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Career development tips for today's nursing academic:
bibliometrics, altmetrics and social media

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Conflict of Interest

No conflict of interest was declared by the authors in relation to the study itself. Note that Roger Watson is Editor-in-Chief of *JAN* but, in line with usual practice, this paper was subjected to double blind peer review and was edited by another editor.

ABSTRACT

Aims: A discussion of bibliometrics, altmetrics and social media for the contemporary nursing scholar and academic researcher.

Background: Today's nursing academic faces a myriad of challenges in balancing their daily life, and in recent years, academic survival has been increasingly challenged by the various research assessment exercises that evaluate the performance of knowledge institutions. As such, it is essential that today's nursing academic keep up to date with the core competencies needed for survival in a modern research career, particularly the intersecting triad of bibliometrics, altmetrics and social media.

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Design: Discussion paper.

Data Sources: Published literature and relevant websites.

Implications for Nursing: The rise of social media and altmetrics have important implications for contemporary nursing scholars who publish their research. Some fundamental questions when choosing a journal might be: does it have a Twitter and/or Facebook site, or a blog (or all three); and does it have any other presence on social media such as LinkedIn, Wikipedia, YouTube, ResearchGate and so on?

Another consequence of embracing social media is that individual academics should also develop their own strategies for promoting and disseminating their work as widely as possible.

Conclusion: The rising importance of social media and altmetrics can no longer be ignored and today's nursing academic now has another facet to consider in their scholarly activities. Despite the changing nature of research dissemination however, it is still important to recognize the undoubted value of established knowledge dissemination routes (that being the peer-reviewed publication).

Keywords: nursing, publishing, bibliometrics, altmetrics, social media, impact factors, h-index, citations, core journals, research

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SUMMARY STATEMENT

Why is this research or review needed?

- Today's nursing academic faces a myriad of challenges, particularly clinician-researchers who are newly transitioning into academic roles.
- Modern academic survival has been increasingly challenged by the assessment exercises that now evaluate the performance of knowledge institutions.
- When publishing and disseminating research in the new millennium, an understanding of bibliometrics, altmetrics and social media is vitally important.

What are the key findings?

- The rising importance of alternative metrics (altmetrics) and social media has become increasingly apparent in the publishing arena.
- 'Traditional' publishing and academic metrics such as citation counts, h-indices and journal impact factors should not be forgotten.
- It is essential that today's nursing academic keep up to date with the core competencies needed for survival in a modern research career.

How should the findings be used to influence

policy/practice/research/education?

- The contemporary nursing academic must recognise the new challenge in building and maintaining their scholarly profile.
- When choosing a journal, nursing academics should now consider whether it displays altmetrics and is linked to social media platforms.
- Individual academics should also develop their own strategies for promoting and disseminating their work as widely as possible.

INTRODUCTION

Today's nursing academic faces a myriad of challenges in balancing their daily life, and these are particularly acute for clinician-researchers transitioning into academic roles, as well as early career researchers navigating their way through the 'cut and thrust' of modern university life. Engagement in research and scholarship have now become the key hallmarks of a quality academic leader, as well as being essential components for academic survival if one aims to profess a discipline (Watson & Thompson 2010). Research itself has also become embedded as one of the most important components of both undergraduate and postgraduate nursing curriculum in the new millennium (Smith & Hazelton 2008).

Background

In recent years, academic survival has been increasingly challenged by the various research assessment exercises that evaluate the performance of knowledge institutions. While few would disagree that research quality is important, considerable argument remains around how best the performance of these organisations should be monitored and compared (Molzahn & Clark 2015). Regardless of one's opinion on the matter, research assessment exercises are clearly here to stay and nursing researchers need to recognize how each evaluation cycle requires one to reframe and re-focus one's attention (Davidson 2015). Researchers have learned to change out of necessity, becoming more strategic in their daily work, and actively identifying priorities where success can be maximized (Clark & Thompson 2013). In this milieu, the quantification of research impact has remained one constant in the various assessment exercises which now examine and rank the work of contemporary scholars. As society continues to grapple with the concept of what research 'success' actually looks like (Thompson & Clark 2015), it is essential that today's nursing academic keep up to date with the core competencies needed for survival in a modern research career. When publishing and disseminating one's work in the new millennium, this includes the intersecting triad of bibliometrics, altmetrics and social media.

Data Sources

This discussion paper sourced all relevant published literature on the topic as well as appropriate websites.

DISCUSSION

Journal-Level Metrics

Bibliometric measures (particularly article counts and citations) have been around for many years and can usually be classified into two subcategories, depending on whether they examine performance at the journal or at the individual researcher level. Impact factors are probably the most well-known journal-level metric in contemporary academia, and although a much debated topic today, probably still influence where authors choose to submit their work, to some extent (Watson *et al.* 2013). The concept is not new, however; with journal impact factors being first introduced by Eugene Garfield in 1963 and becoming a regular feature of the *Science Citation Index* by the mid-1970s. The two-year citation collection 'window' was initially chosen by Garfield and colleagues after they found that many citations in a given year were to material that was only 2-3 years old. As the number of journals increased, calculating impact factors to three decimal places became necessary to prevent too many of

them receiving exactly the same score (Garfield 2006). Four decades later the impact factor debate continues in nursing, as elsewhere. Authors worry about where to publish their own research for the highest impact; while journal editors grapple with questions such as what they could and should be doing to improve their journal's publication metrics (Smith 2012).

A certain amount of bibliometric research has been undertaken in the nursing field to help answer these questions. One of the earliest citation-based studies was conducted by Garfield himself and revealed that the highest impact factors in nursing journals were all below 1.0 in the early 1980s (Garfield 1984). The most highly-cited article in nursing (up to that time) was also identified (Marston-Scott 1985). Since then, an increasing number of bibliometric studies have been undertaken in nursing and have revealed various interesting findings. Some investigations have looked at journal content, for example, with a quantitative content analysis from 2009 finding that 51% of studies in general nursing journals had used quantitative methodologies, 37% were qualitative and 2% used mixed methods (Mantzoukas 2009). International differences in published nursing research have been investigated (Polit and Beck 2009); while other scholars have also looked at journal citation trends over time, the so called 'historical bibliometrics'. One study (Polit & Northam 2011) for example,

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reported that the number of nursing periodicals listed in the *Journal Citation Reports* (Science Edition) rose from 35 in 2004 to 74 in 2009. By 2009, 27 of these journals had impact factor scores above 1.0 (Polit & Northam 2011). Another study found that the average impact factors of core nursing journals have steadily increased over the past few decades (Smith 2010b).

While quantitative journal assessment is important, knowing what type of article journals should actually publish to increase their performance is less clear. Although literature reviews have been shown to attract disproportionately more citations, for example; predicting which articles will best influence journal-level metrics remains difficult and sometimes impossible, especially in the long term (Watson *et al.* 2013). Furthermore, nursing scholars also publish in non-nursing journals (Polit & Northam 2010), meaning that a wide scope is needed if one simply evaluates the performance of individual journals.

Individual-Level Metrics

While journal-level metrics clearly have their place in modern academia, the relationship between influential journals and influential research is not necessarily direct. Publishing in a high impact periodical, for example, does not automatically

mean that an article will, itself, automatically become high impact. A previous study from the journal *Nature*, for example, found that 80 of its most-cited articles (representing 16% of the total), accounted for almost half of all citations the journal received in one particular year (Colquhoun 2003). Similarly, of the 38 million citable items published between 1900 - 2005, half were not cited at all and less than 1% was cited over 200 times (Garfield 2006). Article-level metrics can work the other way, too. A previous study in biogeography, for example, found that many of the influences in a scientific article are not actually cited (MacRoberts & MacRoberts 2010). This limited correlation between publishing in a high-impact journal and the research itself becoming high impact, has understandably led the search for viable alternatives to help assess research performance at the individual rather than journal level (Smith 2015).

Perhaps the most well-known individual-level performance metric used in contemporary academia is the h-index, which was first developed by Jorge Hirsch (2005). This metric considers both an author's total number of publications as well as the citations to those articles and reports the result as a single number. What comprises a 'quality' h-index score depends on a few factors, however; chief among them being how long you have been doing research and in what field of research you

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are actually in. Hirsch, for example, suggested that after 20 years a 'successful' scientist might have a score of 20, an 'outstanding' scientist might score 40; and a 'truly unique' individual, a h-index of 60 (albeit with these values varying between fields) (Hirsch 2005).

Given that the h-index is relatively easy to calculate with available data (Cleary & Hunt 2010), various studies of this metric have now been conducted across a variety of fields. One of the first investigations in nursing found that only 8 UK professors of nursing had h-index scores over 10 during 2010 (Thompson & Watson 2010). Their mean scores appear to have improved over time; however, with a more recent investigation reporting that the average h-index among UK nursing professors is now around 12.6 (Watson *et al.* 2016). One advantage of this increasing focus on individual performance metrics such as the h-index, is that it probably encourages a greater focus on the quality rather than the quantity of research output, especially among early career researchers (Thompson & Watson 2009).

Core Journal Lists

Given that publication in a peer-reviewed academic journal remains the currency of modern academic careers (Clark & Thompson 2012), effectively disseminating your research to the most appropriate audience is clearly represents an essential skill to

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develop. Although potentially daunting, the identification of an ideal venue in which to publish one's work can be most simply achieved by either consulting a preexisting list of appropriate journals, or creating one your own. Although most experienced researchers eventually develop their own 'core journal list' over time, this process is not necessarily straightforward in early academic careers; having been described by some as navigating through the 'journal jungle' (Clark & Thompson 2012). Either way, most research fields usually have a 'core journal' list (either officially or unofficially) that can be consulted, and targeting the periodicals on these lists represents a good starting point. Other resources for the nursing scholar include the NAHRS literature mapping project, for example (NAHRS 2016).

Various methods have also been developed to help define core journal lists in nursing, such as the *Journal Evaluation Tool*, which combines both objective and subjective measures (Crookes *et al.* 2010). Considering that bibliometrics comprises an essential aspect for measuring academic performance in nursing (Davidson *et al.* 2014), ranking journals using citation-based methods not only has precedent, but also offers certain practical advantages. Firstly, bibliometric information is convenient, extensive and readily available from a variety of databases such as the Web of Science, Scopus and Google Scholar; among others. Second, and as a direct result,

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bibliometric methods then offer what are perhaps the most transparent and repeatable techniques for assessing and comparing research between individuals and/or groups (be they journals, institutions, countries, and so on).

Given the various pros and cons of each citation database (Bar-Ilan 2007), and that no single resource is the answer to all citation tracking needs (Bakkalbasi *et al.* 2006), it would seem prudent to combine the output of some key indicators into a single metric for ranking journals, regardless of discipline. A ranked journal list derived from the examination of multiple bibliometric databases can then be further strengthened by incorporating adjustment factors (such as journal age) to account for 'survival' (Smith 2010a). Various bibliometric studies have now ranked journals in mental health nursing (Hunt *et al.* 2012) and nurse education (Hunt *et al.* 2013) for example; offering an important resource for nursing scholars publishing in these fields, among others.

While bibliometric measures (such as citations, h-indices and other methods predominantly based on citations) are now well established and certainly have their place in modern academia; in recent years these 'traditional' yardsticks are being increasingly augmented by 'non-traditional' or alternative metrics, the so called 'altmetrics'.

Alternative Metrics (Altmetrics)

Extensive use of the World Wide Web by larger and more diverse sectors of society has increased the need for novel and more wide-reaching impact indicators (Thelwall & Kousha 2015a). As the sheer volume of data increased following the turn of the Century, it became increasingly necessary to develop filters to keep one's searching efforts to manageable levels. The term 'altmetrics' was first proposed in 2010 (Priem *et al.* 2010) as an alternative to the 'traditional' citation-based metrics previously described, and to help provide a greater understanding of how research products influence conversation, thought and behavior at a wider level (Piwowar 2013).

Altmetrics comprise a broad group of indicators that work either as an alternative or enhancement to existing measures, by examining more of the 'non-traditional' data; especially on social media. One of the first altmetrics was the number of views a published article had attracted; although the field has since expanded to incorporate additional information such as how published articles are discussed (on platforms such as Twitter, Facebook, Wikipedia, science blogs and other social media), how they are saved (using platforms such as CiteULike and Mendeley), cited (using the 'traditional' bibliometric databases previously mentioned) and recommended (using systems such as F1000Prime) (Wikipedia 2016).

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It has been suggested that three of the most relevant altmetrics for the contemporary academic are the microblogging platforms (such as Twitter), online reference managers (such as CiteULike and Mendeley) and blogging (Bornmann 2015). Microblogging involves sending short messages to other users of a particular platform, and although it was initially used to communicate in a simple way; Twitter for example is now also used for professional and scientific purposes (Bornmann 2015). Busy academics, for example, can now use Twitter to help keep up with the latest research developments (Bik & Goldstein 2013). Other measures also provide important information for the contemporary academic such as F1000Prime, which is a post-publication peer review system for articles in the biomedical fields (Bornmann & Haunschild 2015); and the Eigenfactor, which rates journal influence and ranks them incorporating methods similar to those used by some online search engines (Fersht 2009).

The importance of altmetrics to academic publishers is evident by the fact that many now provide detailed altmetrics scores for each article (usually on the same webpage) where readers may click links to access more detailed information on how the particular altmetric score was derived. Calculating an article's altmetric score is not necessarily straightforward, however; as most are not just a simple count of article

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accesses or downloads. Rather, these scores are usually weighted to take into account the likely reach of the source 'citation'; whereby mentions on a scientific blog for example, might be more highly weighted than a mention on a microblogging platform. While peer-reviewed journal articles still dominate many of the measured criteria in scientific research, web indicators such as altmetrics now offer an important tool for evaluating other types of 'non-standard outputs' such as books, which are particularly valuable in the social sciences (Kousha & Thelwall 2015).

Social Media and Research Impact

Social media represents what is probably one of the most important and controversial facets of the altmetrics discussion in contemporary academia. On one hand, social media offers various advantages for the scientific world. First, it has increased the ability to share research, access information and build professional networks in nursing, as elsewhere (Archibald & Clark 2014). Social media helps connect people and facilitates dialog between individuals and groups (Segovis & Rethlefsen 2011); which is not surprising given the wide range of social media outlets that can be used to promote one's work (Watson 2015). Social media therefore offers research teams additional opportunities to not only disseminate findings, but also; to communicate with communities in real-time as their studies progress (Schnitzler *et al.* 2016). The

increasing importance of microblogging platforms such as Twitter, for example, provides an important example in this regard.

The undoubted potential benefits for researchers have, in turn, helped change opinions regarding social media's role in the broader scientific enterprise. Whereas popular websites may have once been frowned upon by research academics, Wikipedia for example, is now being increasingly used by nurses in practice (Ferguson 2013). Similarly, blogging and other forms of social networking used for academic purposes are being increasingly viewed as a legitimate form of scholarship (Watson 2014a). There are a few good reasons for this.

First, the potential outreach of microblogging platforms is clear, given the large number of current (and potential future) users. It has been recently estimated, for example, that around 1 in 40 scholars were active on Twitter, while Mendeley had over 2 million users (Piwowar 2013). One of the first studies to investigate how and why scholars use Twitter, for example, found that Twitter citations formed part of a conversation that participants believed reflected scholarly impact (Priem & Costello 2010). Second, research has also demonstrated the emerging impact of social media

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on research outcomes and traditional metrics such as article citations (Knight 2014); including how Tweets may predict highly cited articles in the first 3 days (Eysenbach 2011). In nursing specifically, Twitter has been shown to facilitate nurse researchers to connect rapidly, directly and cost-effectively with communities; thereby promoting more effectively translation of policy into practice (Archibald & Clark 2014). Furthermore, the opportunities and expectations for researchers to use social media will likely increase as the field continues to grow in both size and popularity (Schnitzler *et al.* 2016).

On the other hand, social media is not necessarily a research panacea; and should probably be viewed more as a complement to, rather than a replacement of the 'traditional' citation-based metrics. For one thing, social media requires effort and having an up-to-date web presence adds yet another component to an academic's daily workload. Publishing a new article, for example, is now marked by what has been described as a series of self-promotional 'chores' for the contemporary researcher (Smith 2016). Maintaining a microblogging platform such as Twitter, for example, does not occur without effort, either (Watson 2014b). Some other issues to consider include the methodological uncertainties of altmetrics, given that the quantitative evaluation of scientific social media is still in its relative infancy, and some

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parallels can be drawn with the current state of research on social media metrics and the early days of citation analysis (Haustein *et al.* 2015).

How people use the internet has also changed. The internet for example, has increasingly evolved from one-way website visits, to a more deeply integrated social structure (Galligan & Dias-Correia 2013). There is no 'standard' web user nowadays, either. Unlike bibliometric measures that predominately focus on citations within defined scholarly outlets, for example; social media users can come from various backgrounds and probably have many different motivations (Weller *et al.* 2011). Furthermore, using any performance metrics to measure research impact still runs the risk of focusing on what can be easily measured, rather than evaluating the difference that these disciplines can actually make to humanity (Molzahn & Clark 2015). Future investigations of social media will, therefore, need to evaluate the extent to which they provide valid information in each of the contexts to which they are applied (Thelwall & Kousha 2015b).

The Future

Just as bibliometrics has now become an essential aspect for measuring research performance in nursing (Davidson *et al.* 2014); so too, social media and altmetrics have also risen to prominence in recent years. An increasing body of evidence clearly suggests that social media should now be embraced by nursing academics interested in increasing their profile and promoting their work. It has been suggested that it is now time for the nursing profession to start leveraging social media (Ferguson 2013); and if so, this process need not be daunting for the contemporary scholar. In today's inter-connected digital world, high altmetric scores cannot be dismissed and probably still contribute to the long-term academic impact of published research (Wang *et al.* 2016). In future it is likely that altmetrics will be increasingly recognized as a legitimate measure of performance and, in addition to targeting high impact journals; it will also become increasingly common for nursing academics to note which publishers are concerned about altmetrics and how well individual journals are taking steps to promote their work on social media.

Implications for Nursing:

The rise of altmetrics and social media have important implications for contemporary nursing scholars. Some fundamental questions when choosing a journal might be:

does it have a Twitter and/or Facebook site, or a blog (or all three); and does it have

any other presence on social media such as LinkedIn, Wikipedia, YouTube,

ResearchGate and so on? Does it take active steps to promote its work in

newspapers? If so, these are all positive indicators suggesting that the journal has a

well-developed social media strategy, presence and vision. Another consequence of

embracing social media is that individual academics should also develop their own

strategies for promoting and disseminating their work as widely as possible; some

examples of which have been described in detail elsewhere (Watson 2014b, Watson

2014a, Watson 2015).

CONCLUSION

Despite the changing nature of research dissemination in the new millennium, it is still

important to recognize the value of established knowledge dissemination routes (that

being the peer-reviewed publication); particularly where quality still trumps quantity in

the long run (Hunt & Cleary 2010). In 2016, citations in academic periodicals remain

vitaly important for the career development of nursing scholars, in the same way that

highly-cited articles still represent a 'badge of honour' in many research disciplines

(Smith 2009). Nevertheless, the rising importance of social media and altmetrics can no longer be ignored. Today's nursing academic, who formerly balanced patient care with academic rigour, now has another facet to consider in their scholarly activities.

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