Does a research group increase impact on the scientific community or general public discussion? Alternative metric-based evaluation

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Abstract: In this study, we investigated the impact of scientific publications of the Italian SIMPAR (Study In Multidisciplinary Pain Research) group by using altmetrics, defined as nontraditional metrics constituting an alternative to more traditional citation-impact metrics, such as impact factor and H-index. By correlating traditional and alternative metrics, we attempted to verify whether publications by the SIMPAR group collectively had more impact than those performed by its individual members, either in solo publications or in publications coauthored by non-SIMP AR group investigators (which for the purpose of this study we will refer to as “individual publications”). For all the 12 members of the group analyzed (pain therapists, biologists, and pharmacologists), we created Open Researcher and Contributor ID and Impact Story accounts, and synchronized these data. Manually, we calculated the level metrics for each article by dividing the data obtained from the research community by those obtained from the public community. We analyzed 759 articles, 18 of which were published by the SIMPAR group. Altmetrics demonstrated that SIMPAR group publications were more likely to be saved (77.8% vs 45.9%), discussed (61.1% vs 1.1%, \( P < 0.0001 \)), and publicly viewed (11.1% vs 1.3%, \( P = 0.05 \)) than individual publications. These results support the importance of multidisciplinary research groups in the impact of scientific literature; the interaction and synergy among the research participants allowed the attainment of high impact-literature in the field of personalized pain medicine. Finally, our findings demonstrate the potential of altmetrics in estimating the value of the research products of a group.

Keywords: altmetrics, SIMPAR group, pain-research impact

Introduction

Altmetrics creates a new approach to evaluating the impact of publications by considering the number of downloads, shares, and discussions on social networks.1 This approach does not replace the traditional bibliometric indicators, such as Impact Factor and H-index, but rather focuses on new aspects of publication impact.2 Although still in its infancy, altmetrics has the potential to become a valid assessment strategy for the evaluation of publication impact.3 Altmetric tools capture information through the use of metrics from HTML views and downloads of articles, blog posts, tweets, bookmarks, etc. All of these sources are alternative indicators of impact that go beyond traditional citation, focusing on the content and uses of the social web,4 with this information provided in real time. Altmetrics elucidate not only the impact of scientific research by researchers but also the impact of the research on the public through social media.5 In fact, through altmetrics, the impact of research can be measured
at the individual-article level, using a combination of such
data as the number of times that a particular paper has been
downloaded, discussed, shared, and cited. This approach
allows not only researchers but also institutions to analyze
postpublication activity around a paper in near-real time using
various online resources.

To use this new tool, we focused on the Italian researchers
of the SIMPAR group, which was founded in Pavia in
2007. This group has rapidly become an eminent transla-
tional group in the pain field, with its annual meeting now
considered a major international pain conference (www.
simpar.eu). In addition to the authors of this study, the
other nine members of the SIMPAR group are Drs Marco
Baciarelo, Dario Bugada, Christian Compagnone, Andrea
Fanelli, Stefano Govoni, Maurizio Marchesini, Cristina E
Minella, Carolina Muscoli, and William Raffaelli. SIM-
PAR's multidisciplinary collaboration has included several
professionals of different disciplines and has produced
a number of publications on the personalization of pain
therapy through a multidisciplinary approach, including
traditional medical, genetic, epigenetic, and “omic” dis-
ciplines. Table S1 lists each of the 18 papers published by
at least two SIMPAR members in collaboration between
2010 and 2015. As described herein, we have been able to
obtain statistically significant results regarding the force
of the group as a whole in both the research and public
communities.

Materials and methods
For each of the 12 researchers of which our team is com-
prised, we created an ORCID (Open Researcher and Con-
tributor ID) account (www.orcid.org), in addition to an
Impact Story (https://impactstory.org) account that imported
our data and synchronized it with the unique ORCID identi-
fiers. Collected items were assigned to specific categories,
such as “cited” (or highly cited), “saved” (or highly saved),
or “discussed”. In doing so, our Impact Story provided
us with data regarding the number of times an article was
saved by scholars, cited by other researchers, publicly
discussed (Facebook, etc), and cited by the general public
(blog posts, Wikipedia). These metrics were classified along
two dimensions: audience (scholars or the public) and type
of engagement with the online research products (viewed,
discussed, saved, cited).

From Impact Story, we were able to retrieve all altmetrics data for the 12 researcher accounts
(paper citations, discussions, views by the research community or public).

Statistical analysis
Through the personal profiles of altmetrics, for each mem-
ber of the SIMPAR group, we were able to count the number
of citations, times a paper was saved, and discussions from
the public community for each paper published. Then, we
compared the SIMPAR group percentages of articles cited
(or highly cited), saved (or highly saved), or discussed relative to those published by single authors (either written
alone or in collaboration with coauthors who were not
members of the SIMPAR group) by means of Fisher’s exact
test. Quantitative variables are described as median and
interquartile range (IQR), ie, the 25th and 75th percentiles
and compared to collective SIMPAR data or individual pub-
lication articles by means of a nonparametric Mann–Whit-
ney test. The association between citations from Scopus
and the altmetric score or its components (eg, Facebook
posts, tweets, Mendeley readers) was expressed through
a nonparametric Spearman’s \( r \)-correlation coefficient. A
\( P \)-value <0.05 was considered statistically significant. All
analyses were performed utilizing Stata 14 (Statacorp LP,
College Station, TX, USA).

Results
We analyzed 169 articles, 18 of which were SIMPAR
group publications. The median number of articles by
the authors was 17 (IQR 10–27), and the median year
of publication was 2013 (IQR 2011–2014). Altmetrics
demonstrated that SIMPAR group publications were more
likely to be saved (78% vs 53%, \( P=0.05 \)) and publicly
discussed (61% vs 4%, \( P<0.0001 \)) than individual pub-
lications. However, no significant difference emerged
between the SIMPAR group publications and individual publications in terms of being cited (cited 44% vs 36%,
highly cited 22 vs 11%; \( P=0.20 \)) and publicly viewed
(11% vs 3%, \( P=0.25 \)). Notably, eleven of 18 articles pub-
lished collectively by the SIMPAR group received a tweet
(median 1, IQR 1–3), while only 36 of 151 individual publications received a tweet. Moreover, 15 articles from
the SIMPAR group collectively were accessed through
Mendeley readers (median times accessed 4, IQR 1–11)
versus 85 of the individual publications (median times
accessed 2, IQR 0–8; \( P=0.01 \)). We describe the correlation
between Scopus citations and the single components
of the analyzed alternative metrics in Table 1. We found
that the alternative metrics were generally low, with
the exception of those for Mendeley readers (\( r=0.47,
\( P<0.0001 \)) (Figure 1).
Table 1  Correlation coefficient (P-value) between Scopus citations and altmetric components

<table>
<thead>
<tr>
<th>Source</th>
<th>Facebook posts</th>
<th>Tweets</th>
<th>Impact Story views</th>
<th>Mendeley readers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tweets</td>
<td>0.02 (0.81)</td>
<td></td>
<td>0.02 (0.81)</td>
<td></td>
</tr>
<tr>
<td>Impact Story views</td>
<td>−0.01 (0.87)</td>
<td>0.13 (0.09)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mendeley readers</td>
<td>−0.04 (0.6)</td>
<td>0.01 (0.87)</td>
<td>0 (0.93)</td>
<td></td>
</tr>
<tr>
<td>Scopus citations</td>
<td>−0.05 (0.53)</td>
<td>−0.10 (0.18)</td>
<td>−0.04 (0.57)</td>
<td>0.47 (&lt;0.001)</td>
</tr>
</tbody>
</table>

Note: Data presented as correlation coefficient (P-value).

Discussion and conclusion

We found significant correlations between the SIMPAR group collective publications and their impact on the indicator linked to research activity (Mendeley readers), although not to public discussion (such as Facebook and tweets). However, the impact of collective SIMPAR group articles was high also on general public items, even though it did not reach statistical significance. This is meaningful, as funders, universities, and publishers increasingly demand indicators of the impact of science on society.8

Moreover, we are confident that the new metrics of medical groups could have an impact on the pain-patient community as well. Through online platforms, such as Twitter and Facebook, like-minded people can form their own communities to discuss their shared experiences, problems, and more.

Our results also illustrate how collaborative multidisciplinary teams and their projects improve the overall impact of researchers’ work on the researchers themselves. If collaborative efforts are more widely disseminated than individual publications, as our study suggests, such efforts can potentially provide additional exposure to group members, which may result in greater career enhancement than individual publications. Through these avenues, researchers can leverage social media opportunities to their own professional and academic advantage.9 Enhanced exposure allows for the sharing of ideas and research among respective networks, spotlighting pain studies both nationally and internationally.

Finally, as the SIMPAR group take research ethics seriously, we opine that our collaborative approach is an ethical one as well as an effective one. Research resources are scarce, and becoming more so. Ways to increase the “yield” from biomedical research have been identified as an imperative.10 As our collaborative efforts have been demonstrated to enhance access to meaningful, clinically relevant research results, our approach results in more “bang for the buck” by more readily disseminating useful information to practicing clinicians, as well as to other researchers interested in building upon the fund of data obtained through our investigations. Hopefully, other pain researchers will choose to follow our lead.
Acknowledgments
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Disclosure
The authors report no conflicts of interest in this work.

References
Supplementary material

The 18 papers published from Italian SIMPAR group (from at least two members) analyzed in the paper are as follows: