Thematic section: Ethics and academic/scientific integrity

Unmasking deceptive journals in education sciences: a study on prevalence, characteristics and visibility

Desmascarando periódicos predatórios em ciências da educação: um estudo sobre prevalência, características e visibilidade

Desenmascarando las revistas depredadoras en ciencias de la educación: un estudio sobre prevalencia, características y visibilidad

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Abstract: This study explores the landscape of predatory journals in education sciences by examining their prevalence, publishers, countries of origin, launch years, malpractices, and internet search metrics, focusing on journals indexed in Cabell's Predatory Reports (n=443). Education science journals make up 2.75% of the total predatory journals listed in the database, primarily scattered across small-scale publishers. The USA, Nigeria, and India emerge as major hubs and results reveal a rapid growth in predatory journals between 2011-2015, followed by slower proliferation. Publication and peer review process violations are the most common malpractices. Internet search metrics indicate increased organic traffic to predatory journal websites from 2017 to 2021 raising concerns about their potential impact on the academic publishing panorama. The findings underscore the need for continued efforts to raise awareness, promote ethical publishing practices, and protect academic integrity in education sciences publications.
Keywords: Predatory journals. Scientific publications. Education sciences. Internet search metrics.

Resumo: Este estudo explora o panorama dos periódicos predatórios nas ciências da educação examinando sua prevalência, editores, países de origem, anos de lançamento, práticas ilícitas e métricas de pesquisa na Internet, com foco em periódicos indexados no Cabell's Predatory Reports (n=443). As revistas científicas

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da educação representam 2,75% do total de revistas predatórias listadas na base de dados, principalmente espalhadas por editoras de pequena escala. Os EUA, a Nigéria e a Índia surgem como grandes centros e os resultados revelam um rápido crescimento de revistas predatórias entre 2011-2015, seguido por uma proliferação mais lenta. As violações do processo de publicação e revisão por pares são as práticas ilícitas mais comuns. As métricas de pesquisa na Internet indicam um aumento do tráfego orgânico para websites de revistas predatórias entre 2017 e 2021, levantando preocupações sobre o seu potencial impacto no panorama da publicação académica. As conclusões sublinham a necessidade de esforços contínuos para aumentar a sensibilização, promover práticas éticas de publicação e proteger a integridade académica nas publicações de ciências da educação.

Palavras-chave: Periódicos predatórios. Publicações científicas. Ciências da educação. Métricas de pesquisa na Internet.

Resumen: Este estudio explora el panorama de las revistas depredadoras en ciencias de la educación examinando su prevalencia, editoriales, países de origen, años de lanzamiento, malas prácticas y métricas de búsqueda en Internet, centrándose en las revistas indexadas en Cabell's Predatory Reports (n=443). Las revistas de ciencias de la educación representan el 2,75% del total de revistas depredadoras incluidas en la base de datos, principalmente distribuidas entre editoriales de pequeña escala. Estados Unidos, Nigeria e India emergen como centros importantes y los resultados revelan un rápido crecimiento de las revistas depredadoras entre 2011 y 2015, seguido de una proliferación más lenta. Las violaciones de los procesos de publicación y revisión por pares son las malas prácticas más comunes. Las métricas de búsqueda en Internet indican un aumento del tráfico orgánico a sitios web de revistas depredadoras entre 2017 y 2021, lo que genera preocupación sobre su impacto potencial en el panorama editorial académico. Los hallazgos subrayan la necesidad de esfuerzos continuos para crear conciencia, promover prácticas editoriales éticas y proteger la integridad académica en las publicaciones de ciencias de la educación.

Palabras clave: Revistas depredadoras. Publicaciones científicas. Ciencias de la educación. Métricas de búsqueda en Internet.

1. Introduction

In recent years, the phenomenon of predatory journals and publishers has grown significantly (Kendall & Linacre, 2022), leading to increased concerns and interest from the academic community (Sureda et al., 2022; Gallent-Torres, 2022). These publications lure researchers with promises of quick edition and wide dissemination, charging fees for publication although they offer little or no editorial oversight and peer review processes, lack transparency and have no credibility in the academic community (Gallent-Torres & Comas-Forgas, 2022). Subsequently, the impact of publishing in predatory journals can be disastrous for the reputation of researchers and institutions and threatens the integrity and reliability of academic research and science, in general (Dinis-Oliveira, 2021).

One of the main interests in the study of predatory journals and publishers is their impact on academic publishing (Krawczyk & Kulczycki, 2021). With the advent of open access publishing, predatory journals have exploited the loopholes in the academic publishing industry (Sureda et al, 2022). Researchers are interested in understanding the extent of predatory publishing on the academic ecosystem, its main characteristics and in developing strategies to address it. In a world where research output is increasingly quantified through metrics, including publication records, publishing in predatory journals can lead to the spread of low-quality or even fraudulent research (Forero et al., 2018). This undermines the quality of academic effort and poses a risk to the scientific results and its impact in society in general. So, it is crucial to address and set a strong corpus of evidence and knowledge on the incidence of predatory publishing (Yamada & Teixeira-da-Silva, 2023), though due to its intrinsic nature and characteristics it is rather difficult achieving it (Grudniewicz et al., 2019). In a broad sense, predatory journals can be identified by five distinctive traits: the presence of false and confusing information on their websites, deviation from ethical

editorial and publishing standards, absence of transparency, usage of aggressive and indiscriminate solicitation methods and management of financial resources that prioritize personal interests (Akça & Akbulut, 2021).

A second area of attention is the business models of predatory journals and publishers (Xia, 2019). These entities often use deceptive marketing practices such as spamming researchers with unsolicited email invitations to submit their manuscripts for publication (Memon, 2018; Sureda et al., 2022). In some cases, they may falsely advertise their impact factors or use the names of legitimate journals to mislead authors (Richtig et al, 2018). This raises questions about the ethics of their business models, which exploit the pressure on researchers to publish their research results in journals (Gallent-Torres, 2022) and takes advantage of their fast (because of being fake or inexistent) review processes to attract the attention of researchers (Demir, 2018). Researchers, publishers, and policymakers are interested in understanding how these business models operate, and in developing mechanisms to distinguish between predatory and legitimate journals and publishers (Laine & Winker, 2017; Ojala et al., 2020).

Yet another topic that merits attention in the context of deceptive journals and publishers is their potential to contribute to the spread of misinformation and disinformation (Otike at al., 2022) and their potential of contagious to legitimate academic publications (Chen & Wang, 2022). Predatory journals lack rigorous editorial oversight and may publish research that is based on flawed or even fraudulent data (Gallent-Torres & Comas-Forgas, 2022). This poses a threat to crucial issues as public health, social problems and safety amongst many others, as well as puts in severe risk the people's trust in science and academia (Sharma & Verma, 2018). In some cases, these journals may even publish research that undermines public policy and generates social polarization on very sensitive issues based on pseudoscientific approaches, such as climate change denial (Beall, 2016) or antivaxxer propaganda (Allen, 2021).

Another aspect that researchers find interesting to investigate in the realm of illegitimate publishers is how they affect the professional development of academics (Balehegn, 2017). Early-career researchers, in particular, are under pressure to publish to secure funding, tenure and promotions. Publishing in predatory journals can damage their reputations and also the ones of their institutions, leading to negative career consequences such as loss of funding and diminished opportunities for collaboration and advancement (Gallent-Torres & Comas-Forgas, 2022).

Finally, there is a growing attention in developing strategies to address the problem of questionable publishers and safeguarding the integrity of academic research (Cukier et al., 2020). This includes, amongst others, strategies as developing standards for identifying and distinguishing between predatory and legitimate journals and publishers (Dadkhah & Bianciardi, 2016), increasing transparency and accountability in academic publishing (Leena & Jeevan, 2022), and providing education and support for researchers to navigate the complex landscape of academic publishing (Gallent-Torres, 2022).

Our approach to the phenomenon it is from the social sciences perspective, which encompass specialties such as sociology, economy and education; disciplines that play a critical role in understanding human behavior, societal dynamics, and the factors that contribute to individual and collective well-being (Heyck, 2015). High-quality research in these fields is essential for informing evidence-based policies and practices that shape vital sectors of society (Head, 2010). The infiltration of predatory journals in social sciences threatens the credibility and utility of research in these disciplines (Shehata & Elgllab, 2018). Understanding the impact and characteristics of predatory journals in social sciences is crucial for safeguarding the quality and

integrity of research in these fields and mitigating the risks associated with impact of these disreputable journals (Sureda et al., 2022).

Education, as a subfield of social sciences, is of particular importance due to its direct influence on the development of human capital, social progress, and economic growth (Ary et al., 2018). Research in education encompasses a wide range of topics, including curriculum development, learning theories, and policy evaluation, among others. The quality and credibility of educational research are paramount for informing effective pedagogical practices and policies that shape the future of education at various levels, from early childhood to higher education.

By disseminating low-quality, unverified research in education sciences, predatory journals can contribute to the implementation of ineffective or even harmful educational practices and policies, with long-lasting repercussions for students' academic achievement, well-being, and career prospects (Sureda et al., 2022).

Our study aligns with some of the trends and topics observed in the existing literature as it focuses on analyzing the prevalence and main predatory characteristics of deceptive journals in the field of education sciences. This discipline has limited knowledge on the subject compared to others (Sureda et al., 2022) and consequently it is necessary to generate a better understanding of the phenomenon of deceitful publications and publishers in social sciences and especially in education. Apart from covering that deficit, our study introduces an innovative approach by analyzing, using internet search metrics, the overall interest in these journals to measure their relevance and estimate their danger or potential threat. In summary, the present study aims to:

1. Determine the prevalence of predatory journals in the field of educational sciences.
2. Identify the geographic context and countries where predatory journals in educational sciences are published.
3. Identify and analyze the malpractices or deviated practices conducted by deceptive journals in education sciences.
4. Investigate the main publishers that issue predatory journals in the field of educational sciences.
5. Assess the longevity of predatory journals in educational sciences.
6. Analyze the interest and visibility of predatory journals in educational sciences on the internet.

Overall, these objectives aim to provide a comprehensive understanding of the phenomenon of predatory journals in the field of educational sciences, and to identify strategies and solutions for addressing the challenges posed by these journals to the academic community.

2. Method

The existence of predatory journals in the education sciences poses significant risks to the integrity of research and the dissemination of reliable knowledge in this field. To better understand the scope and characteristics of these journals, this study employs a descriptive research methodology, focusing on the sample and data drawn from Cabells Predatory Reports (CPR) and complemented by an innovative methodological approach based on internet search metrics analysis.

This study is guided by two main research objectives (summarizing the 6 posed before): 1) to examine the characteristics and distribution of predatory journals in education sciences, and 2) to assess the visibility and impact of these journals on the internet. To achieve these objectives, we

employ a two-step approach, which includes the analysis of CPR and an internet search metrics analysis using SEMrush.

2.1. Cabells Predatory Reports Analysis

CPR provides a comprehensive list of predatory journals identified by a set of pre-established standards operationalized in more than 60 explicit criteria, including misleading or falsified information, use of fake impact metrics, lack of transparency in editorial processes and unethical publication practices (Cabells, 2023). The first step in our methodology involved the extraction of a sample of predatory journals in education sciences from this list.

a. Sample Selection

From the CPR, we selected a sample of predatory journals specifically focused on education sciences topics. Sample selection was conducted in February 2023 by one of the authors by searching in the CPR database using the term "education". An initial list of 698 journals was obtained. The primary sample was then screened and filtered by the three researchers and only the journals included in CPR under the category of "Education", as inclusion criteria, regarding the discipline were selected. This produced the final sample for the study in which a total of 443 predatory journals have been analyzed.

b. Data Collection

For each journal included in the sample, we gathered data on various attributes, including the journal's launch year, country of origin, publisher, and the number and types of violations or malpractices committed based on CPR criteria. This information was collected by the three researchers, who then systematized and stored the data in a Microsoft Excel spreadsheet.

c. Data Analysis

The compiled data were subsequently imported and analyzed using descriptive statistical techniques, such as frequencies, percentages, central tendency measures (mean, median, and mode) and ANOVA and Chi-square tests. This approach enabled us to summarize and delineate the attributes and distribution of predatory journals within the field of educational sciences. We employed IBM SPSS Statistics v25 software to carry out the statistical analysis.

2.2. Internet search metrics analysis using SEMrush

To assess the visibility and impact of the sampled predatory journals on the internet, we used SEMrush, a widely-used digital marketing and search analytics tool (SEMrush, 2023). The research methodology based on the analysis of internet search metrics, sometimes referred to as "search analytics" or "search informatics" (Mackey & Liang, 2013) focuses on studying the behavior of internet users by analyzing data generated from search engines (Jansen et al., 2008). The research methodology based on the analysis of internet search metrics has several advantages, such as providing real-time data, covering a wide range of topics and geographical locations, and offering insights into user behavior that might not be available through traditional research methods (Comas-Forgas et al., 2021). It has been used in studies around many different topics and from many disciplines, for instance: the study and monitoring of online information for public health purposes also known as infodemiology that has many examples and was widely used during the COVID-19 pandemic (Mavragani, 2020), the prediction of electoral results (Digrazia, 2017),

conduct macroeconomy analyses (Donadelli, 2015), to study marketing strategies and campaigns (Ghose & Yang, 2009), for tourism forecasting studies (Li et al., 2021) and even it has been used for analyzing academic dishonest behaviors (Comas-Forgas et al., 2023).

To the best of our knowledge, this is the first time that this methodology has been applied to analyze predatory journals and publishers, and we believe that it could prove to be a highly useful approach in the future.

a. Data collection

Using the initial sample of 443 predatory journals indexed in the CPR we accessed these journals via their websites to copy the *url* and perform individual analysis of each website using SEMrush. The first relevant result was that only 268 of them were operative. This finding highlights the dynamic nature of the predatory journal landscape, as a significant proportion (39.5%) of the journals indexed in the CPR (under the category of education) were no longer active at the time of the study. The operative sample of 268 predatory journals was used for the internet search metrics approach of the study, which may provide valuable insights into the online visibility and impact of these journals. The study focused on analyzing the organic traffic of these predatory journal websites from January 2017 to February 2022. Organic traffic refers to the number of visitors who reach a website through unpaid search results, typically by entering relevant keywords or phrases in search engines such as Google (Comas-Forgas et al., 2021). In contrast to paid traffic generated through advertising, organic traffic is considered a more authentic indicator of a website's visibility, relevance, and authority within its domain (Aswani et al., 2018). To accomplish this we introduced one-by-one the *url* of each journal and SEMrush allowed authors to collect accurate and up-to-date information on the organic traffic trends of the predatory journal websites over the specified period.

By examining the organic traffic of these websites, the study aimed to gain insights into the online visibility and impact of predatory journals in the academic publishing landscape. Understanding the organic traffic trends of predatory journals can help reveal the extent to which researchers and other stakeholders engage with these journals, which can inform policy and intervention strategies to combat predatory publishing practices.

b. Data processing and analysis

Once the data was obtained from SEMrush, it was added to the first Excel spreadsheet generated during the CPR data collection process. This step involved combining the newly acquired organic traffic data with the existing dataset, which included information on the predatory journals such as their launch date, country of origin, number of violations, and other relevant characteristics previously identified. Data was exported to SPSS matrix and statistical analyses were performed with it.

3. Results

3.1. Prevalence of predatory journals in education sciences in CPR

Education science journals constitute 2.75% of the total predatory journals indexed in CPR as for February 2023. This indicates that predatory journals in education sciences represent a relatively small proportion of the overall problem. Just to have elements of comparison and better understand the magnitudes, some other disciplines have greater percentage of predatory journals

indexed in the database, for instance: medicine 36.9%, biology 22.1%, engineering 15.1%, humanities, 8%, chemistry 8% or physics 4%.

3.2. Publishers responsible for predatory journals in education sciences

The data obtained in our study offers an overview of the publishers responsible for editing predatory journals in education sciences. This information sheds light on the publishers contributing to the issue of predatory journals in this specific field. Most publishers (a total of 180 have been identified) contribute a small percentage, typically less than 1%, to the total number of predatory journals in education sciences identified in CPR. This suggests that many predatory journals are scattered across numerous small-scale publishers. Some publishers, however, have a more significant presence. Notable examples include *Adyan Academic Press* (8.1%), *Global Science Research Journals* (3.4%), *World Academic Research Journals* (WARJ) (3.4%) and *Universe Scientific Publishing* (3.2%). These publishers contribute more substantially to the issue and warrant further investigation and scrutiny.

3.3. Countries where the predatory journals are published

The results presented in Graph 1 displays the distribution of predatory journals in educational sciences across countries. This information helps to understand the global landscape of predatory journals and highlights the presence of these journals in different regions. The United States (23.5%) and Nigeria (22.1%) have the highest percentage of predatory journals, suggesting that these countries are major hubs for such publications. India follows closely behind with 21.2%, highlighting another significant source of predatory journals. The United Kingdom (6.3%) and Singapore (5.2%) also have notable percentages of predatory journals, although lower than the top three countries and Canada has a moderate presence at 4.3%. Other countries, such as China (3.8%), Bangladesh (2.3%) and Australia (1.1%), contribute to the overall number of predatory journals, albeit to a lesser extent. Several countries, including the Philippines, Malaysia and Pakistan, have a smaller share of predatory journals, each accounting for 1.1%. The remaining countries, such as Bulgaria, Italy, Japan, Kenya, Korea, Serbia, Seychelles, Switzerland, Turkey and Egypt, have marginal percentages (0.2%). Hong Kong (0.7%), Indonesia (0.7%), Lithuania (0.7%) and the United Arab Emirates (0.7%) also contribute to the global distribution of predatory journals, although with a relatively small share. In summary, the data reveals that predatory journals in education are predominantly found in Asia, North América, and Africa, while Europe and Oceania have a lower presence and regions as South America have no presence at all.

Graphic 1 - Journal's publication country
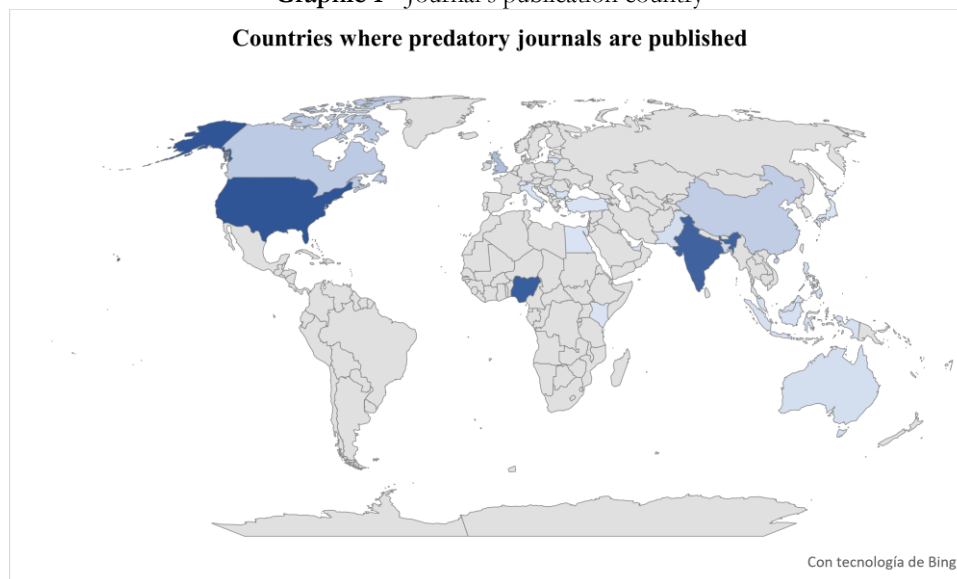
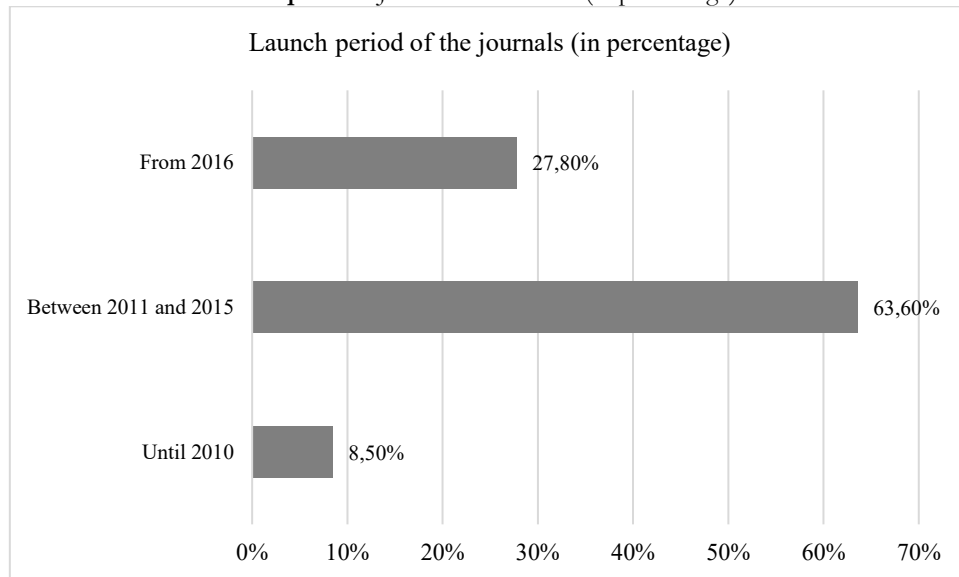**Source:** Authors elaboration based on Cabells Predatory Reports Data Set (2023).

3.4. Launch date of the predatory journals in education sciences

The results emphasize that a relatively small percentage (8.5%) of the predatory journals in education sciences analyzed were founded before 2010, while a significant majority (63.6%) were created between 2011 and 2015. This could suggest a rapid growth in the number of predatory journals during that period. From 2016 onwards, the percentage of newly established predatory journals decreased to 27.8%, which might indicate a slowing down in the proliferation of such journals, potentially due to increased awareness and actions against predatory publishing practices but also it can be interpreted that due to the characteristics of these publications it takes some time to identify them and this explain the lapse of time between the journal launch date and the identification and incorporation in predatory lists as CPR.

Apart, it is crucial to consider that in total numbers based on CPR data there is a relevant number of the journals in the sample (n=127) in which the launch date remains unknown and has not been used to calculate the overall results. This lack of information could be due to various reasons, such as limited transparency, poor or inaccurate record-keeping or the journals' deliberate efforts to conceal their inception.

Graphic 2 - Journal launch date (in percentage)

Launch period of the journals (in percentage)

Source: Authors elaboration based on Cabells Predatory Reports Data Set (2023).

With the aim of analyzing and profiling the trends of launching years we selected the journals from the 3 countries that had higher representation in the sample (USA, India, and Nigeria) to compare them (see table 1). In the USA, 22% of predatory journals were founded before 2010 which is higher than the other countries, with 54% launched between 2011 and 2015, and 24% established from 2016 onwards. In contrast, India and Nigeria had much lower percentages of predatory journals founded before 2010, with 3.4% and 7.7%, respectively. Most predatory journals in India (67%) and Nigeria (82.7%) were launched between 2011 and 2015, demonstrating a more substantial growth in this period compared to the USA. From 2016 onwards, 29.6% of predatory journals in India and only 9.6% in Nigeria were established, indicating different trends in the proliferation of such journals in these countries. The chi-square test result with a two-tailed significance of <0.001* indicates that there is a statistically significant difference in the distribution of predatory journal launch years among these countries.

Table 1 - Predatory journals in education sciences launch years distribution in the USA, India and Nigeria

	Until 2010	Between 2011 and 2015	From 2016	Two-tailed significance
USA	22%	54%	24%	<,001*
India	3,4%	67%	29,6%	
Nigeria	7,7%	82,7%	9,6%	

Source: Authors elaboration based on Cabells Predatory Reports Data Set (2023).

3.5. *Violations and malpractices in predatory journals within education sciences*

The data achieved in our study helps characterizing the violations or editorial malpractices conducted by predatory journals in education sciences based on CPR criteria. The analysis includes the number of violations across various categories for the total of 443 journals. The total number of violations for these journals ranges from a minimum of 2 to a maximum of 13, with an average of 6.18 violations per journal and a standard deviation of 2.098. Based on the average number of

violations per journal for each category (attending to CPR data), we can rank the violations committed by predatory journals in education sciences as follows:

1. *Publication practice violations* (i.e. no copyediting, editor publishes research in his own journal, authors are published several times in the same journal and/or issue): Avg. 1.59 (SD: 0.876)
2. *Peer review violations* (i.e. inadequate peer review, journal's website does not have a clearly stated peer review policy, no affiliations are given for editorial board members and/or editors, editors do not actually exist or are deceased): Avg. 1.21 (SD: 0.776)
3. *Website-related violations* (i.e. website does not identify a physical address for the publisher or gives a fake address, dead links on the journal or publisher's website): Avg. 1.27 (SD: 1.140)
4. *Access and copyright violations* (i.e. journal states it is completely open access but not all articles are openly available, journal has a poorly written copyright policy): Avg. 1.00 (SD: 0.631)
5. *Integrity violations* (i.e. same article appears in more than one journal, owner/Editor of the journal or publisher falsely claims academic positions or qualifications): Avg. 0.52 (SD: 0.759)
6. *Indexing and metric violations* (i.e. journal uses misleading metrics, publisher or its journals are not listed in standard periodical directories or are not widely catalogued in library databases): Avg. 0.26 (SD: 0.476)
7. *Fee-related violations* (i.e. publisher or journal's website seems too focused on the payment of fees): Avg. 0.16 (SD: 0.389)
8. *Business practice violations* (i.e. email invitations for editorial board members or reviewers from the journal are received by researchers who are clearly not in the field the journal covers, journal's website does not allow web crawlers): Avg. 0.14 (SD: 0.426)

This ranking indicates that the two categories of violations with higher incidence, amongst the sample analyzed, are specially those related to publication and peer review processes; somehow the two categories that better describe when a journal conducts predatory practices and clearly undermine the credibility of these journals and the manuscripts that publish.

We also compared the number of violations committed by predatory journals in the three countries with higher representativity in the sample: the USA, India, and Nigeria (see table 2). The study reveals statistically significant differences in the mean number of violations committed by predatory journals in these countries, as indicated by the F-value of 12.862 and a significance level of <0.001* according to an ANOVA test performed with data. The mean number of violations committed by predatory journals in the USA is 6.90 with a standard deviation (SD) of 1.622. In comparison, predatory journals in India have a slightly lower mean of 6.76 violations with a higher SD of 1.993, suggesting more variability in the number of violations in this country. Predatory journals in Nigeria exhibit the lowest mean number of violations at 5.58, accompanied by the highest SD of 2.363, indicating an even broader range of violations committed by the predatory journals published in this country.

Table 2 - Comparison of violations committed by predatory journals in education sciences published in the USA, India and Nigeria

	Number of journals	Mean of violations committed	SD	F.	Sig.
USA	104	6,90	1,622	12,862	<,001*
India	94	6,76	1,993		
Nigeria	98	5,58	2,363		

Source: Authors elaboration based on Cabells Predatory Reports Data Set (2023).

We also analyzed the relationship between the launch date of the journals (the total sample) and the number of violations, seeking to identify any trends or patterns. However, the results of the ANOVA performed were not statistically significant ($p = 0.179$), indicating that there is no apparent relationship between the launch date of the journals and the number of violations committed.

3.6. Predatory journals impact based on internet search metrics

Based on the data obtained, it appears that there has been a substantial increase in organic traffic to predatory journals websites over the years (see graph 3). In 2017, the total organic traffic for the predatory journal websites analyzed was 187,812. This number increased to 208,829 in 2018, showing modest growth. However, in 2019, there was a more significant increase in this metric, with the total reaching 314,221. The trend continued in 2020, with the total organic traffic nearly doubling to 674,424 and, finally, in 2021, the organic traffic further increased to 748,823.

The consistent growth in organic traffic to predatory journal websites over this five-year period suggests that these journals have become more visible and potentially more influential in the academic publishing landscape. The increase in organic traffic may indicate that more researchers and other stakeholders are encountering and engaging with these journals through search engine results, raising concerns about the potential impact of predatory publishing.

Graphic 3 - Yearly organic traffic growth for predatory journal websites (2017-2021)
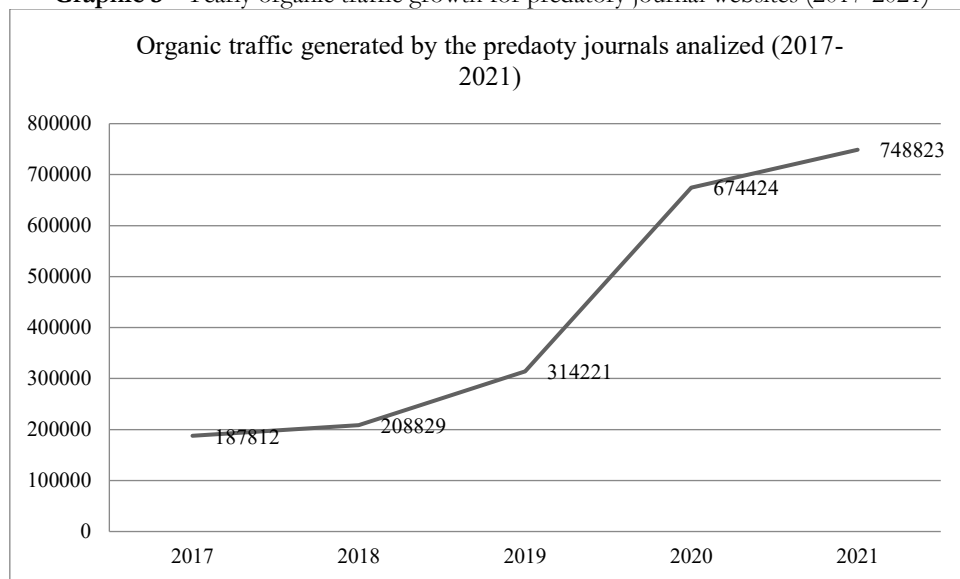
Source: Authors elaboration based on SEMrush Data Set (2023).

If we analyze the monthly mean and trend of organic traffic of these websites we can observe that in 2017, the average of monthly organic traffic for the predatory journal websites stood at 64.41. This figure rose to 68.51 in 2018, indicating a slight increment. A more pronounced escalation occurred in 2019, with the mean organic traffic surging to 99.19 per month. The positive trajectory persisted in 2020, as the mean organic traffic experienced a twofold augmentation, reaching 209.71. Finally, in 2021, the mean organic traffic exhibited a further enhancement, amounting to 232.84 (see graph 4).

Graphic 4 - Average of monthly organic traffic in predatory journal websites (2017-2021)

Mean of organic traffic generated by the predatory journals analized (2017-2021)
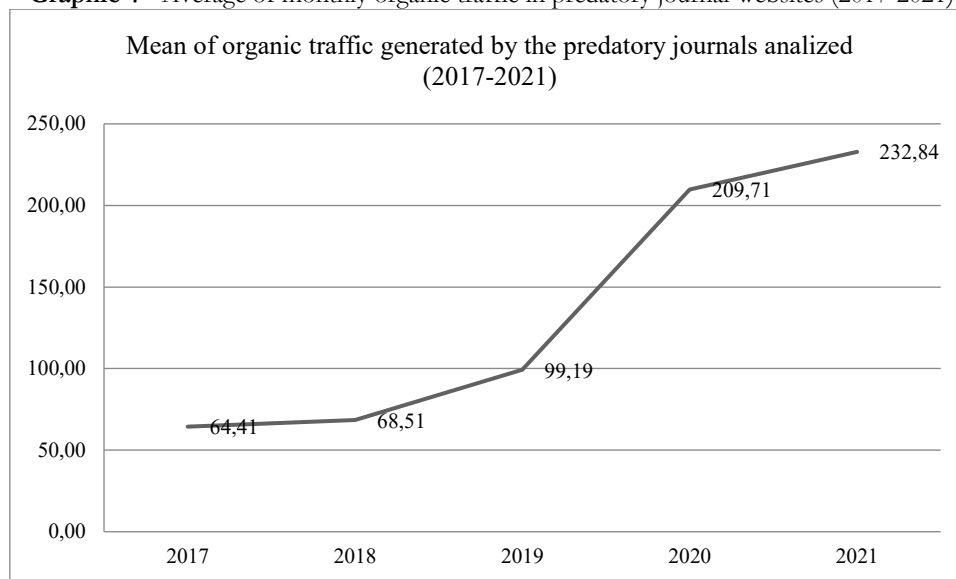
Source: Authors elaboration based on SEMrush Data Set (2023).

4. Conclusions

In conclusion, this study has provided valuable insights into the prevalence, publishers, geographical distribution, malpractices, longevity, and visibility of predatory journals in education sciences. The relatively small proportion of predatory journals in this field (2.75% of the total indexed in CPR) suggests that the problem is less pervasive in comparison to other disciplines. However, the issue remains a concern, as if we calculate the presence of educational science journals in legitimate databases as for instance SCOPUS and Web of Science we will find very similar figures (5,1% and 3,4% of indexed journals are from this disciplines in each database respectively). This supports the first conclusion: the prevalence or representation of fraudulent publications in educational sciences is low, but it is quite similar to the presence of legitimate journals in this discipline within legitimate databases. We believe that a future research topic should involve comparing the presence and percentage of predatory journals per discipline in both predatory and legitimate databases. This will allow for the calculation of the divergence and analysis of the areas where deceptive journals are more and less prevalent.

Our work identified the United States, Nigeria, and India as major publishing centers for predatory journals in education sciences, with a geographical higher concentration in Asia, North America, and Africa. If we follow the same analytical logic as done previously, we will find that the more prolific publishing countries of predatory journals are not as prominent in publishing legitimate journals. In SCOPUS, for instance, 26% of indexed journals in the education category are from the USA (similar to CPR data); however, Nigeria only has a representation of 0.06% of the journals, and India has 0.7% (data significantly lower than CPR presence).

The analysis of journal launch dates reveals a rapid growth between 2011-2015, followed by a decline that it is necessary to follow-up in the following years to verify this tendency that we consider it is not possible to conclude on the basis of our results.

Malpractice analysis highlights that publication and peer review process violations are most common, undermining the credibility of these journals. The comparison between the three countries with the highest representation reveals significant differences in the distribution of

violations and launch years. The lack of a clear relationship between journal launch dates and the number of violations committed suggests that the problem is complex and not easily predictable.

Finally, the increase in organic traffic to predatory journal websites over five years raises concerns about their growing visibility and potential influence on the academic publishing landscape. Nevertheless, it is essential to carefully evaluate our findings to prevent unnecessary alarm. On one hand, our data shows that 268 predatory journals receive a maximum of 232 visits per month, averaging around 7.5 visits per day, which does not appear to be a troubling figure. However, it is important to closely monitor those journals that attract more traffic, as they have a higher potential for impact. In this regard, the top five predatory journals in educational sciences based on organic traffic to their websites are (with the average monthly organic traffic in 2021 in parentheses): 1) *Journal of Music and Dance* (10,908), 2) *International Journal of Research in Education Methodology* (10,612), 3) *International Journal of English Language Education* (2,895), 4) *International Journal of Educational Administration and Policy Studies* (2,793), and 5) *Journal of Education and Training* (2,601). On the other hand, 112 journals had an average monthly organic traffic in 2021 lower than 1, which implies a very low potential and impact for these journals.

Another way to assess the impact of predatory journals in education is by comparing their organic traffic with that of legitimate, established journals. We collected organic traffic metrics from SEMrush for 10 top journals indexed in major databases and positioned in Q1, including *Comunicar, Journal of Teacher Education, Computers & Education, Sociology of Education, Review of Educational Research, Educational Research Review, Educational Psychologist, Research in Science Education, Physical Education and Sport Pedagogy*, and *The Internet and Higher Education*. The average monthly organic traffic for these journals' websites in 2021 was 14,175, significantly higher than the figures obtained from our analysis of deceptive publications. We believe that analyzing internet search metrics can provide valuable insights to track and accurately assess the potential risks of predatory publishing. In the field of education sciences, while the issue is not extremely concerning, it still warrants monitoring.

Despite the valuable insights provided, this study has some limitations that should be acknowledged. First, the analysis is based on data from Cabell's Predatory Reports (CPR), which may not encompass all predatory journals in education sciences. Other sources and databases could provide additional information on the problem. Second, the study relies on the available data for the launch dates, which could be inaccurate or incomplete. Some journals may have deliberately concealed their inception, leading to potential underestimation of the problem. Third, the analysis of malpractices is dependent on the categorization and reporting provided by CPR. Different classifications or evaluation methods could yield different results.

Moreover, the assessment of predatory journals' impact based on internet search metrics may not capture the full extent of their influence on the academic community. Other factors, such as citation rates and the quality of published articles, could provide further insights into the impact of predatory journals. Additionally, it is essential to consider that the study primarily focuses on the prevalence and characteristics of predatory journals in education sciences, without delving into the motivations and incentives that drive authors to submit their work to these journals.

Future research could address these limitations by incorporating data from multiple sources, investigating the motivations behind authors' decisions to submit to predatory journals, and exploring the broader consequences of predatory publishing on the quality and credibility of research in education sciences. Further studies could also examine the effectiveness of different strategies to combat predatory publishing and identify best practices for promoting ethical and responsible publishing within the academic community.

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