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The promotion and implementation of open science measures among high performing journals from Brazil, Mexico, Portugal, and Spain

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Key points

- The implementation of open science measures bolsters the transparency and rigor of scientific publications.
- Forty of the highest-ranked journals of Brazil, Mexico, Portugal, and Spain were analyzed to determine their promotion and implementation of open science measures.
- Analysis of journal policy towards the promotion of open science measures revealed higher promotion among Brazilian journals than their Portuguese counterparts, and higher promotion among international journals than their domestic counterparts.
- Analysis of the implementation of open science measures among 400 articles from the sample revealed higher implementation of open science measures among Brazilian journals than their Portuguese and Mexican counterparts.
- Journals committed to increasing their promotion and implementation of open science measures can do so with a minimum amount of time and effort.

Abstract

This study empirically examined the promotion and implementation of open science measures among high performing journals of Brazil, Mexico, Portugal, and Spain. Journal policy towards data sharing, materials sharing, preregistration, open peer review, and consideration of preprints and replication studies was gathered from the websites of the journals. Four hundred articles were coded for implementation of data availability statements, conflict of interest disclosures, funding disclosures, DOI, ORCID, and continuous publishing. Analyses found higher promotion of open science measures among Brazilian journals than their Portuguese counterparts, and higher promotion of open science measures among international journals than their domestic counterparts. Analyses found higher implementation of open science measures among Brazilian journals than their Portuguese and Mexican counterparts. One journal out of forty encouraged preregistration of studies; none encouraged replication studies and none had implemented open peer review. These findings reveal reasonably strong implementation of secondary open science measures (e.g., DOI, ORCID, conflict of interest and funding source disclosure) among the sample, but weaker implementation of primary measures (e.g., open data, open materials, replication, open peer review). Implications are considered and suggestions are brought forth, to bolster adoption of open science measures among Ibero-American scientific journals.

Keywords: open science, Ibero-American, transparency, scientific rigor, SciELO

Introduction

Over the last decade, Ibero-American journals, which constitute approximately 7% of published science (Scimago, 2023), have been making strides in the adoption of open science (OS) measures. In Portugal, in 2014, the Foundation for Science and Technology (FCT) launched its Open Access Policy, signaling its commitment to OS values (FCT, 2023). In Spain, the National Open Science Strategy (ENCA) 2023-2027, along with the State Scientific, Technical, and Innovation Research Plan (PEICTI) 2021-2023, support the implementation of open and inclusive science models (MICIN, 2023a, 2023b). In Brazil, the Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP, 2023) and the Scientific Electronic Library Online (SciELO, 2021) are strong proponents of OS measures.

While Ibero-American journals are showing a commitment to OS values, there has been no assessment to date of their adoption of OS measures. A study of this type would separately examine: (1) the promotion, and (2) the implementation of OS measures. An assessment of promotion would be based on information offered in the journal's online author instructions. It would assess the journal's encouragement of: data sharing, materials sharing, preregistration, and replication studies, as well as their consideration of preprints. In contrast, an assessment of implementation would be derived from the journal's published articles, and would assess the journal's implementation of: data and materials sharing statements, conflict of interest statements, funding disclosures, DOI, ORCID, continuous publishing, and open peer review.

In 2015, the Center for Open Science (COS), in Charlottesville, Virginia released the Transparency and Openness Promotion (TOP) Guidelines, which established a benchmark of OS standards with the goal of aligning scientific ideals with real-world practices (Nosek et al., 2016). In 2020, COS launched TOP Factor, a metric that tracks the compliance of journal policy with OS standards (TOP Factor, 2023). A recent study (Pataršić & Stojanovski, 2022)

examined the adherence to OS guidelines across journal subject field, among 2,000 journals in the TOP Factor database. To identify the journal subject field, the authors used the Scopus database, which covered 91% of the journals in the TOP Factor list. In an examination of the distribution of journals across journal subject field, the authors found the TOP Factor distribution proportional to the Scopus distribution in the social sciences (33% vs. 32%) and health fields (16% vs. 17%), underrepresentated in the hard sciences (6% vs. 21%), and overrepresentated in the multidisciplinary (35% vs. 22%) fields. The high percentage of journals in TOP Factor indexed in Scopus suggests that journals from selective databases, such as Scopus, may be more active proponents of OS measures than their non-indexed counterparts. Thus, an examination of the adoption of OS measures among Ibero-American journals should consider using a sample drawn from selective databases.

Among the SciELO collections, which comprise one of the most selective databases of Ibero-American journals, Packer (2020) reports a larger presence of journals in the health sciences field (37%) than in human (20%) and applied social sciences (14%). In light of SciELO's commitment to OS, this suggests that journals in the health sciences may adhere more closely to OS values than their counterparts in the social sciences. Watchorn (2022) reminds us that only 1% of scholars in the humanities conduct experiments that involve data, and only 6% conduct quantitative research. Nonetheless, Patarčić and Stojanovski (2022) found higher support of preregistration, replication, and registered reports among journals in the social sciences. Thus, the variable of journal subject field deserves consideration in an examination of Ibero-American OS.

The scale of publisher (e.g., international, commercial, domestic, academic) also deserves consideration. Among a sample of Spanish researchers, Bordons et al. (2022) found higher publication in non-APC, gold open access (OA) journals in the humanities and social sciences than their counterparts in biology and biomedicine. The authors considered that the

hard science journals (biology and biomedicine) were primarily published by commercial publishers, while the soft science journals (humanities and social sciences) came from academic presses. Thus, the relationship between research subject field and scale of publisher should also be considered.

The aim of this study, therefore, was to examine the promotion and implementation of OS measures among Ibero-American journals. We assessed journal policy towards the promotion of data and materials sharing, preregistration, preprints, and replication studies, as well as journal implementation of data and materials sharing statements, conflict of interest and funding disclosure statements, DOI, ORCID, continuous publishing, and open peer review. To do so, we used a sample of the highest performing journals from the top-four Ibero-American countries: Brazil, Mexico, Portugal, and Spain. Among this sample, we examined differences in OS promotion and implementation indicators across country, publishing platform, publication language, and subject field.

Based on SciELO's commitment to align the journals in its collections with the OS model by the end of 2025 (SciELO, 2023), we hypothesized that the promotion and implementation of OS would be: (H1) higher among journals from Brazil (SciELO's base) than the other three countries, and (H2) higher among SciELO-indexed journals than their non-SciELO-indexed counterparts. Based on English being the global language of science (Fradkin, 2015, 2017a, 2017b, 2018), we hypothesized that the promotion and implementation of OS would be: (H3) higher among English-only publications than their multi-language counterparts. Based on journals in the social sciences lagging in their enthusiasm for OS science measures (Karhulahti & Backe, 2021; Packer, 2020; Sidler, 2014; Watchorn, 2022), we hypothesized that the promotion and implementation of OS would be: (H4) lower among social science journals than their hard science and health science counterparts.

Materials and Methods

A bibliometric analysis examined the promotion and implementation of open science practices among the top-ranked journals of the top-four Ibero-American science-producing countries (Brazil, Mexico, Portugal, Spain).

Sample

Journal Citation Reports (JCR) provides a ranking of scientific journals based on their industry-standard impact factor. The top-10 journals from Brazil, Mexico, Portugal, and Spain comprised the sample of the study, based on the most recent JCR impact factor (2022). Data were drawn from online author instructions and a sampling of recent articles. Editorials, corrections, obituaries, and reviewer acknowledgements were excluded.

[Insert Table 1 about here]

Open Science Variables

Data sources are presented in Table 1.

Promotion Indicators

Open data, open materials, preregistration, submission of preprints, and *submission of replication studies* were recorded dichotomously, based on whether these practices were encouraged in the online author instructions. Preregistration did not include clinical trials preregistration.

Implementation Indicators

Data availability statements, conflict of interest statements, and *funding disclosure statements* were indicated, based on whether these measures were incorporated in the pdf rendering of the journal's first ten articles of 2023. DOI and ORCID were indicated, based on their inclusion in the pdf and online renderings of the first ten articles of 2023. *Continuous publishing* was indicated by (1) online-first publication, or (2) single-issue-for-the-year

publication. *Open peer review* was indicated by its disclosure in the online author instructions.

Grouping Variables

Nation was based on the region listing of the journal in JCR (2022). *Dissemination* was gathered from the journal web site, and distinguished between international journals, SciELO-indexed journals, and domestic journals. *Publication language* was gathered from the journal web site, and coded into English-only or multi-language. *Subject field* was gathered from the journal's website, and distinguished between hard sciences, health sciences, and social sciences. Journals in psychology and psychiatry were included in health sciences, while journals in communications, economics, educational technology, information systems, management, political science, tourism, sociology, and urban planning comprised the social sciences group.

Procedure

Data Collection

The top-10 journals from Brazil, Mexico, Portugal, and Spain were drawn from JCR, based on the most recent JCR impact factor (2022). The first 10 articles from each journal (excluding editorials, corrections, obituaries, and reviewer acknowledgements) from 2023 were set aside. In cases where fewer than 10 articles were available for 2023, the deficit was drawn from articles from late 2022. Journals were coded for publication language (English-only, multi-language), publishing platform (domestic, international, SciELO-indexed), and subject field (hard sciences, health sciences, social sciences), based on information on the journal web site. Promotion of open data, open materials, preregistration, and replication studies were recorded dichotomously (yes, no), based on whether these practices were encouraged in the online author instructions. Consideration of preprints was also recorded dichotomously (considered, not considered), based on its disclosure in the author instructions.

Implementation of data availability statements, conflict of interest statements, and funding disclosure statements were recorded dichotomously (yes, no), based on their inclusion in the pdfs of the first ten articles of 2023 (yes, included in 10; no, included < 10). Implementation of DOI and ORCID were recorded recorded dichotomously (yes, no), based on their inclusion in the pdf and online renderings of the first ten articles of 2023 (yes, included in 10; no, included < 10). Continuous publishing was recorded dichotomously (yes, no), based on a sampling of the first ten articles of 2023 and their respective online pages. Open peer review was recorded dichotomously (yes, no), based on its disclosure in the online author instructions.

Data Analysis

Analyses were performed using SPSS version 24. Differences in the OS indicators across country, publication platform, publication language, and subject field, were individually examined using chi-square tests, with alpha set at 0.05. In cases where parametric test assumptions were not met, nonparametric Fisher's exact tests were conducted. For significant main effects, post-hoc comparison tests were conducted, using Bonferonni correction for multiple comparisons. Promotion (range 0-5), implementation (range 0-7), and promotion/implementation scores (range 0-12) were tallied for each journal. Differences in these indices were examined across country, publication platform, publication language, using Kruskal-Wallis tests, with alpha set at 0.05. For significant main effects, post-hoc comparison tests were conducted, using Bonferonni correction for multiple comparisons.

Results

[Insert Table 2 about here]

Descriptive Statistics

Table 2 presents data on dissemination, language, and subject field. With regard to dissemination, 70% of the Spanish journals were published by international publishers, in

contrast to 40% of the Brazilian, and 30% of the Mexican and Portuguese journals in the sample. 50% of the Brazilian journals and 20% of the Mexican journals were indexed on the SciELO platform. 70% of the Portuguese journals were published by domestic publishers, in contrast to 50% of the Mexican, 30% of the Spanish, and 10% of the Brazilian journals. With regard to language, 100% of the Portuguese journals published English-only text, in contrast to 90% of the Brazilian, 80% of the Spanish, and 60% of the Mexican journals in the sample. With regard to subject field, 80% of the Brazilian journals were in the health field, in contrast to 30% of the Portuguese, 60% of the Spanish, and 50% of the Mexican journals in the sample. 50% of the Mexican journals were in the hard sciences, in contrast to 20% of the Brazilian journals, and none of the Portuguese or Spanish journals. 70% of the Portuguese journals were in the social sciences, in contrast to 40% of the Spanish journals, and none of the Brazilian or Mexican journals in the sample.

[Insert Table 3 about here]

[Insert Table 4 about here]

Promotion of Open Science Measures

Tables 3 and 4 present data on the promotion of open science measures. Means are reported for significant differences, only.

Open Data

In the sample as a whole, open data was promoted by 50.0% of the journals. A chi-square test revealed no significant differences in the promotion of open data across nations, $\chi^2(3) = 6.400$, $p = 0.094$. A Fisher's exact test revealed higher promotion of open data among internationally published journals (94.1%) than their SciELO-indexed (28.6%) and domestic counterparts (12.5%), $p < 0.001$. Further Fisher's exact tests revealed no significant difference in the promotion of open data across publication language ($p = 0.407$) or subject field ($p = 0.185$). Based on these findings, none of the hypotheses were supported.

Open Materials

In the sample as a whole, open materials was promoted by 40.0% of the journals. Fisher's exact tests revealed higher promotion of open materials among Brazilian journals (70.0%) than their Mexican counterparts (10.0%), $p = 0.019$, and among internationally published journals (70.6%) than their domestic counterparts (12.5%), $p = 0.002$. Further Fisher's exact tests revealed no significant difference in the promotion of open materials across publication language ($p = 0.210$) or subject field ($p = 0.377$). Based on these findings, Hypothesis 1 was supported.

Preregistration

In the sample as a whole, preregistration was promoted by 2.5% of the journals. Fisher's exact tests revealed no significant differences in the promotion of preregistration across country ($p = 1.000$), publishing platform ($p = 0.575$), publication language ($p = 1.000$), or subject field ($p = 0.450$). Based on these findings, none of the hypotheses were supported.

Preprints

In the sample as a whole, the submission of preprints was encouraged by 50.0% of the journals. A chi-square test revealed no significant difference in the consideration of preprints across nations, $\chi^2(3) = 8.000$, $p = 0.052$. A Fisher's exact test revealed higher consideration of preprints among internationally (88.2%) and SciELO-indexed journals (57.1%) than their domestic counterparts (6.3%), $p < 0.001$. A separate Fisher's exact test revealed no difference in the consideration of preprints across publication language, $p = 0.407$. A final Fisher's exact test revealed higher consideration of preprints among journals in the health field (72.7%) than their counterparts in the social sciences (18.2%), $p = 0.008$. Based on these findings, Hypotheses 2 and 4 were partially supported.

Replication

In the sample as a whole, no journals encouraged replication studies; thus, analyses were not conducted.

Overall Promotion of Open Science Measures

The aggregation of the five above variables represented overall promotion of open science measures (range 0-5). Kruskal-Wallis tests revealed higher overall promotion of open science measures among Brazilian journals (2.20) than their Portuguese counterparts (0.70), $\chi^2(3, N = 40) = 11.597$, $p = 0.009$, and higher overall promotion of open science measures among international journals (2.53) than their domestic counterparts (0.38), $\chi^2(2, N = 40) = 23.365$, $p < 0.001$. Further Kruskal-Wallis test revealed no significant differences in the overall promotion of open science measures, across publication language, $\chi^2(1, N = 40) = 0.220$, $p = 0.639$, or subject field, $\chi^2(2, N = 40) = 6.170$, $p = 0.046$ (pairwise comparisons were not significant). Based on these findings, Hypothesis 1 was partially supported.

Implementation of Open Science Measures

Tables 3 and 4 presents data on the implementation of open science measures. Means are reported for significant differences, only.

Data Availability Statements

In the sample as a whole, data availability statements were consistently implemented in 5.0% of the journals. Fisher's exact tests revealed no differences in implementation of data availability statements across country ($p = 1.000$), publication platform ($p = 0.651$), publication language ($p = 1.000$), or subject field ($p = 1.000$). Based on these findings, none of the hypotheses were supported.

Conflict of Interest Statements

In the sample as a whole, conflict of interest statements were consistently implemented in 50% of the journals. While Brazil's implementation (80.0%) was higher than that of Mexico (20%), Portugal (50%), and Spain (50%), a chi-square test revealed no

significant differences in the implementation of conflict of interest statements across nations, $\chi^2(3) = 7.200$, $p = 0.066$. Fisher's exact tests revealed no differences in implementation of conflict of interest statements across publication platform ($p = 1.000$), publication language ($p = 1.000$), or subject field ($p = 0.329$). Based on these findings, Hypothesis 1 was partially supported.

Funding Disclosure Statements

In the sample as a whole, funding disclosure statements were consistently implemented in 10% of the journals. Fisher's exact tests revealed no differences in implementation of funding disclosure statements across country ($p = 0.167$), publication platform ($p = 0.499$), publication language ($p = 0.552$), or subject field ($p = 0.270$). Based on these findings, none of the hypotheses were supported.

DOI

In the sample as a whole, DOIs were consistently implemented in 92.5% of the journals. Fisher's exact tests revealed no statistically significant differences in implementation of DOIs across country ($p = 0.595$), publication platform ($p = 0.780$), publication language ($p = 0.448$), or subject field ($p = 0.252$). Based on these findings, none of the hypotheses were supported.

ORCID

In the sample as a whole, ORCID was consistently implemented in 15.0% of the journals. A Fisher's exact test revealed no statistically significant differences in implementation of ORCID across country ($p = 0.126$). A separate Fisher's exact test revealed higher consistent implementation of ORCID among SciELO-indexed journals (57.1%) than their international counterparts (0.0%), $p = 0.001$. Further Fisher's exact tests revealed no significant differences in implementation of ORCID across publication language ($p = 0.279$), or subject field ($p = 0.846$). Based on these findings, Hypothesis 2 was supported.

Continuous Publishing

In the sample as a whole, continuous publishing was implemented in 65.0% of the journals. A Fisher's exact test revealed significantly higher continuous publishing among Brazilian and Spanish journals (90.0%) than their Portuguese counterparts (30.0%), $p = 0.12$. A separate Fisher's exact test revealed higher continuous publishing among international journals (100.0%) than their SciELO-indexed (57.1%) or domestic counterparts (31.3%), $p < 0.001$. A Fisher's exact test revealed no difference in continuous publishing across publication language, $p = 1.000$. A final Fisher's exact test revealed higher continuous publishing among health journals (86.4%) than their social science counterparts (36.4%), $p = 0.006$. Based on these findings, Hypotheses 1 and 4 were partially supported.

Open Peer Review

In the sample as a whole, no journals implemented open peer review; therefore, analyses were not conducted.

Overall Implementation of Open Science Measures

The aggregation of the seven above variables represented overall implementation of open science measures (range 0-7). A Kruskal-Wallis test revealed higher overall implementation of open science measures among Brazilian journals (3.30) than their Portuguese (1.60) and Mexican counterparts (1.70), $\chi^2(3, N = 40) = 17.052$, $p = 0.001$. Further Kruskal-Wallis tests revealed no significant differences in the implementation of open science measures, across publication platform, $\chi^2(2, N = 40) = 4.635$, $p = 0.099$, publication language, $\chi^2(1, N = 40) = 0.034$, $p = 0.854$, or subject field, $\chi^2(2, N = 40) = 7.011$, $p = 0.030$ (pairwise comparisons were not significant). Based on these findings, Hypothesis 1 was supported.

Overall Promotion and Implementation of Open Science Measures

Table 4 presents promotion and implementation scores. The aggregation of the five promotion and seven implementation variables represents overall promotion and implementation of open science measures (range 0-12). A Kruskal-Wallis test revealed higher promotion/implementation of open science measures among Brazilian (5.50) and Spanish journals (4.90) than their Portuguese (2.30) counterparts, and higher promotion/implementation among Brazilian journals (5.50) than their Mexican counterparts (2.50), $\chi^2(3, N = 40) = 17.676$, $p = 0.001$. A separate Kruskal-Wallis test revealed higher promotion/implementation of open science measures among international journals (5.29) than their domestic counterparts (2.25), $\chi^2(2, N = 40) = 16.894$, $p < 0.001$. Further Kruskal-Wallis tests revealed no significant differences in the promotion/implementation of open science measures, across publication language, $\chi^2(1, N = 40) = 0.144$, $p = 0.704$, or subject field, $\chi^2(2, N = 40) = 6.809$, $p = 0.033$ (pairwise comparisons were not significant). Based on these findings, Hypothesis 1 was partially supported.

[Insert Table 5 about here]

Ranking of Journals

Table 5 presents ranking of journals, based on the aggregated promotion and implementation scores. In the highest quartile, there was a higher prevalenceof Brazilian (50%) and Spanish (40%) journals than their Portuguese (10%) and Mexican (0%) counterparts. There was a higher prevalence of international journals (80%) than their domestic (10%) and SciELO-indexed (10%) counterparts, and a higher prevalence of English-only journals (90%) than their their multi-language (10%) counterparts. There was a higher prevalence of health journals (60%) than their hard science (20%) and social science (20%) counterparts. In the lowest quartile, there was a higher prevalence of Mexican (50%) and Portuguese journals (50%) than their Brazilian (0%) and Spanish (0%) counterparts. There was a higher prevalence of domestic journals (80%) than their international (0%) or

SciELO-indexed (20%) counterparts, and a higher prevalence of English-only journals (90%) than their their multi-language (10%) counterparts. There was a higher prevalence of social science journals (50%) than their hard science (40%) and health (10%) counterparts. In sum, the highest promotion and implementation scores were among the international, Brazilian and Spanish journals, in the health field. Based on these rankings, Hypotheses 1 and 4 were supported.

Discussion

This study is the first we are aware of that empirically examined the promotion and implementation of OS measures, among Ibero-American journals. Partially consistent with Hypothesis 1 is the finding that the promotion and implementation of OS measures was higher among Brazilian journals than their Mexican and Portuguese counterparts. Among specific measures, the promotion of open materials and the implementation of continuous publishing was higher among Brazilian journals than their Mexican and Portuguese counterparts, respectively. Inconsistent with Hypothesis 2 is the finding that the promotion and implementation of OS measures was higher among international journals than their domestic counterparts, although SciELO-indexed journals were higher in their promotion of preprints than their domestic counterparts and higher than international journals in their implementation of ORCID identifiers. Inconsistent with Hypothesis 3 is the finding that the promotion and implementation of OS measures does not vary according to publication language. Inconsistent with Hypothesis 4 is the finding that the promotion and implementation of OS measures does not vary across research subject field, although social science journals were lower in their promotion of preprints and their implementation of continuous publishing than their health science counterparts.

SciELO

Among the sample, there are seven SciELO-indexed journals (five based in Brazil and two in Mexico), which may explain the strong performance of the Brazilian journals. Since 2019, SciELO (2021, 2023) has promoted OS practices through its Priority lines of action, and Brazil's 319 SciELO-indexed journals may have benefited more from this program than their lesser-represented counterparts (SciELO: Mexico: 162; Portugal: 59; Spain: 46). Future studies could explore the influence of SciELO on the promotion and implementation of OS measures among a sample of SciELO-indexed journals and a control group of their non-SciELO-indexed counterparts.

[Insert Table 6 about here]

Performance

The weak performance of the Portuguese journals appears to be associated with the high prevalence (70%) of social science journals in this group (see Table 6). By contrast, the stronger performance of the Brazilian and Spanish journals appears to be associated with the higher prevalence of health journals in these groups (80% and 60%, respectively). Interestingly, the two lowest scoring journals in the study were from Portugal and in the social science field. Conversely, the highest scoring journal in the study was from Brazil and in the health field. These associations are consistent with studies citing lagging support for OS among journals in the social science field (Karhulahti & Backe, 2021; Packer, 2020; Watchorn, 2022). A study by Mugnaini et al. (2021), for example, noted a significantly higher prevalence of DOIs in the bibliographical references of journals from the health and hard sciences than those from the social sciences and humanities.

Among the sample as a whole, implementation of OS measures (31.7%) was slightly higher than promotion of OS measures (28.5%). One journal out of forty encouraged preregistration of studies; none encouraged replication studies and none had implemented open peer review. The highest scoring journal, *Diabetology & Metabolic Syndrome*, from the

health field, promoted three of the five OS measures and implemented five of the seven OS measures. By contrast, the lowest scoring journals, *IJISPM - International Journal of Information Systems and Project Management* and *Tourism & Management Studies*, both from social sciences, promoted and implemented none of the OS measures we examined. The poor performance of these two social science journals contributed to the poor performance of Portugal overall.

Operationalization

A unique quality of this study is its operationalization of variables. Data availability statements, COI statements, funding statements, DOI, and ORCID were scored dichotomously based on a sampling of 10 recent articles. For a journal to score 1 on data availability statements, it would have had data availability statements included in all 10 sampled articles, while a score of 0 represents less than 10 data availability statements among the sampled articles. The same criteria applied to DOI, ORCID and the other implementation variables. Thus, the scores on implementation represent a whole-hearted commitment from the journal to a particular OS measure. This rubric distinguishes the journal that lists ORCID identifiers for every author in the article from the journal that lists for corresponding author only. On a broader scale, it distinguishes journals with the highest OS commitment from their less-committed counterparts.

Future research

With regard to future research, future studies should examine the implementation of OS measures of Ibero-American journals using a control group of non-Ibero-American journals. If the samples in this case were based on journal impact factor, inclusion criteria would be needed, as several of the highest ranked international journals (e.g., *Nature Reviews Drug Discovery*, *Nature Reviews Molecular Cell Biology*, *Nature Reviews Immunology*) do not publish original research, and would best be excluded from the study. Further studies

could examine journals from the entire 22 Ibero-American countries, for a more comprehensive snapshot of OS. Within-groups studies would be valuable as well, particularly within research subject field. Future research could also track the adoption of OS practices longitudinally, both retrospectively and prospectively. Imperative for future research is that scholars distinguish between journal policy toward OS and the implementation of OS practices, as these are related but independent variables.

Limitations

Among limitations of this study, one is sample size. Larger sample size would have enabled a more granular examination of OS practices across research subject field. It would also have enabled a more nuanced operationalization of several variables (e.g., ORCID, COI). A related limitation was the non-normality of the data, which precluded parametric analyses. For certain readers, another limitation may be drawn from our operationalization of research subject field. While we included psychology and psychiatry journals in the health science field, some may insist that they be labeled social science. While we acknowledge that psychology and psychiatry journals are traditionally labeled social science, we placed them in health science because their content is health science. A final limitation might be generalizability of the findings. As the sample consisted of journals from four Ibero-American countries, the findings cannot be generalized to journals from all 22 Ibero-American countries.

[Insert Table 7 about here]

Implications

Limitations withstanding, this study has implications for the expansion of OS measures among Ibero-American journals. For a start, publishers can align their journal policy with OS values. They can do this by updating their author instructions to encourage submission of preprints and replication studies, data/materials sharing, and the preregistration

of studies (see Table 7). They can further align their journals with OS values, by mandating data and materials availability statements, COI and funding disclosure statements, and ORCID numbers for all authors as conditions for manuscript submission. This can be accomplished through the addition of several mandatory fields in the online submission portal. They can also implement continuous publishing, along with open peer review, and DOIs (which most have done already). We acknowledge that some of these changes will not happen overnight, but we believe deadlines are a boon for forward movement. We therefore propose a deadline of four weeks to implement journal policy changes (online author instructions), and four months further for implementation measures (online submission portal).

Closing

This study is the first bibliometric examination of the promotion and implementation of OS measures among Ibero-American scientific journals. While the findings reveal consistent implementation of several secondary OS measures (e.g., DOI, ORCID, conflict of interest and funding source disclosure), they reveal sporadic implementation of critical OS measures (e.g., open data statements, open materials statements, encouragement of replication studies, open peer review). Journal publishers are the gatekeepers in the expansion of OS measures; they decide whether ORCID identifiers are a requirement for manuscript submission. They have the power to require a data availability statement as a condition of manuscript submission. We acknowledge that other OS practices, such as open peer review, will require more discussion before they are implemented. In the meantime, however, there is much work to be done, as Ibero-American journals, and their non-Ibero-American counterparts, make adjustments in their publishing machinery to meet the standards of the OS movement.

References

Bordons, M., González-Albo, B. & Moreno-Solano, L. (2023). Improving our understanding of open access: how it relates to funding, internationality of research and scientific leadership, *Scientometrics, 128*, 4651–4676. https://doi.org/10.1007/s11192-023-04726-1

Fradkin, C. (2015). A summary evaluation of the top-five Brazilian psychology journals by native English-language scholars. *Psicologia: Reflexão e Crítica, 28*, 99-111. https://doi.org/10.1590/1678-7153.20152840014

Fradkin, C. (2017a). Scientific publication for nonnative English speakers: a retrospective of a workshop in Brazil. *Science Communication, 39*(3), 395-403. https://doi.org/10.1177/1075547017710244

Fradkin, C. (2017b). The Internationalization of Psychology Journals in Brazil: A Bibliometric Examination Based on Four Indices. *Paidéia (Ribeirão Preto), 27*, 7-15. https://doi.org/10.1590/1982-43272766201702

Fradkin, C. (2018). The impact of non-Brazilian contribution on the publishing performance of psychology journals in Brazil. *Frontiers in Psychology, 9*, 1934. https://doi.org/10.3389/fpsyg.2018.01934

Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP). (2023). Open Science @ FAPESP. https://www.fapesp.br/openscience/

Fundacao para a Ciencia e a Tecnologia (FCT). (2023). *Open Access to Scientific Publications*. Fundacao para a Ciencia e a Tecnologia (FCT). https://www.fct.pt/en/sobre/politicas-e-estrategias/politicas-de-ciencia-aberta/acesso-aberto-a-publicacoes-cientificas/

Karhulahti, V. M., & Backe, H. J. (2021). Transparency of peer review: a semi-structured interview study with chief editors from social sciences and humanities. *Research Integrity and Peer Review, 6*(13). https://doi.org/10.1186/s41073-021-00116-4

Ministerio de Ciencia e Innovación (MICIN). (2023a). National Open Science Strategy (ENCA) 2023-2027. https://www.ciencia.gob.es/en/Estrategias-y-Planes/Estrategias/ENCA.html

Ministerio de Ciencia e Innovación (MICIN). (2023b). State Plan of scientific and technical research and Innovation (PEICTI). https://www.ciencia.gob.es/en/Estrategias-y-Planes/Planes-y-programas/PEICTI.html

Mugnaini, R., Fraumann, G., Tuesta, E. F., & Packer, A. L. (2021). Openness trends in Brazilian citation data: factors related to the use of DOIs. *Scientometrics, 126*, 2523–2556. https://doi.org/10.1007/s11192-020-03663-7

Packer, A. L. (2020). The Pasts, Presents, and Futures of SciELO. In M. P. Eve & J. Gray (Eds.), *Reassembling Scholarly Communications: Histories, Infrastructures, and Global Politics of Open Access* (pp. 297-313). Cambridge, MA: The MIT Press. https://doi.org/10.7551/mitpress/11885.003.0030

Patarčić, I., & Stojanovski, J. (2022). Adoption of Transparency and Openness Promotion (TOP) guidelines across journals. *Publications, 10*(4), 46. https://doi.org/10.3390/publications10040046

SciELO. (2021, June). *SciELO - Priority lines of action 2019-2023*. https://wp.scielo.org/wp-content/uploads/priority-lines-action-2019-2023.pdf

SciELO. (2023). *SciELO Network - Priority lines of action for professionalization, internationalization, and sustainability - 2024-2028 preliminary version 24/07/2023*. https://wp.scielo.org/wp-content/uploads/Priority_lines.pdf

Scimago. (2023). *SJR, Scimago Journal & Country Rank*. https://www.scimagojr.com/

Sidler, M. (2014). Open science and the three cultures: Expanding open science to all domains of knowledge creation. In S. Bartling & S. Friesike (Eds.), *Opening Science* (pp. 81-85). https://doi.org/10.1007/978-3-319-00026-8_5

TOP Factor (2023) Transparency and openness promotion. https://www.topfactor.org/

Watchorn, D. (2022). What does Open Science mean for disciplines where pen and paper are still the main working methods? *Impact of Social Sciences Blog.* https://blogs.lse.ac.uk/impactofsocialsciences/2022/04/21/what-does-open-science-mean-for-disciplines-where-pen-and-paper-are-still-the-main-working-methods/

Table 1

Data Sources: Open Science Indicators

Variable	Source		
	Author Instructions	Article page	Article pdf
Promotion			
Open data	✓		
Open materials	✓		
Preregistration	✓		
Preprints	✓		
Replication	✓		
Implementation			
Data availability statements			✓
COI statements			✓
Funding statements			✓
DOI		✓	✓
ORCID		✓	✓
Continuous publishing		✓	✓
Open peer review	✓		

Note. Article Page, online article page; COI, conflict of interest.

Table 2

Descriptive Statistics

Journal	Dissemination	Language	Subject Field	IF
Brazil				
J Mater Res Technol	Elsevier	E	hs	6.4
Braz J Psychiat	SciELO	E	hlth	5.5
Diabetol Metab Syndr	BMC/Springer	E	hlth	4.8
Perspect Ecol Conser	Elsevier	E	hs	4.7
Int Braz J Urol	SciELO	E	hlth	3.7
Braz J Infect Dis	Elsevier	E	hlth	3.4
Braz J Phys Ther	ABRAPG	E	hlth	3.4
J Pediat-Brazil	SciELO	E	hlth	3.3
Cad Saude Publica	SciELO	EPS	hlth	2.8
Mem I Oswaldo Cruz	SciELO	E	hlth	2.8
Mexico				
Arch Med Res	Elsevier	E	hlth	7.7
Ann Hepatol	Elsevier	E	hlth	3.8
Salud Publica Mexico	INSP	ES	hlth	2.3
Rev Mex Fis	Soc Mex Fis	ES	hs	1.7
Rev Gastroenterol Me	Elsevier	ES	hlth	1.6
J Mex Chem Soc	Soc Quim Mex	E	hs	1.5
Rev Mex Ing Quim	UAM	E	hs	1.5
Atmosfera	SciELO	E	hs	1.4
Bot Sci	Soc Bot Mex	ES	hs	1.4
Rev Invest Clin	SciELO	E	hlth	1.4
Portugal				
Pulmonology	Elsevier	E	hlth	11.7
IJISPM-Int J Inf Sys	U Minho	E	ss	3.3
Media Commun-Lisbon	Cogitatio	E	ss	3.1
Eur J Psychol Educ	Springer	E	hlth	3.0
Politics Gov	Cogitatio	E	ss	2.2
Tour Manag Stud	U Algarve	E	ss	2.2
Rev Port Cardiol	Elsevier	E	hlth	1.8
Urban Plan	Cogitatio	E	ss	1.8
J Tour, Sust Well-Being	U Algarve	E	ss	1.7
Soc Incl	Cogitatio	E	ss	1.5
Spain				
J Innov Knowl	Elsevier	E	ss	18.1
Eur J Psychol Appl L	Col Psi Mad	E	hlth	9.5
Rev Psiquiatr Salud	Elsevier	ES	hlth	9.2
Int J Clin Hlth Psyc	Elsevier	E	hlth	8.8
Int J Educ Technol H	Springer	E	ss	8.6
Arch Bronconeumol	Elsevier	E	hlth	8.0
J Invest Allerg Clin	Esmon Pub	E	hlth	7.2
Rev Esp Cardiol	Elsevier	ES	hlth	5.9
Eur Res Manag Bus Ec	Elsevier	E	ss	5.8
Comunicar	Grupo	E	ss	5.6

Note. IF, JCR impact factor (2022); Language: E, English, P, Portuguese, S, Spanish; Subject Field: hlth, health sciences, ss, social sciences, hs, hard sciences.

Table 3

Between-Groups Differences in the Promotion and Implementation of Open Science Measures

	Nations	Dissemination	Language	Subject Field
Promotion				
Open data	n.s.	int > sci, dom	n.s.	n.s.
Open materials	B > M	int > dom	n.s.	n.s.
Preregistration	n.s.	n.s.	n.s.	n.s.
Preprints	n.s.	int, sci > dom	n.s.	hlth > ss
Replication	--	--	--	--
Overall	B > P	int > dom	n.s.	n.s.
Implementation				
Data availability statements	n.s.	n.s.	n.s.	n.s.
COI statements	n.s.	n.s.	n.s.	n.s.
Funding statements	n.s.	n.s.	n.s.	n.s.
DOI	n.s.	n.s.	n.s.	n.s.
ORCID	n.s.	sci > int	n.s.	n.s.
Continuous publishing	B, S > P	int > sci, dom	n.s.	hlth > ss
Open peer review	--	--	--	--
Overall	B > M, P	--	--	--
Promotion/Implementation	B, S > P; B > M	int > dom	n.s.	n.s.

Note. n.s., statistically non-significant; COI, conflict of interest; Nations: B, Brazil, M, Mexico, P, Portugal, S, Spain; Dissemination: int, international, sci, SciELO, dom, domestic; Subject Field: hlth, health sciences, ss, social sciences.

Table 4

Overall Promotion and Implementation Scores

Grouping Variable	Promotion (0-5)	Implementation (0-7)	P & I (0-12)
Nation			
Brazil	2.20[a]	3.30[a]	5.50[a]
Mexico	0.80[ab]	1.70[b]	2.50[b]
Portugal	0.70[b]	1.60[b]	2.30[c]
Spain	2.00[ab]	2.90[ab]	4.90[ab]
Dissemination			
Domestic	0.38[a]	1.88[a]	2.25[a]
International	2.53[b]	2.76[a]	5.29[b]
SciELO-indexed	1.14[ab]	2.57[a]	3.71[ab]
Language			
English-only	1.48[a]	2.36[a]	3.85[a]
Multi-language	1.14[a]	2.43[a]	3.57[a]
Subject Field			
Hard Sciences	0.86[a]	1.86[a]	2.71[a]
Health Sciences	1.86[a]	2.82[a]	4.68[a]
Social Sciences	0.91[a]	1.82[a]	2.73[a]

Note. P & I, combined score: promotion and implementation; [a, b, c], different superscript denotes statistically significant difference between levels, after Bonferroni pairwise adjustment.

Table 5

Journal Ranking by Promotion (P) and Implementation (I) Scores

Journal	Nation	Diss	Lang	Subject	P	I	P & I
Diabetol Metab Syndr	B	int	E	hlth	3	5	8
Int J Educ Technol H	S	int	E	ss	3	4	7
Braz J Infect Dis	B	int	E	hlth	3	3	6
Comunicar	S	dom	E	ss	3	3	6
Int J Clin Hlth Psyc	S	int	E	hlth	3	3	6
J Mater Res Technol	B	int	E	hs	3	3	6
Mem I Oswaldo Cruz	B	scielo	E	hlth	3	3	6
Perspect Ecol Conser	B	int	E	hs	3	3	6
Rev Port Cardiol	P	int	E	hlth	3	3	6
Rev Psiquiatr Salud	S	int	M	hlth	3	3	6
Ann Hepatol	M	int	E	hlth	2	3	5
Arch Bronconeumol	S	int	E	hlth	3	2	5
Arch Med Res	M	int	E	hlth	3	2	5
Braz J Phys Ther	B	dom	E	hlth	2	3	5
Braz J Psychiat	B	scielo	E	hlth	1	4	5
Eur Res Manag Bus Ec	S	int	E	ss	3	2	5
Int Braz J Urol	B	scielo	E	hlth	1	4	5
J Pediat-Brazil	B	scielo	E	hlth	2	3	5
Pulmonology	P	int	E	hlth	3	2	5
Rev Esp Cardiol	S	int	M	hlth	1	4	5
J Invest Allerg Clin	S	dom	E	hlth	0	4	4
Salud Publica Mexico	M	dom	M	hlth	1	3	4
Bot Sci	M	dom	M	hs	0	3	3
Cad Saude Publica	B	scielo	M	hlth	1	2	3
Eur J Psychol Educ	P	int	E	hlth	1	2	3
J Innov Knowl	S	int	E	ss	1	2	3
Rev Gastroenterol Me	M	int	M	hlth	2	1	3
Eur J Psychol Appl L	S	dom	E	hlth	0	2	2
Media Commun-Lisbon	P	dom	E	ss	0	2	2
Politics Gov	P	dom	E	ss	0	2	2
Soc Incl	P	dom	E	ss	0	2	2
Urban Plan	P	dom	E	ss	0	2	2
Atmosfera	M	scielo	E	hs	0	1	1
J Mex Chem Soc	M	dom	E	hs	0	1	1
J Tour, Sust Well-Being	P	dom	E	ss	0	1	1
Rev Invest Clin	M	scielo	E	hlth	0	1	1
Rev Mex Fis	M	dom	M	hs	0	1	1
Rev Mex Ing Quim	M	dom	E	hs	0	1	1
IJISPM-Int J Inf Sys	P	dom	E	ss	0	0	0
Tour Manag Stud	P	dom	E	ss	0	0	0

Note. P score: promotion of open science measures (range 0-5); I score: implementation of open science measures (range 0-7); P & I, combined score: promotion and implementation of

open science measures (range 0-12); Nation: B, Brazil, M, Mexico, P, Portugal, S, Spain; Diss, dissemination: int, international, dom, domestic, scielo, SciELO-indexed; Lang, language: E, English-only, M, multi-language; Subject, subject field: hlth, health sciences, ss, social sciences, hs, hard sciences.

Table 6

Journal Subject Field by Country

Country	Hard Sciences	Health Sciences	Social Sciences	Total
Brazil	8	2	-	10
Mexico	5	5	-	10
Portugal	3	-	7	10
Spain	6	-	4	10
Total	22	7	11	40

Table 7

Open Science Checklist for Journal Publishers

Author Instructions Page	
Encourages submission of preprints	✓
Encourages submission of replication studies	✓
Encourages data/materials sharing	✓
Encourages preregistration of studies	✓
Online Submission Portal	
Mandates data/materials sharing statement	✓
Mandates COI statements	✓
Mandates funding disclosure statements	✓
Mandates ORCID numbers (all authors)	✓
Journal Policy	
Continuous publishing	✓
DOIs	✓
Open Peer review	✓

Supplementary Materials

Table S1

Promotion and Implementation of Open Science Measures

	Promotion						Implementation								P & I
Journal	open data	open mats	pre-reg	pre-print	repl stud	total (0-5)	data avail	coi	fund	doi	orc	cont pub	open rev	total (0-7)	total (0-12)
Brazil															
J Mater Res Technol	1	1	0	1	0	3	0	1	0	1	0	1	0	3	6
Braz J Psychiat	0	0	0	1	0	1	0	1	0	1	1	1	0	4	5
Diabetol Metab Syndr	1	1	0	1	0	3	1	1	1	1	0	1	0	5	8
Perspect Ecol Conser	1	1	0	1	0	3	0	1	0	1	0	1	0	3	6
Int Braz J Urol	0	0	0	1	0	1	0	1	0	1	1	1	0	4	5
Braz J Infect Dis	1	1	0	1	0	3	0	1	0	1	0	1	0	3	6
Braz J Phys Ther	1	1	0	0	0	2	0	1	0	1	0	1	0	3	5
J Pediat-Brazil	1	1	0	0	0	2	0	1	0	1	0	1	0	3	5
Cad Saude Publica	0	0	0	1	0	1	0	0	0	1	1	0	0	2	3
Mem I Oswaldo Cruz	1	1	0	1	0	3	0	0	0	1	1	1	0	3	6
Mexico															
Arch Med Res	1	1	0	1	0	3	0	0	0	1	0	1	0	2	5
Ann Hepatol	1	0	0	1	0	2	0	1	0	1	0	1	0	3	5
Salud Publica Mexico	0	0	0	1	0	1	0	1	0	1	0	1	0	3	4
Rev Mex Fis	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Rev Gastroenterol Me	1	0	0	1	0	2	0	0	0	0	0	1	0	1	3
J Mex Chem Soc	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Rev Mex Ing Quim	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Atmosfera	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Bot Sci	0	0	0	0	0	0	0	0	0	1	1	1	0	3	3
Rev Invest Clin	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Portugal															

Pulmonology	1	1	0	1	0	3	0	0	0	1	0	1	0	2	5
IJISPM-Int J Inf Sys	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Media Commun-Lisbon	0	0	0	0	0	0	0	1	0	1	0	0	0	2	2
Eur J Psychol Educ	1	0	0	0	0	1	0	0	0	1	0	1	0	2	3
Politics Gov	0	0	0	0	0	0	0	1	0	1	0	0	0	2	2
Tour Manag Stud	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rev Port Cardiol	1	1	0	1	0	3	0	1	0	1	0	1	0	3	6
Urban Plan	0	0	0	0	0	0	0	1	0	1	0	0	0	2	2
J Tour, Sust & Well-Being	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Soc Incl	0	0	0	0	0	0	0	1	0	1	0	0	0	2	2
Spain															
J Innov Knowl	1	0	0	0	0	1	0	0	0	1	0	1	0	2	3
Eur J Psychol Appl L	0	0	0	0	0	0	0	1	0	1	0	0	0	2	2
Rev Psiquiatr Salud	1	1	0	1	0	3	0	1	0	1	0	1	0	3	6
Int J Clin Hlth Psyc	1	1	0	1	0	3	0	0	1	1	0	1	0	3	6
Int J Educ Technol H	1	1	0	1	0	3	1	1	0	1	0	1	0	4	7
Arch Bronconeumol	1	1	0	1	0	3	0	0	0	1	0	1	0	2	5
J Invest Allerg Clin	0	0	0	0	0	0	0	1	1	1	0	1	0	4	4
Rev Esp Cardiol	0	0	0	1	0	1	0	1	1	1	0	1	0	4	5
Eur Res Manag Bus Ec	1	1	0	1	0	3	0	0	0	1	0	1	0	2	5
Comunicar	1	1	1	0	0	3	0	0	0	1	1	1	0	3	6

Note. P & I, promotion and implementation.