also now including Altmetrics in data repositories. It has been demonstrated in other areas of healthcare, that Altmetric scores directly correlate with article citations. This suggests that the Altmetric score and conventional bibliometrics can be treated as complementary metrics.<sup>11</sup>

To conclude, Altmetrics are a useful tool that can be used to measure the impact of research outputs. Altmetrics are not designed to replace traditional journal metrics and they should be used to complement traditional journal metrics. Traditional journal metrics have been subject to criticism for several reasons. Nonetheless, they influence where researchers publish and where students are encouraged to submit to. Many PhD students, for example, are encouraged to “shoot for the stars” or “aim high” and generally speaking, this advice tends to refer to the submission of articles to journals with high-ranking metrics, particularly JIF. However, there is no single traditional metric that can accurately measure the impact of research outputs.<sup>12</sup>

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