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Measuring the online attention of the Rehabilitation Web of Science category: an Altmetrics-based analysis[1]

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Introduction

Social media has supposed a revolution in the information dissemination. In that way, the introduction of this kind of tools in academia activities is now increasing, such as new ways for measuring the impact of scientific publications in social media (Costas, Zahedi, & Wouters, 2015). These new metrics are called Altmetrics (Priem et al., 2011). They are centered on the article impact and utilize the social web for analyzing it. Currently, they are not considered as a substitute of the traditional metrics (generally, citations), but rather as complementary.

In that way, there is general agreement on the necessity of other types of metrics to evaluate and monitor the research impact (Mohammadi et al., 2015). There are different groups of population, non-author professionals, which read research articles, and now also share them. Some examples of these groups are practitioners, undergraduate students or lecturers (to teach or professional activities). Furthermore, about the different groups of population, new types of academic outputs have been appeared (such as dataset, posters, blog or online teaching). Therefore, the "traditional" acceptance that the research output only was disseminated within the scientific community has now changed (Bornmann & Williams, 2013).

In that way, the Rehabilitation research field is composed of different professional areas that have a high impact on the general population well-being. For this reason, it could be interesting to measure the online attention on social media and relate it to the scientific impact. To our knowledge, no documents are currently available evaluating these aspects in the Rehabilitation research field. Therefore, the primary aim of the present study is to determine the online attention of the Rehabilitation related scientific output in social media, in other words, through Altmetrics. Three different subgoals are established: 1) To show the relation between the Web of Science (WoS) citations and the Altmetric score at the journal level, 2) To know the differences between Top 10 papers ranked by WoS citations and Altmetric score, and 3) To analyze the existent correlation among the different ways to mention the scientific output through the different platforms.

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Methods

In order to analyse the online attention of the Rehabilitation WoS category in social media, the tasks described in this section were employed.

Dataset

The set of documents to carry out the analysis was obtained from the list of journals in the Rehabilitation WoS category from the Journal Citations Reports (JCR), metrics from 2016. According to the literature (Hodge & Lacasse, 2011; Seipel, 2003), WoS contains the most important research output related to the different scientific disciplines, since they are considered as a primary criterion in tenure, promotion and other professional decisions. Nevertheless, social sciences and humanities are not well-covered by this database.

The list of the DOIs of the articles and reviews published, in the period 2013-2017, in the 113 journals within the Rehabilitation WoS category was downloaded in March 2018. A total of 36,840 documents were retrieved (1,550 documents did not have DOI). Then, they were matched with the data available in Altmetrics.com. It is the commercial tool that monitor, analyses and records the online activity around research outputs from a set of online sources, such as blogs, Twitter, Facebook, Google+, news, media, and other sources (Adie & Roe, 2013; Costas et al., 2015). A total of 24,701 records were finally downloaded. It is important to highlight that only the 67% of the documents from WoS matched with Altmetrics.com data (almost the 70% of those with DOI).

Altmetrics analysis

In order to show the online attention of the Rehabilitation research in social networks and the correlation between the different media, two different analyses have been performed. First, a descriptive approach was employed to obtain: i) the number of documents with at least 1 mention/citation and those with 10 or more, ii) the relation between WoS citations and Altmetric score of the Top 20 journals ranked by the number of WoS citations, and iii) the Top 10 documents ranked by WoS citations and Altmetric score. Secondly, a statistical analysis based on correlations was employed to show the relationships between the mentions/citations.

The statistical analysis was performed using the software IBM SPSS 24 (Armonk, New York, USA). First, the Kolmogorov-Smirnov test for the variables WoS citations, Twitter, Facebook, Google +, Blog, Wikipedia, and LinkedIn mentions was $p<0.001$ for all of them. Thus, they do not follow a normal distribution. Then, the Spearman correlation was employed to analyze the correlation between the different variables. Probabilities less than 0.01 were considered statistically significant for this analysis.

Results

In the following section, the descriptive and statistical analysis of the correlation between the different variables is described.

First, the number of mentions for each social media and the number of WoS citations are shown in Table 1. Twitter is the media in which the Rehabilitation research production has a higher impact. Nevertheless, at a glance, the rates of the Twitter mentions and WoS citations seem to be similar. Some observation will be made in the Discussion section. LinkedIn is the media in which the Rehabilitation area has a fewer impact. On the other hand, the information about the documents with more than 10 mentions/citations are shown. It was applied in order to exclude those documents that received a low number of mentions/citations. In this way, a drastic

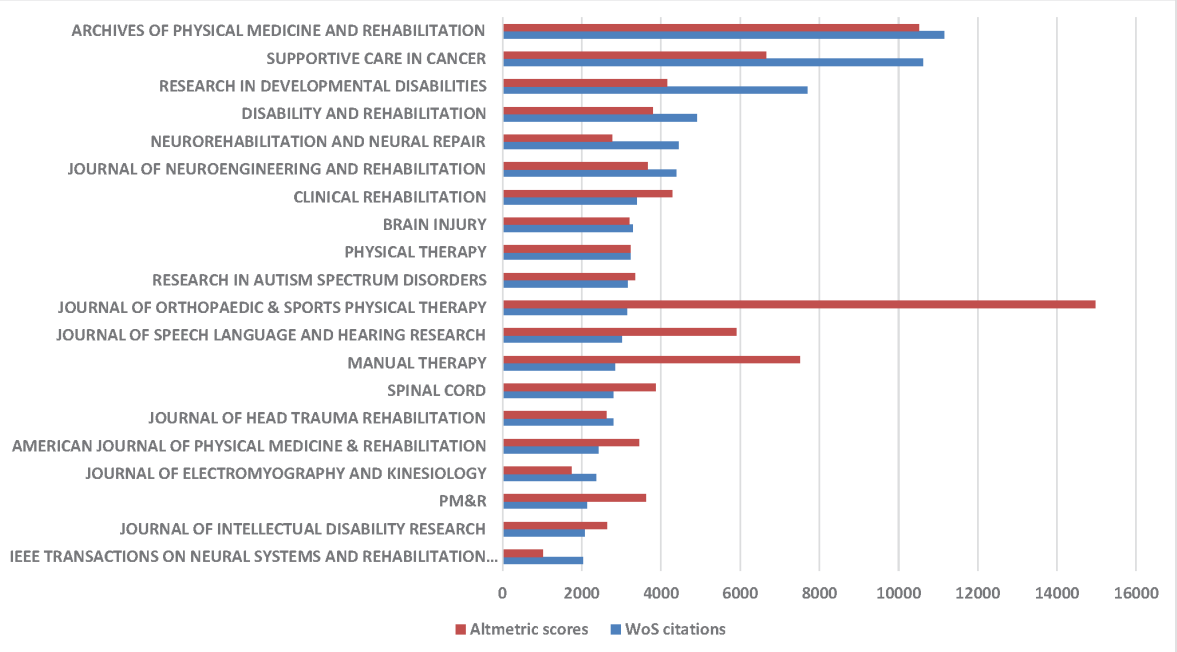
reduction of the rates is observed. Nevertheless, Twitter follows being the media with higher rates, closely related to the WoS citations rates.

Table 1. Documents with at least 1 mentions/citations and those with 10 or more.

Media	**m/c>0**	**% of Total**	**m/c>10**	**% of Total**
Twitter	20,712	83.85%	3,722	15,07%
WoS	19,060	77.16%	3,448	13.96%
Facebook	8,555	34,63%	269	1,09%
Google +	1,649	6,68%	4	0,02%
Blog	1,017	4,12%	1	≈0,00%
Wikipedia	213	0,86%	0	0,00%
LinkedIn	10	0,04%	0	0,00%
m/c: mentions/citations.				

Second, Figure 1 shows the relation between the numbers of mentions/citations that receives each of the Top 20 journals ranked by WoS citations. Mostly, these numbers are closely related. Nevertheless, there are some cases in which the relation attracts the attention. *Journal of Orthopaedic & Sports Physical Therapy* is the most obvious case, with almost five times higher Altmetric score than WoS citations. In that way, it is also remarkable the journal of Manual Therapy with more than the double of the Altmetric score. On the contrary, there are two journals in which the relations are inverted, *Supportive Care in Cancer* and *Research in Developmental Disabilities* with almost the double of WoS citations in both cases.

Figure 1. WoS citations and Altmetric scores of the Top 20 journals ranked by WoS citation.



Third, the Top 10 papers ranked by WoS citations and Altmetric scores are shown in Table 2 and 3, respectively. Both Top 1 papers, Maciejasz et al. (2014) by WoS ranking and King et al. (2015) by Altmetrics ranking, belong to the same journal, *Journal of NeuroEngeenering and Rehabilitation*, but none of them appear in both rankings. The first one is in the 14972nd position of the Altmetrics ranking and the second one in the 2003rd position of the WoS ranking. Furthermore, it seems to have differences between the journals that attract the scientific and social attention. The presence of the documents published in the *Journal of Orthopaedic & Sports Physical Therapy* in the Top 10 ranking by Altmetric scores is also remarkable. There is a highly different between the citations in WoS and Altmetric scores.

Table 2. Top 10 papers by WoS citations.

Rank	Year	Title	Journal	Cites
#1	2014	A survey on robotic devices for upper limb rehabilitation	Journal of Neuroengineering and Rehabilitation	209
#2	2013	Using iPods (R) and iPads (R) in teaching programs for individuals with developmental disabilities: A systematic review	Research in Developmental Disabilities	150
#3	2014	The global map for traumatic spinal cord injury epidemiology: update 2011, global incidence rate	Spinal Cord	145
#4	2014	Incidence, Prevalence, Costs, and Impact on Disability of Common Conditions Requiring Rehabilitation in the United States: Stroke, Spinal Cord Injury, Traumatic Brain Injury, Multiple Sclerosis, Osteoarthritis, Rheumatoid Arthritis, Limb Loss, and Back Pain	Archives of Physical Medicine and Rehabilitation	144
#5	2013	Effects of Exercise Training on Fitness, Mobility, Fatigue, and Health-Related Quality of Life Among Adults With Multiple Sclerosis: A Systematic Review to Inform Guideline Development	Archives of Physical Medicine and Rehabilitation	122
#6	2013	Mechanical design and performance specifications of anthropomorphic prosthetic hands: A review	Journal of Rehabilitation Research and Development	117
#7	2013	Systematic review of agents for the management of gastrointestinal mucositis in cancer patients	Supportive Care in Cancer	89
#8	2014	Ten questions about terminology for children with unexplained language problems	International Journal of Language & Communication Disorders	85
#9	2013	The clinical effects of Kinesio (R) Tex taping: A systematic review	Physiotherapy Theory and Practice	83
#10	2014	Physical Exercise Interventions for Improving Performance-Based Measures of Physical Function in Community-Dwelling, Frail Older Adults: A Systematic Review and Meta-Analysis	Archives of Physical Medicine and Rehabilitation	83

Table 2. Top 10 papers by Altmetric score.

Rank	Year	Title	Journal	AS
#1	2015	The feasibility of a brain-computer interface functional electrical stimulation system for the restoration of overground walking after paraplegia	Journal of Neuroengineering and Rehabilitation	1062
#2	2016	Rotator cuff related shoulder pain: Assessment, management and uncertainties	Manual Therapy	734
#3	2016	Comparative study of millennials' (age 20-34 years) grip and lateral pinch with the norms	Journal of Hand Therapy	703
#4	2014	Current evidence does not support the use of Kinesio Taping in clinical practice: a systematic review	Journal of Physiotherapy	632
#5	2013	The Effectiveness of a Deep Water Aquatic Exercise Program in Cancer-Related Fatigue in Breast Cancer Survivors: A Randomized Controlled Trial	Archives of Physical Medicine and Rehabilitation	437
#6	2017	Physical function and health-related quality of life in patients undergoing surgical treatment for malignant pleural mesothelioma	Supportive Care in Cancer	425
#7	2017	Understanding Adolescent Low Back Pain From a Multidimensional Perspective: Implications for Management	Journal of Orthopaedic & Sports Physical Therapy	407
#8	2016	Behavior of the Linea Alba During a Curl-up Task in Diastasis Rectus Abdominis: An Observational Study	Journal of Orthopaedic & Sports Physical Therapy	381
#9	2015	The Immediate Effects on Inter-rectus Distance of Abdominal Crunch and Drawing-in Exercises During Pregnancy and the Postpartum Period	Journal of Orthopaedic & Sports Physical Therapy	367
#10	2017	The Association of Recreational and Competitive Running With Hip and Knee Osteoarthritis: A Systematic Review and Meta-analysis	Journal of Orthopaedic & Sports Physical Therapy	364

Finally, the correlation study results are shown in Table 5. Overall, the mentions in Wikipedia and LinkedIn are the less associated with the rest of the platforms measured. Both correlate with WoS citations, but the first correlates with Blogs and the second with Facebook and Google +, probably due to the more social character of this one. On the other hand, there is a correlation among WoS citations and all the selected platforms. The higher correlation is between Facebook and Twitter (0,334).

Table 5. Spearman correlation coefficients of the different variables.

	WoS	Blogs	Twitter	Facebook	Wikipedia	Google +	LinkedIn
WoS Citations	1	**0.051 (p=0.000)**	**0,027 (p=0.000)**	**0,018 (p=0.006)**	**0,066 (p=0.000)**	**0,146 (p=0.000)**	**0,021 (p=0.001)**
Blog	**0.051 (p=0.000)**	1	**0,084 (p=0.000)**	**0,068 (p=0.000)**	**0,032 (p=0.000)**	**0,038 (p=0.000)**	-0,004 (p=0.512)
Twitter	**0,027 (p=0.000)**	**0,084 (p=0.000)**	1	**0,334 (p=0.000)**	0,006 (p=0.337)	**0,143 (p=0.000)**	-0,004 (p=0.492)
Facebook	**0,018 (p=0.006)**	**0,068 (p=0.000)**	**0,334 (p=0.000)**	1	0,007 (p=0.270)	**0,230 (p=0.000)**	**0,018 (p=0.006)**
Wikipedia	**0,066 (p=0.000)**	**0,032 (p=0.000)**	0,006 (p=0.337)	0,007 (p=0.270)	1	0,010 (p=0.108)	-0,002 (p=0.768)
Google +	**0,146 (p=0.000)**	**0,038 (p=0.000)**	**0,143 (p=0.000)**	**0,230 (p=0.000)**	0,010 (p=0.108)	1	**0,067 (p=0.000)**
LinkedIn	**0,021 (p=0.001)**	-0,004 (p=0.512)	-0,004 (p=0.492)	**0,018 (p=0.006)**	-0,002 (p=0.768)	**0,067 (p=0.000)**	1

**The correlation is significant at the 0.01 level (bilateral). Significant results are highlighted in bold.

Discussion

From a global perspective, our study states that the 83.85% of the papers published in Rehabilitation during the period 2013-2017 have at least 1 mention in Twitter. If we take a look at the WoS citations, the percentage is 77.16%. Furthermore, if we only consider the papers with at least 10 mentions/citations, the percentages change to 15.07% and 13.96%. Therefore, as shown in Table 1, the Twitter platform has the highest number of mentions. In views of these results, it was interesting to analyze the correlation between WoS citations and Twitter mentions. According to Table 5, it is concluded that there is a relation between them, but it is not very strong. On the other hand, the platforms with fewer impact are LinkedIn and Wikipedia, but it could be related to the type of information shared on them.

Additionally, considering the mentions/citations rates shown in Figure 1, the scientific and online attention are very different in each journal. There are two different cases, *Journal of Orthopaedic & Sports Physical Therapy* and *Manual Therapy* with a clear impact on social media, and *Supportive Care in Cancer* and *Research in Developmental Disabilities* with higher impact in a scientific way. Thus, are there differences between the type of documents published in these journals? Do the tye of professionals influence the online attention? In that sense, it important to highlight that the Rehabilitation WoS category is composed of multidisciplinary professions (Shadgan et al., 2010). Nonetheless, in our study, without divide into different disciplines, seems that those journals more focused on Physical Therapy obtain higher impact on social media. Thus, a more detailed study is needed.

In this way, the results obtained with the Top 10 papers ranked by WoS citations and Altmetric score confirm the previously stated. There are high differences among the documents attracting the online or scientific attention. At a glance, it seems that documents based on interventions, such as randomized clinical trials and observational studies could have higher online attention. Conversely, those documents derived from other ones, such as

systematic reviews or meta-analyses obtains higher scientific attention. Nevertheless, these findings should be confirmed by analyzing the type of documents and/or the topics covered by those documents.

Finally, some observations can be made about the correlation analysis. WoS citations are correlated with all the variables measured. Conversely, LinkedIn and Wikipedia are those less correlated, but it seems to depend on the distribution type; LinkedIn is related to those more social platforms, Facebook and Google+, and Wikipedia is more related to Blogs. Besides, according to the correlation coefficients, WoS seems to be more correlated to Blogs and Wikipedia than other social media.

Limitations

Although the findings provided in the present paper are interesting, there are several limitations. First, only a percentage of the publications indexed in WoS is available in Altmetric.com. Therefore, the conclusions are influenced by the core obtained, probably could have no-covered papers with high online attention. Second, the study only covers the period 2013-2017, so it only shows a partial volume of the research area. Third, only the main social media has been selected to be included in the analysis; so, further coverage is needed. Finally, the intentional tweeting by the publisher or the editor of the journal was not analyzed.

Conclusions

The present study shows several findings of the online attention of the Rehabilitation research area. First, Twitter is the social media in which the production attracts the highest attention. Nevertheless, not all types of documents and journals obtain the same social and scientific recognition. In this way, further analysis about the online attention of the Rehabilitation research area and how the variables are correlated, dividing the dataset by different characteristics, is still needed.

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