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Are predatory journals undermining the credibility of science? A bibliometric analysis of citers

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Abstract Warnings against publishing in predatory journals are plentiful and so are the suggested solutions to the problem. The existing studies all confirm that authors of articles published in potential predatory journals are typically young, inexperienced and from Asia or Africa. To what extend we can consider the problem negligible is determined by the impact they are having on the scholarly communication in terms of publications and citations. The existing literature can provide more information about the former than the latter. This paper is an analysis of potential predatory journals as well as potential poor scientific standards journals. Citations to 124 potential predatory journals and poor scientific standards journals are looked up in Scopus and the citing authors analysed in regards to geographic location, publications and citations. The results show that the characteristics of the citing author indeed resemble those of the publishing author. Implications for recommendations and future research are discussed.

Keywords Predatory journals · Citing authors · Citation analysis

Introduction

The number of predatory journals is claimed to be continuously rising (Beall 2012, 2015b; Shen & Bjork 2015). Unscrupulous publishers are exploiting the open-access (OA) publishing model by producing fake, scam, unscholarly and deceptive journals. The peer review process is corrupted and is either non-existent or minimal. Huge profits are made on the basis of author publication fees, which seem to be the main criteria for publication.

Several claims have been made that the integrity of science is at risk and so is the reputation of the authors publishing in predatory journals (Bartholomew 2014; Beninger

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et al. 2016), and scholars are being advised against publishing in these journals (Anthony 2015; Betz 2016; Clark & Smith 2015; Fitzpatrick 2015; Flanagan 2015; Kmietowicz 2009; Moher & Moher 2016). Some even consider these journals evil (Das & Chatterjee 2017) or pollution of the scientific record (Beall 2016) as they contaminate the genuine scientific records of legitimate journals (Manca et al. 2017a, b).

Despite the frequent warnings the number of predatory journals has risen dramatically during the past 5 or 10 years (Shen & Bjork 2015). Authors who publish in potential predatory journals and potential poor scientific standards journals are geographically concentrated in developing countries, especially India, Nigeria, and more generally Asia, African and the Middle East whereas prestigious OA journals are primarily publishing papers by authors from Australia, Europe, and North America (Xia et al. 2015). Even experienced scholars can be deceived by the numerous invitations from predatory journals, although inexperienced scholars are at the highest risk for falling prey of predatory publishers (Xia et al. 2015). Misleading metrics, journal titles similar to the titles of respected journals and the presence of academics/scientists with affiliations to leading research organizations and universities are possible explanations for the rapid growth.

The numerous warnings against submitting to the predatory journals are being supplemented with warnings against citing them as well. Journal of Threatened Taxa (JoTT) has even published the following guidelines regarding the citation of work from predatory journals (Raghavan et al. 2015: p 7610):

1. JoTT discourages citation of work published in journals from any of the known predatory publishers or stand-alone predatory/deceptive journals. For all practical purposes, we suggest that authors refer to the list of publishers and list of stand-alone journals at www.scholarlyoa.com (Beall 2015a).
2. JoTT discourages citation of work from journals that are not yet listed in Beall (2015a) but fulfil the criteria set by Beall (2015b).
3. If the author must cite the work published in a predatory journal, as it is important in the study, they should cite it in the text as 'published in a predatory journal' (since JoTT does not trust that such work was published following scientific procedure of peer review). For instance, "…….. was suggested by Author et al. (published in a predatory journal)" or "….. was suggested (Author et al., published in a predatory journal)".
4. Although JoTT does not consider work published in predatory journals as scientifically valid, authors are advised not to reproduce the content of such work as a whole or in part in JoTT as all such frauds will be considered scientific misconducts of the form 'plagiarism'. Such accusations will be objectively analyzed and penalized appropriately as stated in an earlier JoTT Editorial on policy (Dahanukar and Molur 2012).
5. JoTT understands the limitations of the present listing of predatory publications by Beall (2015a) as applied to only open-access journals, and will include predatory/deceptive subscription or toll-access journals as identified by other systematic and authentic evaluators.

Consequently, JoTT discourages citing the predatory journals, as the work is not considered valid. Citing predatory journals is considered "unacceptable" by Gasparyan et al. (2015) and avoiding them is not just the responsibility of the authors. Regardless of the warnings JoTT has noted an increasing number of references to predatory journals in works submitted to JoTT (Raghavan et al. 2015).

Studies inform of us the characteristics of the publishing authors in potential predatory journals and potential poor scientific standards journals (e.g. Watkinson et al. 2016; Xia

et al. 2015). However, we know less of the scholars citing the work published in potential predatory journals and potential poor scientific standards journals. The present study is an examination of who cites potential predatory journals and potential poor scientific standards journals. In particular, this study examines the following research questions:

1. Are authors citing potential predatory journals and potential poor scientific standards journals predominantly from developing countries?
2. Are authors citing potential predatory journals and potential poor scientific standards journals generally inexperienced authors with few publications and citations?

In the following an overview of the related research is provided. Following that is a description of the methods used in the study and the results of the analyses. Finally, the results are discussed and conclusions are offered.

Related research

Beall uses a number of criteria to determine if a publisher or a standalone journal can be characterized as predatory. The criteria are classified into 5 groups (Beall 2015a):

- Editor and staff.
- Business management.
- Integrity.
- Other.
- Poor journal standards/practice.

Although the use of Beall's list is widespread the contribution by Beall is also questioned (Berger & Cirasella 2015). Identification of predatory journals is not straightforward. Numerous frameworks or checklists exist (for an overview see Frandsen 2017). However, the frameworks differ significantly in their approach and tend to focus more on form than content. Furthermore, an application of Beall's criteria on a set of journals revealed that even traditional model journals might classify as possibly predatory (Olivarez et al. Forthcoming). Consequently, low-quality journals found in the traditional publishing model should also be taken into account when classifying journals as noted by Berger and Cirasella (2015).

The lack of indexing in databases such as DOAJ, Web of Science or PubMed is typically considered a characteristic of the predatory journal (e.g. Eriksson & Helgesson 2016; Masten & Ashcraft 2016; Roberts 2016; Van Nuland & Rogers 2016; Ward 2016). However, as pointed out by Manca et al. (2017a) some predatory journals are found in PubMed and even though they are marked as not currently indexed for Medline they are nonetheless visible in PubMed which is problematic as authors are not made aware of potential predatory status (Manca et al. 2017a, b).

The number of predatory journals has risen dramatically during the past 5 or 10 years. Predatory journals have increased their publication volumes from 53,000 articles in 2010 to an estimated 420,000 articles in 2014 and is considered of the same magnitude as in the journals indexed in DOAJ (Shen & Bjork 2015). However, the numbers have been questioned and are considered to overestimated by some arguing that the number of articles in predatory journals is only about one-third (Crawford). The overall scientific output is estimated to be over 1.5 million articles in 2012 and an segmented regression analysis shows the global scientific publication output is growing at a rate of $\sim$ 3% annually

suggesting an overall scientific output to be over 2 million articles in 2015 (Bornmann & Mutz 2015).

Several studies confirm that the regional distribution of both the publisher's country and authorship is highly skewed. Shen and Bjork find that Asia and Africa contributed three quarters of authors (Shen & Bjork 2015), and similar results are found by other studies and in anecdotal evidence (Ezinwa Nwagwu & Ojemeni 2015; Nwagwu 2015, 2016; Omobowale et al. 2014; Raghavan et al. 2014; Xia et al. 2015). Furthermore, authors of articles published in predatory journals tend to be young and inexperienced (Xia et al. 2015).

Shen and Bjork (2015) find that the problems caused by predatory journals are rather limited and regional. They believe that the publishing volumes in predatory journals will cease growing in the near future and consequently, action is not needed. However, a number of other scholars call for action. The use of Beall's list or a set of criteria for evaluating journals is suggested by several (Berger & Cirasella 2015; Roberts 2016; Umlauf 2016), but other studies suggest other strategies; Dadkhah and Bianciardi (2016) suggest an extension of Beall's list by introducing a new metric for ranking journals called the Predatory Rate. The metric is based on Beall's criteria but allows journals to fall into three categories: predatory journals, journal with predatory practice, and non-predatory ones. Moher and Moher (2016) suggest a collaborative effort by e.g. publishers, editors, funders and academic institutions while Asadi et al. (2016) suggest the use of cross-disciplinary online-based approaches to evaluate scientific journals in order to avoid the hijacked ones. Finally, Jalalian (2015) recommends the development of a republication procedure for the authors of papers published in hijacked journals and thus allowing them to publish the same article twice.

Summing up, predatory journals come in various forms but they are all based on making a profit from extracting author publication fees without fulfilling the traditional publisher obligations. The number of predatory journals has escalated the past 5 years, however, the extent can be difficult to determine. Several studies confirm that the regional distribution of both the publisher's country and authorship is highly skewed and dominated by Asian and African authors. Authors of articles published in potential predatory journals and potential poor scientific standards journals are typically young and inexperienced. Some believe that the problem is negligible and the number of predatory journals will stabilize in a few years. Others suggest a number of different solutions to meet the challenges of predatory journals threatening to short circuit the scholarly communication system.

Methods

In order to analyse the characteristics of citers of potential predatory journals and potential poor scientific standards journals a set of potential predatory journals and potential poor scientific standards journals is needed as a starting point. The stand-alone journals (as opposed to those titles that are a part of a predatory publisher's portfolio of titles) on Beall's list from 2014 form the basis of the analyses. We assume that citation patterns of the standalone journals are not different from that seen in the journals on the predatory publisher list. This has not been tested, which would have been preferable. However, as the portfolio of a predatory publisher is likely to change rapidly and no full, annual list of journals for each potential predatory publisher exits the status of a specific journal cannot be verified in a specific year and thus the approach of using the standalone journals reduces this potential bias. In this case the data consists of a random selection of half of the journals

on the standalone journals. As we must expect a number of these journals not to be cited at all 100 + journals is considered necessary in order to get a solid data set.

The list is downloaded from the website prior to being taken down in the beginning of 2017. The list was claimed to contain potential, probable and possible predatory journals. However, the list should be considered to contain potential poor scientific standards journals as well. The list from 2014 is used as starting point for analyses of the articles in 2013 because it is assumed that it is the articles published in 2013 that forms the assessments of the journals on the list for 2014. To track citers Scopus is being used. Being a larger database than Web of Science there is a greater chance of finding more citations to the journals in the data set and thus ensuring a larger data material. Citations to these journals are looked up in Scopus and analysed in terms of citations to the geographic location of the authors as well as the citations received by these articles that cite potential predatory journals and potential poor scientific standards journals.

Some journals could not be uniquely identified as the name of the journal is part of another, longer journal title. In those 26 cases the journal was omitted from the data set, leaving 124 journals for analysis. The characteristics of authors citing these journals are determined in terms of geographic location (i.e. affiliation) and the number of publications up until the year before citing a potential predatory journals and potential poor scientific standards journals in our data set. The publishing year is not included to allow for publication lags. Publication lags vary considerably (Björk & Solomon 2013; Heneberg 2013; Tort et al. 2012) and in this case the lag is set to range from 1 to 12 months depending on specific time of publication. Should the publishing year have been included there would have been a risk of including subsequent publications instead of only previous. Consequently, the publication lag of up to 1 year is the doable solution to the problem of not having data about the exact time of publication. Finally, data on whether or not a specific author is first author or not is also included. First authorship often implies a role with certain expectations. The acknowledgement of first authorship is in some cases shared by several authors (Omary et al. 2015). For an overview of studies of authorship the reader is referred to Marušic et al. (2011). One may thus hypothesize that there is a difference in characteristics of the first author compared to the rest of the authors.

For every citation the following information is recorded:

- Cited potential predatory journal or potential poor scientific standards journal.
  - Name of journal.
  - Cited year.
- Citing publication.
  - DOI (if DOI is not available the title is recorded).
  - Publication year.
- Author(s) of citing publication.
  - First authorship.
  - Number of publications at publication year-1.
  - Number of citations at publication year-1.
  - Country (if multiple affiliations the first affiliation is recorded).
  - Region.

The first journal on Beall's list can serve as an example. Articles published in 2013 in Academic Exchange Quarterly are cited a total of 13 times. One of these citing publications is a book chapter from 2013 by Delello, J. A. and McWhorter, R. R. Both of these authors are from the US. In 2012 the first author had neither publications nor citations. The second author had two publications and 11 citations in 2012.

The analyses of the potential predatory journals and potential poor scientific standards journals do not include a control or reference group of journals. In a previous study (Xia et al. 2015) PLOS journals are being used as control group as they focus on biomedical science, primarily pharmaceutical science. In this case journals on Beall's standalone list form the basis of our study and as the journals on the list by Beall cover several disciplines, suitable controls are impossible to determine, as they should be chosen at the level of subdiscipline. Consequently, we draw on the existing studies by e.g. Xia et al. (2015) when characterising authors citing the journals in our data set.

The data collection took place from February to March 2017 and the data was analysed using standard statistical software.

Results

The data collection resulted in 1295 citations to 124 journals. The 1295 citations were written by a total of 4250 authors.

Fig. 1 Share of authors grouped in regions

We start with the geographical distributions of the citing authors. Figure 1 depicts the shares of authors grouped in different geographic regions. South Asia is dominating followed by Southeast Asia and Middle East. These findings are supported by the existing literature (Ezinwa Nwagwu & Ojemeni 2015; Nwagwu 2015, 2016; Omobowale et al. 2014; Raghavan et al. 2014; Shen & Bjork 2015; Xia et al. 2015).

Figure 2 is similar to Fig. 1, but shows only the geographic distribution of the first authors of the citing publications.

By comparing Figs. 1 and 2 it is evident that the first authors do not stand out from the rest of the authors in terms of geographical distribution. There are a few minor differences. The shares of first authors from Africa, South Asia and North America are slightly higher whereas the share of first authors from the Middle East is lower. However, the differences in author geographic distribution are minor and further analysis is not promising.

The geographical locations of the authors are, however, not equally distributed within regions. In each region a few countries dominate and many countries are barely present. Table 1 contains an overview of the 20 most frequent author countries. One in three of all authors to the citing publications are affiliated with an institution in India. Almost half of the authors are affiliated in either India or Malaysia.

We shall now turn to the level of experience and prestige of the citing authors. Figure 3 is an illustration of the publications and citations of the citing authors in the citing year-1. The figure depicts a picture of most of the authors having no or little experience and prestige when citing on of the journals on Beall's list. Almost half of the citing authors have not published any publications that are indexed in Scopus and more than half have not

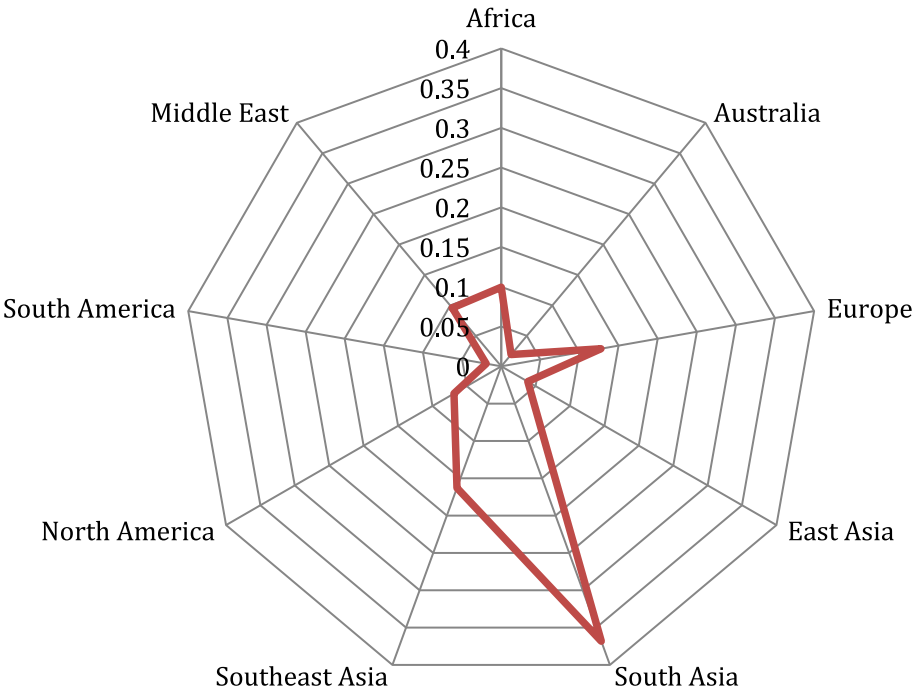

Fig. 2 Share of first authors grouped in regions

Table 1 Top 20 geographical locations

Country	Share in percentages
India	33.4
Malaysia	15.1
USA	4.8
Iran	3.3
Pakistan	2.6
Egypt	2.6
China	2.5
Poland	2.2
Brazil	2.2
Nigeria	1.9
Morocco	1.7
Indonesia	1.7
UK	1.6
Turkey	1.5
South Africa	1.4
Saudi Arabia	1.1
South Korea	1.1
Romania	1.1
Australia	0.9
Russia	0.9

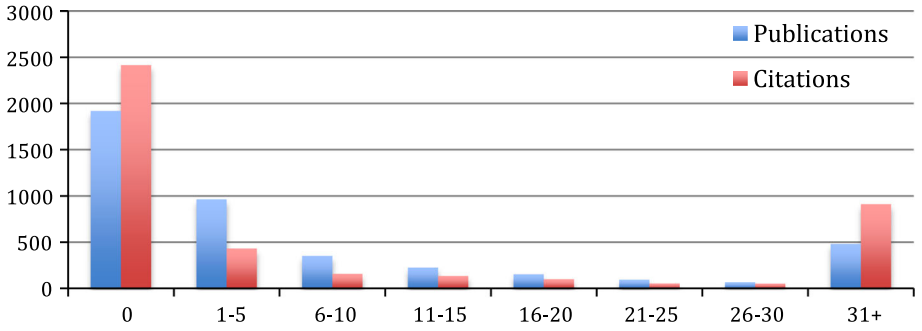

Fig. 3 Publications and citations of the citing authors in the citing year-1

received any citations. This figure corresponds perfectly with the results found by Xia et al. (2015).

Looking at the authors from the various geographic regions we can see different levels of author experience and prestige depending on the geographical location of the citing author. Table 2 provides an overview of the mean publication number by the citing authors in the citing year-1. Regions marked with asterisks are characterised by a mean number of publications significantly different from the world average. More specifically * indicates $p < 0.05$, ** indicates $p < 0.01$ and *** means that $p < 0.001$.

Authors citing journals from Beall's list have published less than the world average at the time of publication if the author is located in Africa, Southeast Asia or South Asia. On

Table 2 Publications of the citing authors in the citing year-1

	Publications	
	Mean	SD
World average	13.27	39.79
Africa	8.83	27.81**
Europe	20.08	38.16***
East Asia	34.78	90.55***
South Asia	9.32	28.02***
Southeast Asia	10.14	23.73**
North America	24.07	57.94**
Oceania	20.22	53.13
South America	11.13	26.57
Middle East	11.06	54.57

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

the other hand the citing authors from Europe, East Asia and North America have a higher number of publications in the citing year-1 than the world average. Authors from North America have 24 publications on average when citing a journal on Beall's list and authors from East Asia even have almost 35 publications on average. Consequently, they can hardly be characterised as inexperienced.

Table 3 is similar to Table 2, but instead shows the mean number of citations received in citing year-1. The results are undeniably parallel to the previous analysis.

Authors citing journals from Beall's list receive a mean number of citations in the citing year-1 that is significantly lower than the world average if the author is located in Africa, Southeast Asia or South Asia. The citing authors have a mean number of received citations higher than the world average if the author is located in Europe, East Asia or North America.

Table 3 Citations received by the citing authors in the citing year-1

	Citations	
	Mean	SD
World average	102.53	549.82
Africa	48.28	191.45***
Europe	163.31	549.75*
East Asia	369.94	1398.00**
South Asia	60.06	258.35***
Southeast Asia	30.46	117.24***
North America	335.44	1262.41**
Oceania	220.86	953.08
South America	105.66	369.83
Middle East	65.33	463.12

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Discussion

Before the results are discussed some limitations of this study should be considered. First of all this study builds on the list of potential predatory journals and potential poor scientific standards journals created by Beall. While that list is the result of the impressive work of a single man, the number of predatory journals is colossal with new ones emerging all the time and the amount of time available to do the assessments singlehandedly is limited. Some questions have been raised in regards to the work by Beall (e.g. Berger & Cirasella 2015), and although the list is far from flawless and many entries are questionable many scholars recommend the use of the list (e.g. da Silva 2015). In this case just being on the list is in itself interesting as the list is widely used for identification of predatory journals and many scholars would avoid a journal just for being on the list. Secondly, this study only includes the standalone journals on Beall's list. It is undetermined if there are significant differences among the journals on the standalone list and the journals that are a part of a publisher's portfolio of titles. Consequently, any effect of this selection of journals as opposed to all potential predatory journals and potential poor scientific standards journals is unknown.

First of all, the problem of citations to potential predatory journals and potential poor scientific standards journals is not as extensive as one would think when being presented with a figure of 420,000 articles in 2014 (Shen & Bjork 2015). This study finds that articles published in 2013 in 124 different journals were cited a total of 1295 times from 2013 to 2016. That is less than ten citations per journal in a four-year citation window and on average single-journal publishers publish more than 260 articles per year (Shen & Bjork 2015). Consequently, we are looking at something in the area of 1295 citations/ 124 * 260 = 0.04 citations per publication. Shen and Bjork (2015) find that the problems caused by predatory journals are rather limited and regional. They do not recommend action.

Secondly, the papers published in these journals may not necessarily be of poor quality and thus citing them may not even be a problem of quality. They probably did not go through rigid peer review, but does not necessarily mean that they are of poor quality. However, in reality these journals often do contain poor quality papers, a fact that is probably also well reflected in the lack of citations to them. In some cases an author may also cite these journals with a note that they are aware of the journal being predatory as recommended by Raghavan et al. (2015: p 7610).

Thirdly, the journals on Beall's list are all open access and under suspicion of being predatory, however, as pointed out by Moustafa (2015) and Olivarez et al. (Forthcoming) journals can have predatory practice regardless of financial model just as journals can have poor scientific standards that makes them resemble a predatory journal. Consequently, this paper is considered an analysis of potential predatory journals as well as potential poor scientific standards journals. However, it would be preferable if a number of traditional subscription based journals with poor scientific standards were also included.

So who cites the potential predatory and poor quality standards journals? It seems to be inexperienced authors primarily from Africa, Southeast Asia or South Asia and to a lesser extent experienced authors from the rest of the world. The number of total citations to the journals in the present data set is relatively low. The problem with citations to potential predatory and poor quality standards journals is limited to a relatively low number of citing authors from a limited number of countries that seems to support the viewpoint of Shen and Bjork (2015) that these journals present a rather limited and regional problem. They even

believe that the publishing volumes in such journals will cease growing soon. This view is, however, challenged by Moher et al. (2017) arguing that a considerable share of authors in predatory journals are from the developed world and thus the problem is not to be ignored. They find severe lack of descriptions of study methods, results and study registration in the papers published by predatory journals. They recognize that adherence to guidelines is irregular even in mainstream publications. However, for their sample it was a considerably lower. They argue: "Substandard publications have permeated authentic electronic databases" (Moher et al. 2017: p25). Roiling the scientific community with sketchy publications is even characterized as the fake news problem of medical journals (Deprez & Chen 2017).

There may be a difference between publishing in the potential journals and afterwards citing them. Most savvy scholars would avoid both and to get cited in a citation database requires indexing of the citing document. Consequently, if potential predatory and poor quality standards journals are indexed in bibliographic databases the number of citations to these publications will increase all other things equal. Articles from potential predatory journals have been identifies in several bibliographic databases including PubMed and DOAJ (Manca et al. 2017a, b; Nelson & Huffman 2015). The indexing of journals in bibliographic databases such as DOAJ and Medline is considered a corner stone when fighting the problem (Manca et al. 2017; Oransky 2017).

Conclusion

The results of the present study confirm the profile of citing authors being comparable to that of publishing authors in potential predatory journals and potential poor scientific standards journals. The citing authors tend to be inexperienced authors from Africa, Southeast Asia or South Asia and to a lesser extent experienced authors from the rest of the world. Although disputed, the number of published papers in potential predatory journals and potential poor scientific standards journals seems to pose a greater problem (as authors actually pay for the publishing process) than the citations to them.

However, even if the number of citations to these journals is generally low action should be taken targeting the different groups of authors that publish in or cite potential predatory journals and potential poor scientific standards journals. It means targeting experienced as well as inexperienced authors from all over the world. Educational programmes in publication strategies are needed or maybe even a change in publication incitements. More research is needed to develop the appropriate strategies and as argued by David Moher in a recent interview: "For example, there is almost no research that has interviewed a sample of predatory journal authors to ascertain their motivations for publishing in these journals. Funders really need to step up to the plate and provide funding to researchers to develop a broad range of investigations related to predatory journals. If we are to stop predatory journals we need evidence to guide us" (Oransky 2017). Finally, bibliographic databases should play an active role in strengthening the quality control of indexed articles and journals.

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Appendix: List of included cited journals (from Beall's list)

1. Academic Exchange Quarterly.
2. Academicus International Scientific Journal.
3. Academy of Contemporary Research Journal (AOCRJ).
4. Acta de Gerencia Ciencia (CAGENA).
5. Advances in Forestry Letter.
6. Al Ameen Journal of Medical Sciences (AJMS).
7. American Journal of Advanced Drug Delivery.
8. American Journal of Advances in Medical Science (ARNACA).
9. American Journal of Engineering Research.
10. American Journal of Pharmacy and Health Research (AJPHR).
11. American Journal of PharmTech Research (AJPTR).
12. American Journal of Phytomedicine and Clinical Therapeutics.
13. American Journal of Social issues and Humanities.
14. American Research Journal.
15. Anglisticum: International Journal of Literature, Linguistics & Interdisciplinary Studies.
16. Archives Des Sciences Journal.
17. Archives of Pharmacy Practice.
18. ARNACA American Journal of Advances in Medical Science.
19. Asian Journal of Biomedical and Pharmaceutical Sciences.
20. Asian Journal of Health and Medical Sciences.
21. Asian Journal of Humanities and Social Sciences.
22. Asian Journal of Business and Management Sciences (AJBMS).
23. Asian Journal of Pharmaceutical and Health Sciences.
24. Asian Journal of Pharmacy and Life Science.
25. Asian Journal of Pharmaceutical Research and Health Care (AJPRHC).
26. Australasian Journal of Herpetology.
27. Australian Journal of Basic and Applied Sciences.
28. Australian Journal of Business and Management Research (AJBMR).
29. Ayupharm: International Journal of Ayurveda and Allied Sciences.
30. The Bioscan.
31. Bioresearch Bulletin.
32. Bioscience Discovery.
33. Biosciences, Biotechnology Research Asia (BBRA).
34. British Biomedical Bulletin.
35. British Journal of Economics, Finance and Management Sciences.
36. British Journal of Science.
37. Bulletin of Mathematical Sciences & Applications.
38. Bulletin of Pharmaceutical Research.
39. Bulletin of Society for Mathematical Services and Standards.
40. Calodema.
41. Canadian Chemical Transactions.
42. Case Studies Journals.
43. Chemical Science Transactions.
44. Computer Science Chronicle.
45. Computer Science Journal.

46. The Criterion: An International Journal in English.
47. Current Biotica.
48. Current Discovery.
49. Current Trends in Technology and Sciences (CTTS).
50. Direct Research Journals.
51. E-Library Science Research Journal.
52. ExcelingTech Publishing Company, Ltd.
53. Elixir International Journal (formerly Elixir Online Journal).
54. FOREX Technical Journal Library.
55. Frontiers in Aerospace Engineering.
56. Galaxy: International Multidisciplinary Research Journal.
57. Global Journal of Management Science and Technology.
58. Global Journal of Medicine and Public Health.
59. Golden Research Thoughts.
60. Indian Journal of Applied-Basic Medical Sciences.
61. Indian Journal of Pharmaceutical and Biological Research (IJPBR).
62. Indian Journal of Research Anvikshiki.
63. Indian Journal of Research in Pharmacy and Biotechnology (IJRPB).
64. Indian Journal of Scientific Research (IJSR).
65. Indian Streams Research Journal.
66. Indo American Journal of Pharmaceutical Research.
67. Indo-Global Journal of Pharmaceutical Sciences.
68. Innovations in Pharmaceuticals and Pharmacotherapy (IPP).
69. Interdisciplinary Journal of Contemporary Research in Business.
70. Interdisciplinary Journal of Research in Business (IDJRB).
71. International Ayurvedic Medical Journal (IAMJ).
72. International Design Journal.
73. International Journal of Advanced Technology and Engineering Research (IJATER).
74. International Journal of Advancements in Mechanical and Aeronautical Engineering.
75. International Journal of Advances in Power Systems (IJAPS).
76. International Journal of Agronomy & Plant Production.
77. International Journal of Ayurveda and Pharma Research.
78. International Journal of E-Computer Science Evolution.
79. The International Journal of Educational and Psychological Assessment.
80. The IJES: The International Journal of Engineering and Science.
81. International Journal of English and Education.
82. International Journal of English Language & Translation Studies (IJ-ELTS).
83. International Journal of Health Research.
84. International Journal of Health Sciences and Research.
85. International Journal of Humanities and Social Science Invention (IJHSSI).
86. International Journal of Humanities, Engineering and Pharmaceutical Sciences.
87. International Journal of Information and Communication Research.
88. International Journal of Latest Research in Engineering and Computing (IJLREC).
89. International Journal of Management, Economics and Social Sciences (IJMESS).
90. International Journal of Mathematics and Soft Computing (IJMSC).
91. International Journal of Medicobiologial Research.
92. International Journal of Novel Drug Delivery Technology.

93. International Journal of Power Electronics Engineering.
94. International Journal of Research Development (IJORD).
95. International Journal of Research in Medical and Dental Sciences.
96. International Journal of Science and Advanced Technology (IJSAT).
97. International Journal of Scientific Research and Application (IJSRA Publishing).
98. International Journal of Trends in Economics Management and Technology (IJTEMT).
99. Journal der Pharmazie Forschung (RAPSR).
100. Journal of Advances in Internal Medicine.
101. Journal of American Physicians and Surgeons (JPANDS).
102. Journal of Basic and Clinical Pharmacy [Link dead as of 2013-05-06].
103. Journal of Behavioral Sciences in Asia.
104. Journal of Bio Innovation.
105. Journal of Business Management and Applied Economics.
106. Journal of Current Pharma Research.
107. Journal of ELT and Applied Linguistics (JELTAL).
108. Journal of International Academic Research for Multidisciplinary(JIARM).
109. Journal of Science Editing.
110. Kashmir Economic Review.
111. National Journal of Basic Medical Sciences.
112. National Journal of Medical and Dental Research.
113. Oriental Journal of Computer Science and Technology.
114. Plant Digest.
115. Reef Resources Assessment and Management Technical Paper.
116. Research Directions: International Multidisciplinary Research Journal.
117. Researchers World – Journal of Arts Science & Commerce.
118. Seventh Sense Research Group Journal.
119. South Asian Journal of Mathematics.
120. Tactful Management Research Journal (TMRJ).
121. Universal Journal of Applied Computer Science and Technology.
122. Universal Journal of Computer Science and Engineering Technology (UniCSE).
123. Weekly Science International Research Journal.
124. World Journal of Science and Technology (WJST).

References

Anthony, M. (2015). Predatory journals. *Home Healthc Now, 33*(2), 65–66. doi:10.1097/nhh.0000000000000186.

Asadi, A., Rahbar, N., Asadi, M., Asadi, F., & Khalili Paji, K. (2016). Online-based approaches to identify real journals and publishers from hijacked ones. *Science and Engineering Ethics*. doi:10.1007/s11948-015-9747-9.

Bartholomew, R. E. (2014). Science for sale: The rise of predatory journals. *Journal of the Royal Society of Medicine, 107*(10), 384–385. doi:10.1177/0141076814548526.

Beall, J. (2012). Predatory publishers are corrupting open access. *Nature, 489*(7415), 179.

Beall, J. (2015a). Criteria for determining predatory open-access publishers. Scholarly openaccess. https://scholarlyoa.files.wordpress.com/2015/01/criteria-2015.pdf. Accessed 28 May 2016.

Beall, J. (2015b). Predatory journals and the breakdown of research cultures. *Information Development, 31*(5), 473–476. doi:10.1177/0266666915601421.

Beall, J. (2016). Predatory journals: Ban predators from the scientific record. *Nature, 534*(7607), 326. doi:10.1038/534326a.

Beninger, P. G., Beall, J., & Shumway, S. E. (2016). Debasing the currency of science: The growing menace of predatory open access journals. *Journal of Shellfish Research, 35*(1), 1–5. doi:10.2983/035.035.0101.

Berger, M., & Cirasella, J. (2015). Beyond Beall's list better understanding predatory publishers. *College & Research Libraries News, 76*(3), 132–135.

Betz, C. L. (2016). Authors beware: Open access predatory journals. *Journal of Pediatric Nursing, 31*(3), 233–234. doi:10.1016/j.pedn.2016.02.006.

Björk, B.-C., & Solomon, D. (2013). The publishing delay in scholarly peer-reviewed journals. *Journal of Informetrics, 7*(4), 914–923.

Bornmann, L., & Mutz, R. (2015). Growth rates of modern science: A bibliometric analysis based on the number of publications and cited references. *Journal of the Association for Information Science and Technology, 66*(11), 2215–2222. doi:10.1002/asi.23329.

Clark, J., & Smith, R. (2015). Firm action needed on predatory journals. *Bmj-British Medical Journal, 350,* 2. doi:10.1136/bmj.h210.

da Silva, J. A. T. (2015). A response to the editorial on predatory publishing. *Journal of Threatened Taxa, 7*(15), 8305–8306.

Dadkhah, M., & Bianciardi, G. (2016). Ranking predatory journals: Solve the problem instead of removing it! *Advanced Pharmaceutical Bulletin, 6*(1), 1–4. doi:10.15171/apb.2016.001.

Dahanukar, N., & Molur, S. (2012). Scientific conduct and misconduct: Honesty is still the best policy. *Journal of Threatened Taxa, 4*(9), 2845–2848.

Das, S., & Chatterjee, S. S. (2017). Say no to evil: Predatory journals, what we should know. *Asian Journal of Psychiatry, 28,* 161–162. doi:10.1016/j.ajp.2017.05.011.

Deprez, E. E., & Chen, C. (2017). Medical journals have a fake news problem. *Bloomsberg Businessweek*, Aug 29, available at Deprez, E. E., & Chen C. (2017). https://www.bloomberg.com/news/features/2017-08-29/medical-journals-have-a-fake-news-problem. Accessed 15 sept 2017.

Eriksson, S., & Helgesson, G. (2016). The false academy: Predatory publishing in science and bioethics. *Medicine, Health Care and Philosophy, 20*(2), 163–170. doi:10.1007/s11019-016-9740-3.

Ezinwa Nwagwu, W., & Ojemeni, O. (2015). Penetration of Nigerian predatory biomedical open access journals 2007-2012: a bibiliometric study. *Learned Publishing, 28*(1), 23–34. doi:10.1087/20150105.

Fitzpatrick, J. J. (2015). Predatory journals: When outcome is valued over quality. *Applied Nursing Research, 28*(1), 1. doi:10.1016/j.apnr.2014.12.004.

Flanagan, J. (2015). Predatory publishers: Authors beware. *International Journal of Nursing Knowledge, 26*(1), 1. doi:10.1111/2047-3095.12069.

Frandsen, T. F. (2017). Identifying predatory journals: Checklists and frameworks. Unpublished material.

Gasparyan, A. Y., Yessirkepov, M., Voronov, A. A., Gerasimov, A. N., Kostyukova, E. I., & Kitas, G. D. (2015). Preserving the integrity of citations and references by all stakeholders of science communication. *Journal of Korean Medical Science, 30*(11), 1545–1552. doi:10.3346/jkms.2015.30.11.1545.

Heneberg, P. (2013). Effects of print publication lag in dual format journals on scientometric indicators. *PLoS ONE, 8*(4), e59877.

Jalalian, M. (2015). A second chance for authors of hijacked journals to publish in legitimate journals. *Electron Physician, 7*(2), 1017–1018. doi:10.14661/2015.1017-1018.

Kmietowicz, Z. (2009). Students warned not to subscribe to journal "scam". *British Medical Journal, 338,* 3. doi:10.1136/bmj.b735.

Manca, A., Cugusi, L., Dvir, Z., & Deriu, F. (2017a). PubMed should raise the bar for journal inclusion. *The Lancet, 390*(10096), 734–735. doi:10.1016/S0140-6736(17)31943-8.

Manca, A., Martinez, G., Cugusi, L., Dragone, D., Dvir, Z., & Deriu, F. (2017b). The surge of predatory open-access in neurosciences and neurology. *Neuroscience, 353,* 166–173. doi:10.1016/j.neuroscience.2017.04.014.

Manca, A., Martinez, G., Cugusi, L., Dragone, D., Mercuro, G., & Deriu, F. (2017c). Predatory open access in rehabilitation. *Archives of Physical Medicine and Rehabilitation, 98*(5), 1051–1056.

Marušić, A., Bošnjak, L., & Jerončić, A. (2011). A systematic review of research on the meaning, ethics and practices of authorship across scholarly disciplines. *PLoS ONE, 6*(9), e23477.

Masten, Y. B., & Ashcraft, A. S. (2016). The Dark Side of Dissemination: Traditional and Open Access Versus Predatory Journals. *Nursing Education Perspectives, 37*(5), 275–277. doi:10.1097/01.NEP.0000000000000064.

Moher, D., & Moher, E. (2016). Stop predatory publishers now: Act collaboratively. *Annals of Internal Medicine, 164*(9), 616–617. doi:10.7326/m15-3015.

Moher, D., Shamseer, L., Cobey, K. D., Lalu, M. M., Galipeau, J., Avey, M. T., et al. (2017). Stop this waste of people, animals and money. *Nature, 549*(7670), 23–25. doi:10.1038/549023a

Moustafa, K. (2015). Fake journals: Not always valid ways to distinguish them. *Science and Engineering Ethics, 21*(5), 1391–1392. doi:10.1007/s11948-014-9608-y.

Nelson, N., & Huffman, J. (2015). Predatory journals in library databases: How much should we worry? *The serials librarian, 69*(2), 169–192.

Nwagwu, W. E. (2015). Counterpoints about predatory open access and knowledge publishing in Africa. *Learned Publishing, 28*(2), 114–122. doi:10.1087/20150205.

Nwagwu, W. E. (2016). Open access in the developing regions: Situating the altercations about predatory publishing. *Canadian Journal of Information and Library Science-Revue Canadienne Des Sciences De L Information Et De Bibliotheconomie, 40*(1), 58–80.

Olivarez, J. D., Bales, S., & Sare, L. (Forthcoming). Format Aside: Applying Beall's Criteria to Assess the Predatory Nature of both OA and Non-OA Library and Information Science Journals. *College & Research Libraries*.

Omary, M. B., Wallace, M. B., El-Omar, E. M., Jalan, R., & Nathanson, M. H. (2015). A multi-journal partnership to highlight joint first-authors of manuscripts. *Gut, 64*(2), 189.

Omobowale, A. O., Akanle, O., Adeniran, A. I., & Adegboyega, K. (2014). Peripheral scholarship and the context of foreign paid publishing in Nigeria. *Current Sociology, 62*(5), 666–684. doi:10.1177/0011392113508127.

Oransky, D. (2017). Predatory journals: Not just a problem in developing world countries, says new Nature paper. *Retraction Watch, September 6*.

Raghavan, R., Dahanukar, N., Knight, J. D. M., Bijukumar, A., Katwate, U., Krishnakumar, K., et al. (2014). Predatory journals and Indian ichthyology. *Current Science, 107*(5), 740–742.

Raghavan, R., Dahanukar, N., & Molur, S. (2015). Curbing academic predators: JoTT's policy regarding citation of publications from predatory journals. *Journal of Threatened Taxa, 7*(10), 7609–7611. doi:10.11609/JoTT.o4388.7609-11.

Roberts, J. (2016). Predatory journals: Think before you submit. *Headache, 56*(4), 618–621. doi:10.1111/head.12818.

Shen, C. Y., & Bjork, B. C. (2015). 'Predatory' open access: a longitudinal study of article volumes and market characteristics. *BMC Medicine, 13,* 15. doi:10.1186/s12916-015-0469-2.

Tort, A. B., Targino, Z. H., & Amaral, O. B. (2012). Rising publication delays inflate journal impact factors. *PLoS ONE, 7*(12), e53374. doi:10.1371/journal.pone.0053374.

Umlauf, M. G. (2016). Predatory open access journals: Avoiding profiteers, wasted effort and fraud. *International Journal of Nursing Practice, 22*(Suppl 1), 3–4. doi:10.1111/ijn.12433.

Van Nuland, S. E., & Rogers, K. A. (2016). Academic nightmares: Predatory publishing. *Anatomical Sciences Education, 10*(4), 392–394. doi:10.1002/ase.1671.

Ward, S. M. (2016). The rise of predatory publishing: How to avoid being scammed. *Weed Science, 64*(4), 772–778. doi:10.1614/WS-D-16-00080.1.

Watkinson, A., Nicholas, D., Thornley, C., Herman, E., Jamali, H. R., Volentine, R., et al. (2016). Changes in the digital scholarly environment and issues of trust: An exploratory, qualitative analysis. *Information Processing and Management, 52*(3), 446–458. doi:10.1016/j.ipm.2015.10.002.

Xia, J., Harmon, J. L., Connolly, K. G., Donnelly, R. M., Anderson, M. R., & Howard, H. A. (2015). Who publishes in "predatory" journals? *Journal of the Association for Information Science and Technology, 66*(7), 1406–1417. doi:10.1002/asi.23265.