International Journal of Information Science and Management
Vol. 20, No. 3, 2022, 215-225
https://dorl.net/dor/20.1001.1.20088302.2022.20.3.12.9

Original Research

Investigating the Relationship between Altmetrics indicators and Scientometric indicators of Iranian researchers in the field of nursing in the period 2000-2019

Ali Biranvand
Assistant Prof., Department of Knowledge and Information Science, Payame Noor University, Iran.
Corresponding Author: biranvand@gmail.com
ORCID iD: https://orcid.org/0000-0003-2316-0405

Zohreh Cheraghi
Ph.D., Knowledge and Information Science, Shahid Chamran University of Ahvaz, Ahvaz, Iran.
z.cheraghi58@gmail.com
ORCID iD: https://orcid.org/0000-0002-5067-6354

Received: 22 August 2021
Accepted: 04 January 2022

Abstract

This study aimed to identify the effect of Altmetrics indicators of Mendeley resource management database on scientometric indicators in Scopus and Web of Science citation databases. The present study is an applied and descriptive research that has been done by scientometric method with Altmetrics approach. The statistical sample for the study includes Iranian researchers in the field of nursing who had an indexed document in the Scopus citation database, in the period 2000-2019 and on the date of the research (20/03/2020), and was also a member of the Mendeley resource management database. There were 158 high-profile authors introduced by Scopus. Findings illustrated that there is no significant relationship between the h-index in Scopus and the followers' index in Mendeley. However, there is a significant relationship between the other indicators studied in these two databases. There is also a significant relationship between co-authorship index, h-index, citations, readers, publications, and viewers in Mendeley scientific social network with indexes of citation number and h-index in the Web of Science citation database. But there is no significant relationship between the follower's index and these indicators. Examining the relationship between the numbers of citations received in Mendeley, Scopus, and Web of Science shows that there is a significant relationship between the numbers of citations received in these databases. Respectively, the strongest correlation, in this case, is between the citation index received in the Mendeley and Web of Science database, Mendeley and Scopus, and finally Scopus and Web of science. There is also a significant relationship between the etch index in the Mendeley, Scopus, and Web of Science databases. The correlation between the Mendeley h-index and Web of Science is stronger than the correlation between the Mendeley h-index and Scopus.

Keywords: Altmetrics Indicators, Scientometrics Indicators, Iranian Researchers, Iran, Nursing, Mendeley, Web of Science, Scopus.

Introduction

Scientific communication does not occur in a vacuum, but rather depends on the review, evaluation, and use of the previous research findings. Citing the scientific findings has

particular importance and is a fundamental concept in the scientific communication (Belli, 2019; Weller and Puschmann, 2011) Citation indicators examine the impact of a publication, an author, or an institution, based on the number of times works and/or authors have been cited by others (Weller, 2015); So, the more citations they have obtained, the more impact and recognition they have. The use of traditional bibliographic and citation indicators, such as the number of publications and citations, to evaluate scientific activities back to the 1960s. Since then, Citation indicators are used to evaluate individuals, scientific works, journals, and institutions, and even the results of these evaluations can be used in decisions such as job appointments, project funding, information retrieval, and journal selection. Citation indexes help identify popular and influential articles and are often used to explore research topics by following article citations. Thus, citation indicators help both measure performance and navigate large volumes of scientific literature.

However, there have always been challenges in using citation indicators and providing useful indicators to overcome the deficiencies of existing criteria and indicators. Due to the growing importance of the web, a new approach to calculating indexes based on web links has emerged. This approach, called Altmetrics, evaluates the various activities of users on social media. Over the past few decades, Internet-based technologies have influenced the ways of research data gathering, information retrieval, presenting and distributing the results, scientific collaboration, education, and interaction with students (Weller, 2015).

Social media often referred to as social networks, are one of the most widely used and effective tools in network communication. Social networks are technologies that facilitate social interaction, collaboration, and discussion among colleagues. These technologies include blogs, wikis, media sharing tools (audio, photos, videos, text), and network operating systems (including Facebook). (Weller, 2015). Social networks help people to feel that they belong to a community (Abdelrahmam, 2013). What is emphasized in this research are academic social networks that have become an important tool for researchers around the world to publish works and interact with colleagues. Academic social networks, unlike other online social media platforms such as Twitter and Facebook, which may also be used for advertising purposes, are specifically designed for academic discourse and facilitate interaction between people in the scientific world (Mason, 2020). Due to the increasing importance of academic social networks on the interaction between authors and researchers, this study examines the relationship between Altmetrics indicators of Mendeley on scientometric indicators for Iranian articles in the field of nursing, indexed in Scopus and Web of Science in the period 2000 to 2019. The questions that will be answered to investigate this issue are:

1- What is the status of the presence and activity of Iranian authors in the field of nursing in Scopus, Web of Science, and Mendeley?
2- What is the relationship between Altmetrics indicators of Iranian authors in the field of nursing in Mendeley and Scopus?
3- What is the relationship between Altmetrics indicators of Iranian authors in the field of nursing in Mendeley and Web of Science?
4- What is the difference between the number of citations received by Iranian authors in the field of nursing in Scopus and Web of Science?
5- What is the difference between the h-index of top Iranian authors in the field of nursing in Scopus and Web of Science?

Theoretical Background

The social web created new research connections between researchers and scientists by influencing the ways that they communicate with each other. It is not easy to measure the effectiveness of new communications by using traditional citation indicators, because they often do not fully measure the impact (McRobertz & McRobertz, 2010). For this reason, Altmetrics indices, which are a complement to citation indices and try to compensate for the shortcomings of traditional indices, have been used to evaluate the impact. Altmetrics, in contrast to citation-based indicators, measures the impact of an article (Prim, Pivar, & Hemminger, 2012). Although these metrics are provided to gauge the impact of articles, they can be used to gauge individuals, books, datasets, web pages, etc. (Priem, Taraborelli, Groth & Neylon, 2010).

Altmetric's mission is to make article-level metrics easy. It collects download statistics, reference manager counts, links from mainstream media sources, and social media shares and discussions, enrich the resulting data with demographics and profile information and then makes everything available through APIs (Application Programming Interfaces) and for analysis through a web app called the Explorer. Article-level Indicators are quantitative or qualitative indicators to evaluate the impact of an individual article such as the number of times an article has been downloaded or shared on Twitter. Some of the quality indicators can be referred to in media coverage or the blog post of an expert in that field (Adie & Roe, 2013).

Web-based social networks are the platform for developing Altmetrics tools. Social networks are a collection of individuals, organizations, and other social entities that are interconnected by a set of social relationships such as friendship, cooperation, or information exchange. The structure of these networks is composed of individuals, groups, and organizations as their nodes. These nodes can have different types of interdependencies with each other. Values, goals, and any common ground that connects individuals, groups, and organizations can be called relationships in these networks. Initially, however, social media served as a platform for photo sharing, discussion of shared interests, and complementarity with traditional social interactions; but they quickly became powerful communication tools in the field of science. Virtual social networks have revolutionized the way people interact, communicate, and even think (Abdelraheem, 2013; Weisgerber & Butler, 2010).

Despite the significant development in the use of social media, there are concerns about increasing the use of social media for scientific purposes (Tenopir, Volentine & King, 2013; Vine, 2006; Williams, 2017). For this reason, it is necessary to discuss the use of different types of social media separately. In addition, there are differences between the types of uses, as studies show that social media is often used for publishing, consumption, communication, and advertising and less for creating or receiving a Scholarship (Carpenter, 2012; Tenopir et al., 2011; Haustein, 2019; Sugimoto, Work, Larivière & Haustein, 2017). The abilities such as reading, storing, discussing, and proposing, led people to use social networks increasingly. The distinctive ability to detect all interactions in the social networks led to the creation of a set of new indicators to examine the influence, attention, and impact (Donato, 2014). These indicators are called Altmetrics which is an abbreviation for Alternative metrics. Altmetrics was first introduced by Priem, Piwowar, Hemminger (2010). Altmetric Institute is one of the most important providers of altmetric data that collects information according to the impact of an article on various social media and allocates the altmetric score to the article by weighting the scores obtained from social media (Robinson, Torres-Salinas, Zahedi & Costas, 2014).

According to the literature review, several studies have been conducted worldwide to examine the quality and accuracy of indicators in social networks (Wouters, Zahedi & Rodrigo, 2019; Zahedi, Fener, & Costas, 2014); some are presented in Table 1.

Table 1
Summary of research background

Database / network	Findings	Source
ResearchGate, Scopus	There is a positive correlation between the indicators of the Scopus database and the ResearchGate network.	(Salimi, 2016), (Ansari et al., 2019)
Mendley, Web of Science	Benefiting from Mendelssohn helps to obtain more citations for articles in Web of Science	(Mohammadi and Thelwall, 2014)
ResearchGate	The use of ResearchGate broadly reflects the traditional distribution of academic capital	(Thelwall and Kousha, 2015)
Scopus, Research, Google Scholar, Web of Science	Received fewer citations in ResearchGate than Google Scholar, but more than Web of Science and Scopus. Research-Gate also has more to do with Google Scholar in terms of citations received. However, sharing copies of articles in Research-Gate is more important	(Thelwall and Kousha, 2017)
Mendeley, Web of Science,	Essential Science There is a significant positive correlation between Mendelian reading and citation indices in both essential science and web science indices	(Riahinia Rahimi, Jahangiri, Mirhaghjoo & Alinezhad 2018).
Mendeley, Scopus	There is a positive correlation between the loading rate and the reading of articles in Mendeleev with the citations received in Scopus.	(Ruan, Chen, Cohen, Singhal, Lin & Lee, 2018)
Social networks	The lack of use of social media has a direct impact on the lack of increasing the number of citations in health research.	(Bardus et al., 2020)
Research, Academia, Web of Science, Scopus	The level of activity of authors in social networks will lead to more readers, increase the number of citations and, consequently, increase the H-index score in databases.	Biranvand Samie &) (Rahmaniyand, 2021
Dimensions, clarivate analytic	Activity on social media increases the correlation between altogether scores and citations received. Presenting research results on social networks, by institutionalizing the culture of knowledge sharing, provides the ground for attracting more citations	Biranvand,) Ghanaatian & Alhaei (2021

Materials and Methods

This study is applied research, which has been done by the scientometric method with the Altmetrics approach. The statistical population includes Iranian articles and authors in the field of nursing who had indexed documents in the Scopus database from the period 2000 to 2019. Due to the importance of the subject and the possibility of a decrease in the number of researchers with an indexed article in the Scopus database, all authors introduced by the Scopus

database (158 authors) have been examined.

Data analysis

Initially, all Iranian nursing researchers and authors, who have indexed a document in Scopus in the last twenty years (2000-2019), were identified. The information of these authors was obtained on (16/03/2020) from the Scopus database. Then, 158 prolific nursing authors were selected. In the next step, the names of these people are matched on a case-by-case basis with their profiles in the *ResearchGate* and *Mendeley* and the profile information was examined as Altmetrics indicators. The information collected through the Scopus database was matched in *Web of Science* and *Google Scholar* databases for comparison of the information. Data analysis was performed by descriptive and inferential statistics. To analyze the data, SPSS version 23 was used.

Results

Results show that among 5821 records related to the field of nursing indexed by Iranian authors in the Scopus database in the period 2000-2019, 5009 records (86%) are of the article type and other types are from critiques, conference papers, notes, book chapters, etc. Also, 5627 records (96.6%) were in English, 198 (3.4%) in Persian, and the rest in French, Arabic, etc. Hayat Magazine (291 records), was the largest publisher. Tehran University of Medical Sciences and Health Services was the top university in the field of activity with 216 documents.

Question 1: What is the status of the presence and activity of Iranian authors in the field of nursing in Scopus, Web of Science, and Mendeley?

To answer the first question, the data was collected and the author's indicators were compared. The indicators include the number of documents, citations, and h-index. The top ten authors with the most documents are listed in Table 2.

Table 2
Scientometric indicators related to the documents indexed in the studied databases from the years 2000 to 2019

		Scopus			Web of Science			Mendeley		
No.	Authors	Doc.	Pub.	h-index	Doc.	Pub.	h-index	Doc.	Pub.	h-index
1	Larijani, B.	1005	16560	55	2	15	1		55	1
2	Sahebkar, A.	865	18270	71	735	14991	65		18796	72
3	Hébert, J.	653	19545	70	526	9036	44	675	19677	70
4	Malekzadeh, R.	649	59499	8	44	107	6	54	120	6
5	Kelishadi, R.	613	16421	56	447	12549	46		16661	56
6	Banach, M.	587	1620	55	568	1303	53	593	16569	56
7	Qorbani, M.	506	27364	56	425	24894	50		28146	56
8	Hedayati, M.	481	4961	31	256	3254	27		5015	31
9	Mirmiran, P.	471	8803	44	359	7633	41	472	8956	44
10	Ferns, G.	463	9752	47	25	37	4	53	369	10
…										
158	Dehqan, A.	20	166	8	76	983	17		1254	19

The presence of Iranian authors in the field of nursing in the databases of Scopus, Web of Science, and Mendeley, respectively, is 158, 158, and 124. The number of documents available in Scopus, Web of Science, and Mendeley databases is 24273, 15998, and 17866. Descriptive statistics are present in Table 3.

Table 3
Mean, average, minimum, and maximum of the studied variable

Database	index	Average	Mid.	Min.	Max.
Scopus	Doc.	153.63	88.50	20	1005
	Citations	3219.68	893.50	71	59499
	h-index	19.45	16	0	71
	Obtained citations	2407.83	793	68	48617
	Co-author	608.57	168	26	8198
Web of Science	Pub	101.25	54	1	937
	h-index	14.58	10	0	74
	Citations	2067.05	363	0	54417
Mendeley	Co-author	649.81	177	0	8227
	Followers	10.71	2	1	162
	h-index	19.49	16	0	87
	Obtained citations	3044.93	926	55	60258
	Readers	11241.60	259.5	573	249496
	Pub.	151.41	58	1	2296
	Viewers	72198.22	22657	829	519684

The highest average h-index is 19.49 in Mendeley, 19.45 in Scopus, and 14.58 in Web of Science. The highest average number of citations is from Scopus with 31219.68 citations, Mendeley with 3044.93 citations, and Web of Science with 2067.05 citations. The highest average publications/number of documents is from Scopus with 153.63, Mendeley with 151.41, and Web of Science with 101.25.

Question 2: What is the relationship between Altmetrics indicators of Iranian authors in the field of nursing in Mendeley and Scopus?

Information about this question is shown in Table 4. The correlation analysis indicated that there is no relationship between the follower's index in Mendeley and the h-index in Scopus. However, there is a significant relationship between other Altmetrics indices in Mendeleev and Scopus.

Table 4
The correlation coefficient between Altmetrics indices in Mendeley and Scopus

		Doc.	Citation	h-index	Obtained citation	Co-author
Co-author	Correlation co.	0.840^{**}	0.778^{**}	0.721^{**}	0.769^{**}	0.915^{**}
	significance	0.0001	0.0001	0.0001	0.0001	0.0001
Followers	Correlation co.	0.483^{**}	0.462^{**}	0.310^{ns}	0.476^{**}	0.528^{**}
	significance	0.017	0.023	0.140	0.019	0.008
h-index	Correlation co.	0.733^{**}	0.809^{**}	0.804^{**}	0.794^{**}	0.672^{**}
	significance	0.0001	0.0001	0.0001	0.0001	0.0001
Obtained citation	Correlation co.	0.784^{**}	0.884^{**}	0.836^{**}	0.873^{**}	0.752^{**}
	significance	0.0001	0.0001	0.0001	0.0001	0.0001
Readers	Correlation co.	0.883^{**}	0.931^{**}	0.925^{**}	0.943^{**}	0.788^{**}
	significance	0.0001	0.0001	0.0001	0.0001	0.0001
Publication	Correlation co.	0.840^{**}	0.725^{**}	0.690^{**}	0.724^{**}	0.725^{**}

		Doc.	Citation	h-index	Obtained citation	Co-author
	significance	0.0001	0.0001	0.0001	0.0001	0.0001
Viewer	Correlation co.	0.623**	0.747**	0.685**	0.755**	0.700**
	significance	0.0001	0.0001	0.0001	0.0001	0.0001

**. Significance in 0.05% ns. Non- Significance in 0.05%

Question 3: What is the relationship between Altmetrics indicators of Iranian authors in the field of nursing in Mendeley and Web of Science?

As shown in Table 5, the correlation coefficient between the indexes of co-authorship, H-index, citation received, readers, publications, and viewers in Mendeley with the number of citations and h-index in Web of Science is less than 0.05. Therefore, there is a significant relationship between these indicators. But there is no significant relationship between the index of followers and the number of citations and h- index in the Web of Science database.

Table 5

The correlation coefficient between Altmetrics indices in Mendeley and web of Science

		Doc.	h-index
Co-author	Correlation co.	0.558	0.522
	significance	0.0001	0.0001
Followers	Correlation co.	0.132	0.276
	significance	0.538	0.202
h-index	Correlation co.	0.536	0.642
	significance	0.0001	0.0001
Obtained citation	Correlation co.	0.568	0.666
	significance	0.0001	0.0001
Readers	Correlation co.	0.527	0.585
	significance	0.001	0.0001
Publication	Correlation co.	0.585	0.555
	significance	0.0001	0.0001
Viewer	Correlation co.	0.420	0.523
	significance	0.006	0.0001

Question 4*:* What is the difference between the number of citations received by Iranian authors in the field of nursing in Scopus and Web of Science?

Information in Table 6, indicated that there is a very strong significant relationship between the number of citations in Scopus, Web of Science, and Mendeley (because the significance level of the correlation coefficient is less than 0.05 and the value of the correlation coefficient is very high). The correlation between the number of obtained citations in Mendeley and Web of Science is stronger than the relationship between the Mendeley and Scopus.

Table 6

The correlation coefficient between citations in Scopus, Web of Science, and Mendeley

		Scopus	Web of Science	Mendeley
Scopus	Correlation co.	1		

	significance			
Web of Science	Correlation co.	0.911**	1	
	significance	0.000		
Mendeley	Correlation co.	0.930**	0.977**	1
	significance	0.000	0.000	

Question 5: What is the difference between the h-index of top Iranian authors in the field of nursing in Scopus, Web of Science, and Mendeley?

As can be seen in Table 7, there is a significant relationship between the h-index in the Scopus and with h-index in Web of Science and Mendeley databases (because the significance level of the correlation coefficient is less than 0.05). The correlation between the h-index in Scopus and Mendeley is high (0.787 **), but the correlation between the h-index in Mendeley and Web of Science is stronger (0.859 **). Also, the correlation between the Scopus h-index and Web of science is high (0.720 **).

Table 7

The correlation coefficient between the h-index in Scopus, Web of Science, and Mendeley

		Scopus	Web of Science	Mendeley
Scopus	Correlation co.	1		
	significance			
Web of Science	Correlation co.	0.720**	1	
	significance	0.000		
Mendeley	Correlation co.	0.787**	0.859**	1
	significance	0.000	0.000	

Discussion

Descriptive findings indicated that 86% of the documents in Scopus were articles, of which 96.6% were in English. Within the Iranian indexed journals in Scopus, Hayat journal covers the largest number of articles (291 records). Among the researchers' financial sponsors, Tehran University of Medical Sciences and Health Services is ranked first with 216 degrees. Some of the critical Findings are:

The tendency of Iranian researchers and authors to publish articles in journals indexed in Scopus is greater than on the Web of Science (Tahloual and Koosha, 2017; Zand, 2009; Shabani, 2009). The reason is the presence of some Iranian journals in Scopus and it is much more convenient and tacks less time to publish articles in these journals. The research indicated that there is a remarkable difference in the number of documents and the number of citations received in Mendeley compared to Scopus and Web of Science. The reason is that Mendeley is a software, based citation management, and if a source enters this database, it will be more probable to be cited.

The results show that the personal pages of many Iranian nursing writers and researchers in Mendeley are not up to date. Also, 24.6% of the authors surveyed do not have a personal page in Mendeley. The absence of members in the Mendeley database is one of the indications that nursing writers do not pay enough attention to the effects of using this citation database in their works. Not using new citation methods, or using other citation tools such as Endnote, etc. are cases of not paying attention to Mendeley's influence in attracting a high number of citations. Introducing citation databases such as Mendeley to researchers and holding

workshops to familiarize them with these databases can increase the membership of Iranian researchers in databases such as Mendeley, to be able to enjoy the benefits of being in this database.But as the results of other research in this field show (Mohammadi & Tahloual, 2014; Reiahnia et al., 2018; Ravan et al., 2018), the effect of Mendeley scientific-citation base Due to the direct connection of this site, it is seen much more and deeper on social networks. Accordingly, there is a need to provide the necessary ground for the more and more active presence of researchers and writers in the Mendeley database. Because the influence of social networks and networks in attracting citations or reading documents by others cannot be ignored.

Examining the relationship between the amounts of citations received in Mendeley, Scopus, and Web of Science databases shows that there is a significant relationship between the amounts of citations received in Scopus, Web of Science, and Mendeley databases. The strongest correlation, in this case, is between the citation index received in Mendeley and Scopus, Web of Science and Scopus, and finally Mendeley and Web of Science. The results of this section are in line with the results presented in the research of Mond et al. (2016). There is also a significant relationship between the etch index in Scopus, Web of Science, and Mendeley databases. The correlation between Scopus and Mendeley index is stronger than the correlation between Schedule Web of Science index and Mendeley. This strong connection between Mendeley and Scopus is due to the authors' acceptance of journals indexed in Scopus for publishing their articles.

Conclusion

Scientific social media allow scientific content to be readable, regardless of the time-consuming process of publishing the papers. The lack of proper use of these networks is evident among Iranian researchers. Considering the effective and vital role of social networks in receiving citations, which has also been shown in various studies, it is suggested that researchers in all fields of medicine, especially nursing, have an active presence in social networks to view articles in this field. Have higher acceptability and receive more citations. Due to the importance of citation management software, especially Mendel and its widespread use around the world, creating a profile in this database and uploading articles to researchers in all scientific fields of the country is recommended.

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