Scientometrics (2024) 129:4741–4750
https://doi.org/10.1007/s11192-024-05096-y

Journal self-citations trends in sport sciences: an analysis of disciplinary journals from 2013 to 2022

Hunter Bennett[1,2] · **Ben Singh**[1,2] · **Flynn Slattery**[2,3]

Received: 3 September 2023 / Accepted: 21 June 2024 / Published online: 5 July 2024

Abstract
This study reports on the yearly rate of journal self-citation (JSC) in sport sciences, how it changes over time, and its association with journal impact factor (JIF). Citations made by all 87 journals in "sport sciences" from 2013 to 2022 were extracted, as was their 2022 JIF. JSC rates were calculated using a Poisson distribution method. A mixed-effects negative binomial regression examined changes in yearly JSC rates over time. The association between average JSC rates and JIF were compared using a negative binomial regression. The median JSC rate was 6.3 self-citations per 100 citations. JSC rates are increasing in sport sciences by ~ 10% per year (incidence rate ratio [IRR] = 1.1, 95% CI 1.1–1.2; *trivial effect*). There was a significant negative association between JSC rate and JIF (IRR = 0.9, 95% CI 0.9, 1.0; *trivial effect*). Contrary to observations made in prior literature examining broader disciplines, the increasing JSC rate in sport sciences may be attributed to the growing maturity of this novel discipline. As sport-science topic areas become more established and appear in discipline specific journals, more JSCs may occur due to an increasing body of literature in these journals. The negative association between JSC rate and JIF may be due to specialized and less visible journals having a naturally lower JIF, as their impact is confined to a narrower field.

Keywords Trends · Impact factor · Manipulation · Malpractice · Metascience · Journal self-citation

Introduction

Journal impact factor (JIF) is one of the most common methods of assessing the quality of academic journals. Despite its widespread use amongst academic institutions, it is susceptible to manipulation (Falagas & Alexiou, 2008; Martin, 2016; Vanclay, 2012).

✉ Hunter Bennett
Hunter.bennett@unisa.edu.au

[1] Allied Health and Human Performance, University of South Australia, GPO Box 2471, Adelaide, SA 5001, Australia

[2] Alliance for Research in Exercise, Nutrition, and Activity (ARENA), University of South Australia, Adelaide, Australia

[3] Central Adelaide Local Health Network, Adelaide, Australia

For any given year, JIF is calculated from two elements: the numerator, which is the number of citations in the current year to any items published in a journal in the prior 2 years, and the denominator, which is the number of source items published in the same 2 years (Garfield, 1999). Commonly reported means of JIF manipulation include preferentially publishing articles at the start of the year to maximise the time they have available to accrue citations, the excessive publishing of reviews that are likely to be highly cited at the expense of original research, and the preferential publication of non-research items such as letters to the editors and correspondences that contribute to journal citations, but are not deemed to be original research (i.e., they do not contribute to the denominator) in the calculation of JIF (Heathers & Grimes, 2022). Further investigations of JIF manipulation have also identified journal self-citation (JSC) as a form of malpractice used to increase JIF (Mahian & Wongwises, 2015; Smith, 1997; Wilhite & Fong, 2012; Yu et al., 2014).

The rate at which JSC occurs indicates how often a journal is cited by its own publications. There is evidence demonstrating that a journals "normal" JIF is poorly correlated with its "modified" JIF that has been calculated after excluding JSCs (Giri & Chaudhuri, 2020). This highlights the notable impact that high JSC rates can have on JIF, and why they warrant additional consideration as a means of malpractice. High JSC rates are driven by several potential factors, some coercive, and some not. Forms of coercive JSC include journal editors requesting that authors add references to papers that have been recently published in that journal during revisions, and journals actively suggesting authors cite their publications in their author guidelines. Previous research has indicated that ~ 20% of journals participate in coercive JSC (Wilhite & Fong, 2012), while ~ 14% of researchers have admitted to being coerced into JSC, indicating the seriousness of the issue (Fong & Wilhite, 2017). Conversely, an example of non-coercive JSC would be authors strategically citing papers recently published in the journal to which they are submitting to increase the likelihood of acceptance (Chorus & Waltman, 2016). Interestingly, evidence conducted on journals in the category of "Library and Information Science" has indicated that the JSC rates of individual publications tend to peak in the 2 years after it is published, before trending downward after this 2 years period has elapsed (Giri, 2019). These findings further support the suggestion that JSC rates may be a common means of manipulating JIF. It is also important to highlight that high rates of JSC do not always imply malpractice. It is likely that journals experience higher self-citation rates due to publishing higher volumes of work in niche areas, and in the case of well-regarded journals, because they both publish and receive highly impactful research that naturally accrue more citations.

In the largest study on JSC to date, Gazni and Didegah (2021) explored the yearly self-citation trends of ~ 24,000 active journals between 1975 and 2017. They observed a decline in yearly JSC rates from 21% in 1975 to 12% in 2017 (Gazni & Didegah, 2021). They also indicated that when examining journal self-citations as a percentage of total citations in the prior 2 years, quartile one (Q1) journals were more likely to self-cite than Q2, Q3, and Q4 journals, suggesting a potential relationship between JSC and JIF (Gazni & Didegah, 2021). However, these findings should be interpreted with caution, as the authors did not perform any formal statistical analyses when drawing these inferences (Gazni & Didegah, 2021). Moreover, while the comprehensive evaluation of multiple fields may provide insight into general JSC trends, it is likely that different fields have different self-citation patterns, which are not reflected in this report. In an early analysis of field-specific citation trends, Krauss (2007) examined the average JSC rate of 107 journals in the field of "ecological sciences." They reported an average JSC rate of 16.2%, and a negative association between JSC and JIF ($r^2 = 8.4\%$; $p = 0.003$) (Krauss, 2007). Notably, this analysis was conducted using the JIF from 2004, and may not be reflective of recent JSC trends. More

recently, in 35 journals specific to the field of "critical care," self-citation rates ranged from 0 and 35%, with a median JSC of 8.8% (Sanfilippo et al., 2021). Associations with JIF were not explored. Similarly, in an analysis of a small number ($n=6$) of Q1 emergency medicine journals, the average JSC rate was 5.8% (range 4.3–8.1), and the authors found no significant association between self-citation rates and JIF ($r=0.78$, $p=0.07$) (Sri-Ganeshan et al., 2021). However, this analysis was likely limited by the small number of journals included in the study, and therefore may not be reflective of the broader research environment within that field. Lastly, in a large analysis of 117 paediatric journals, the median JSC rate was 9% (range 0–30%), and there was significant inverse association between JIF and JSC ($r=-0.28$, $p=0.002$), suggesting that lower impact journals were more likely to self-cite than higher impact journals (Mimouni et al., 2016).

Objectives

Despite various limitations in methodology, previous research indicates that yearly JSC rates are likely to vary between fields, and that this may vary between journals with low and high impact factors. To date, there has been no extensive evaluation of JSC rates in the sport sciences, a field that is relatively new compared to more established fields of scientific research (Halperin et al., 2018). This paper aims to report the rate of JSC in the field of sport sciences. To provide insight into how the publishing practices of sport sciences journals have changed over time, the association between yearly JSC rates and publication year will be explored. Additionally, to provide insight into how JIF impacts JSC, associations between JSC rates and JIF will be examined. We hypothesised that JSC rates will have decreased over time, and that they are negatively associated with JIF, as observed in other fields (Gazni & Didegah, 2021).

Methods

All citations made by all 87 journals in the category of "sport sciences" from the years 2013 to 2022 were extracted from Clarivate Journal Citation Reports on the 11th of August 2023, as was the 2022 JIF for each journal. From this data, the total number of citations made by each journal each year was calculated, as was the total number of JSCs made by each journal each year. Average yearly JSC rates across the 10-year period were then calculated using the Poisson distribution method, where the total number of citations made by the journal was considered the exposure variable, and the number of journal self-citations was considered the incidence variable. All journal self-citation rates are presented as self-citations per 100 total citations, with 95% confidence intervals (CI). While the assumption of independence (i.e., that each incidence of self-citation was independent of one another) could not be verified, a Poisson distribution was deemed most appropriate to present the raw self-citation rates due to the discrete nature and non-normal distribution of the self-citation count data (Vose, 2008). A mixed effects negative binomial regression was used to examine whether the rate of yearly self-citation had changed from 2013 to 2022. For this analysis, a mixed model was selected as it allowed JIF to be included as a covariate to account for potential variations in JSC trends between high and low impact journals, journal ID to be included a random effect, and the total number of citations made by the journal each year to be included as an exposure variable. The association between the

average JSC rates from the years 2020 and 2021, and 2022 JIF, were compared using a negative binomial regression to determine the relationship between these variables, with the total number of citations made by the journal in the years 2020 and 2022 included as the exposure variable. For both of these analyses a negative binomial regression model was deemed appropriate due to overdispersion being present in the data (Gardner et al., 1995). Effect sizes were reported as incidence rate ratios (IRR) and considered trivial (0.77–1.00 or 1.00–1.29), small (0.51–0.78 or 1.30–1.99), moderate (0.25–0.50 or 2.00–3.99), and large ($\leq$0.24 or $\geq$4.00) (Hopkins, 2010). All analyses were conducted in Stata Statistical Software, release 18 (College Station, TX).

Results

Across the 10-year period, the 87 journals cited a total of 353,499 sources, of which 23,577 (6.7%) were journal self-citations. Within this timeframe the total number of citations made within each journal ranged from 136 to 26,589, and the average rate of JSC ranged from 0.0 to 35.7 per 100 citations, with a median of 6.3 self-citations per 100 citations (Supplementary Digital Content Table 1; Fig. 1).

To determine whether the yearly JSC practices of sport sciences journals changed over time, a mixed-effects negative binomial regression model explored the association between yearly JSC rate and year of publication, while considering the number of total citations per year as the exposure variable. Journal ID was included as a random

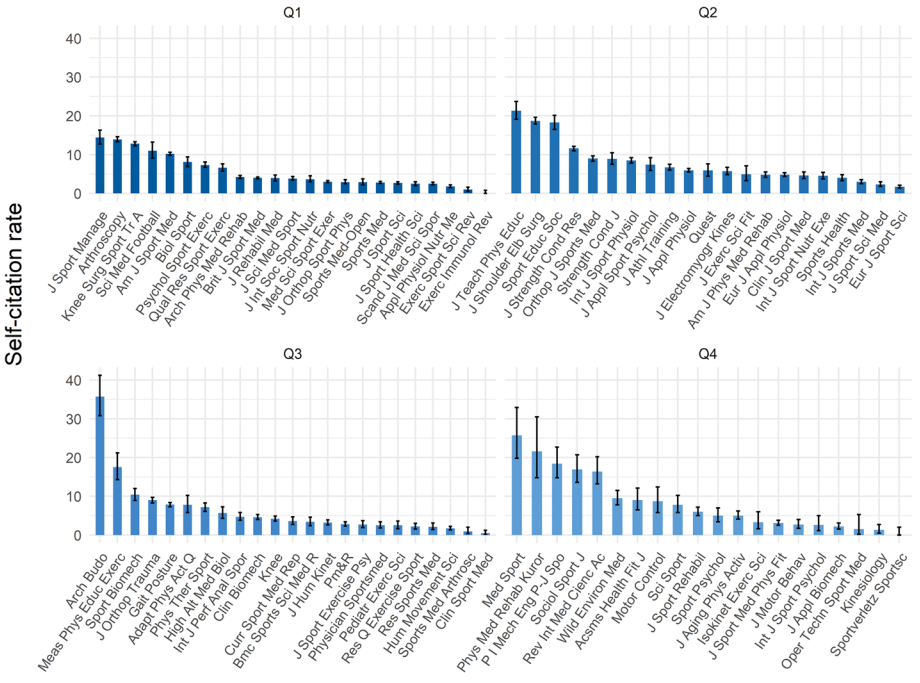

Fig. 1 Overview of included journals, including journal self-citation (JSC) rate per 100 citations, and 95% confidence intervals (CI), sorted by quartile and in order of 2022 Journal Impact Factor (JIF)

factor to account for within-journal clustering. The regression equation (log(self-citations) = − 2.1968312 + 0.116*year + u0 + ln(exposure) + ε) revealed that JSC rate is significantly associated with the year of publication ($\beta 1 = 0.116$, $P < 0.001$). The IRR indicated that JSC rates have increased over time by approximately 10% per year (IRR = 1.1, 95% CI 1.1–1.2; *trivial effect*) (Fig. 2).

The negative binomial regression analysis explored the relationship between JSC rates from 2020 and 2021, and JIF, when considering the total number of citations made by each journal in 2020 and 2021 as the exposure variable. The regression equation (ln(JSC rate) = − 2.1968 − 0.0726*JIF + 1*ln(exposure)) indicated a significant negative association between JSC rate and JIF ($\beta 1 = -0.07256$, $P = 0.016$). The IRR suggested a ~ 10% reduction in JSC rate for every one unit increase in JIF (IRR = 0.9, 95% CI 0.9, 1.0; *trivial effect*) (Fig. 3).

Discussion

This study provides the first comprehensive analysis of JSC rates in the sport sciences, and the first statistical evaluation of how yearly JSC rates are changing over time in any field. Sport sciences journals are increasing the rate at which they self-cite by ~ 10% each year. A negative association between rates of JSC and JIF indicates that, on average, lower ranked journals self-cite at higher rates than their higher-ranking counterparts.

Average journal self-citation rates in sport sciences

With a median self-citation rate of 6.3 self-citations per 100 citations, sport science journals self-cite at a slightly lower rate than that previously reported in the broader literature, which have collectively observed average JSC rates of ~ 12% (Gazni & Didegah,

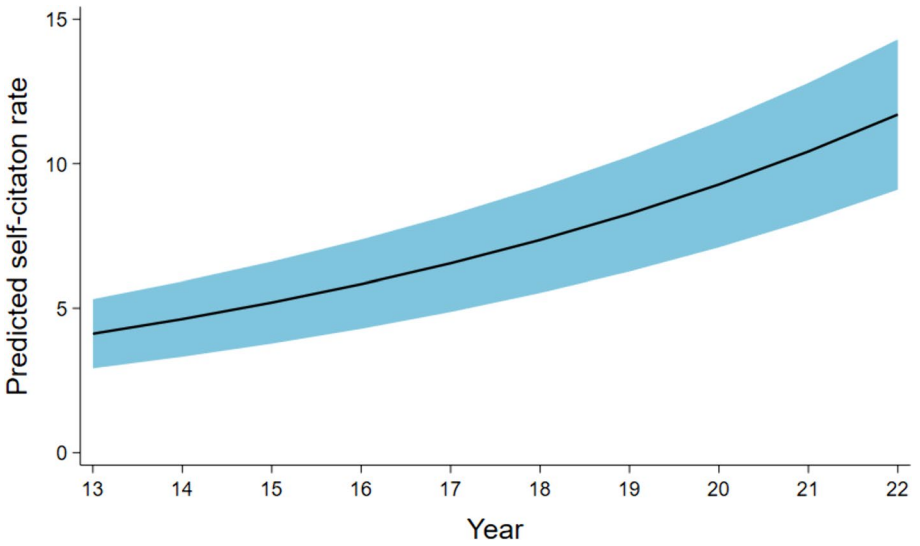

Fig. 2 Mean predicted self-citations (95% CI) per 100 citations between 2013 and 2022

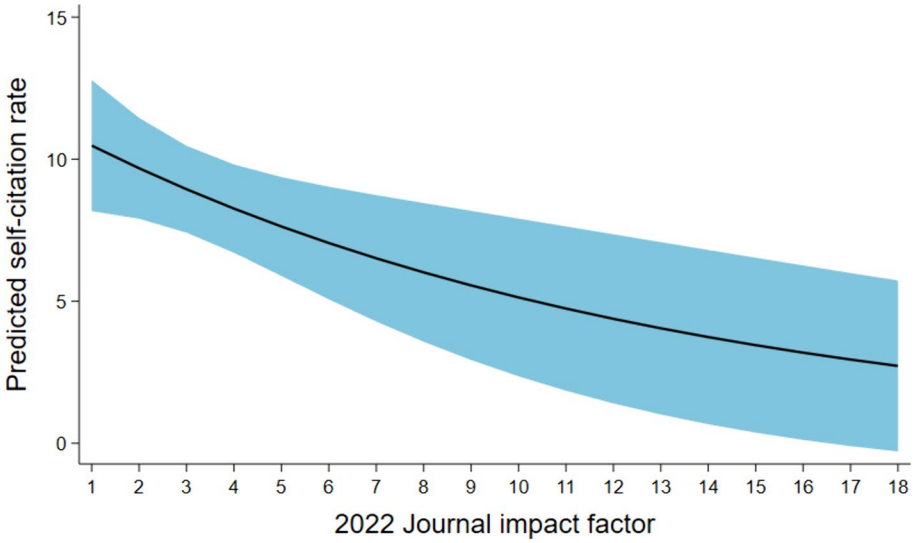

Fig. 3 The relationship between mean predicted self-citations (95% CI) per 100 citations and journal impact factor

2021; Sanfilippo et al., 2021). While the exact reason for this finding is unclear, it could be partially related to the fact that sport science is a growing field, and often draws on the application of more "foundational" research from other fields to formulate its research questions (Halperin et al., 2018). For example, the application of human physiology into sport physiology research, or physics into sport biomechanics research. If this is the case, it would make sense that sport science research is more likely to cite work outside its direct field, and thus result in a lower rate of JSC compared to other, more well-established, fields.

Despite the median JSC rate being relatively low, seventeen journals (20%) had JSC rates of greater than 10%, ten journals (11%) had JSC rates above 15%, and one journal had a JSC rate exceeding 35%. While the precise reason for certain journals having such high JSC rates is unclear, there are some potential explanations. Some of these journals had more specific scopes than many others in the field (i.e., Archives of Budo; Journal of Shoulder and Elbow Surgery; Journal of Teaching in Physical Education), and as such may be prone to publishing on specific topics that are rarely included in other journals. This could suggest that high JSC rates in the sport sciences may simply be indicative of how niche a specific journal is (Heneberg, 2016). Another possible explanation may relate to an increased number of 'special issues' being published within certain journals. Special issues are quite distinct in that they often invite authors to submit their research, rather than being submitted independently by the authors. Although this has largely been seen as a method of increasing profit (particularly amongst open access journals that charge a publication fee) (Hanson et al., 2023), they may also increase JSC by inviting authors who have previously published in that journal to contribute. However, as the data extracted from Journal Citation Reports does not provide sufficient information to examine the extent to which special issues contribute to JSC rates, this suggestion should be considered cautiously. Future research could consider examining whether the rate at which sport sciences journals publish special issues is associated with JSC rates.

Journal self-citation rates are increasing over time in sport sciences

Contrary to what was hypothesised, and conflicting with what appears to be occurring in the broader literature (Gazni & Didegah, 2021), the results of the present study demonstrated that the yearly rates of JSC in sport sciences have increased over time. This may again be related to the relative novelty of the field, suggesting that as topics within the sport sciences become more established, they result in more self-citations due to an increasing body of literature on any given topic. It may also be a result of an increasing rate of specialisation in the sport sciences. As a field of research evolves, it often leads to the development of specialised sub-fields (Coccia, 2020). It is conceivable that, with the growth of the sport science research, journals may naturally specialise in specific areas and topics, resulting in an increased rate of JSC due to more relevant papers being published within a specific journal. This is partially supported by recent research demonstrating an increasing number of unique research trends in the sport science literature, particularly in topics pertaining to specific sporting injuries (i.e., concussion) and novel exercise interventions (i.e., blood flow restriction training) (Tao & Lv, 2023).

It is also important to highlight that prior research examining JSC in the broader literature have suggested that high JSC rates may be due to certain forms of research malpractice (Chorus & Waltman, 2016). For example, editors requesting authors add references to papers recently published in that journal during revisions, or the preferential publication of non-research items (i.e., letters to the editors, correspondences) that contribute to journal citations but are not deemed to be original research when calculating JIF. As such, the present findings may also suggest that malpractice in sport sciences has increased over the last decade. In support of this suggestion, a significant increase in editorial content (including letters to the editor and editorial comments), combined with no increase in empirical research articles, has been observed in the "British Journal of Sports Medicine" (currently the highest impact Sport Sciences journal) over the last 15 years (Heathers & Grimes, 2022). While such articles have been proposed as a way to increase author self-citations in the sport sciences (Nuzzo, 2021), they may also offer a means to increase JSC rate given their propensity to cite previous work from the same journal.

However, it is important to highlight that the present study examined JSC rates over the previous 10 years (2013–2022). As such, it is unclear as to whether this increase in rates is consistent with historical changes to JSC in the sport sciences. Moreover, the reason for these changes cannot be elucidated from the current findings.

Lower impact factor is associated with greater journal self-citation in sport sciences

As hypothesised, JSC rates were negatively associated with JIF, which aligns with previous findings in the broader literature (Gazni & Didegah, 2021) and other specific fields (Krauss, 2007; Mimouni et al., 2016). It stands to reason that higher JIF journals would naturally receive more novel research due to reputation. As novel pieces of research may be more likely to draw on other topic areas to formulate their research questions, this would naturally lead to lower rates of JSC. However, this finding could also suggest that higher ranked journals are less likely to use coercive JSC to inflate their JIF. This is partially supported by research indicating that high quartile journals inflate their JSC through other means which may be less effective in smaller, less well known, journals. For example, they may be more likely to publish research that does not contribute to the denominator when

calculating JIF (e.g., editorials, letters to editor), something that has been observed in high-impact journals in other fields (Schekman, 2013; Van Noorden, 2017), and as previously described, in the highest impact journal in the sport sciences (Heathers & Grimes, 2022). Conversely, the finding that low JIF journals are more likely to have higher rates of JSC is a logical one and may indicate coercive JSC by some lower ranked journals, which is theme that has been observed in the broader literature (Siler & Larivière, 2022). As such, this finding may suggest that coercive JSC is not a considerable issue in higher ranked sport science journals, despite being proposed as a notable concern in the broader research environment (Wilhite & Fong, 2012).

It is also plausible that the negative association observed between JIF and JSC rates is simply a by-product of lower impact journals having more niche topic areas, as outlined above when discussing the average self-citation rates in sport sciences. For example, it may be that those journals aligned with specific research topics get cited less often by the broader literature and are more likely to get cited in that same journal due to topic relevance. This is something that has been observed in a small subset of paediatric journals, where it was speculated that articles published in a journal are more likely to be cited again in the same journal due to the apparent relevance across their specific topic area (Mimouni et al., 2016). Prior research examining citation rates in sport sciences journals would support this suggestion, where those journals that focus on specific sub-disciplines of sport science (i.e., history of sport) had notably lower citation rates (Knudson, 2015).

Limitations

These findings should be considered with certain limitations. Firstly, this study only examined citation metrics published from 2013 onwards. Therefore, it may not be reflective of historical changes in yearly JSC rates before this time. Secondly, while it provides a detailed overview of the broader sport-science field, it does not examine its subdisciplines, or statistically account for journals that appear in multiple research categories. It may be that journals who specialise in certain sub-disciplines of exercise science have different JSC patterns than those with broader topic areas. Similarly, journals that are ranked across multiple research categories may demonstrate different JSC rates than those that only appear within a single category. Thirdly, the present study did not consider how different study types (i.e., original articles, reviews, etc.) influence JSC rates. It is likely that different types of articles attract citations differently, which would impact JSC rates. Future research should consider examining what types of articles are associated with higher rates of JSC. Lastly, it is important to note that this study examined changes in the yearly JSC rates of journals but did not examine how the JSC rates of individual papers changed over time. Prior research on journals in the category of "Library and Information Science" has indicated that the JSC rates of individual papers tends to peak in the 2 years after publication, before trending downwards (Giri, 2019). Future research should explore whether individual publications in sport sciences journals exhibit similar patterns.

Conclusions

In the first comprehensive overview of self-citation rates in sport sciences journals, we found relatively low rates of JSC compared to the broader literature. However, over the last decade JSC rates increased significantly by ~ 10% per year, which may indicate increasing

rates of publication malpractice in the field. Conversely it is also possible that increasing JSC rates are related to the relative novelty of the field, whereby as specific sport-science topic areas become more established, they naturally result in more self-citations due to an increasing body of literature. Lastly, a negative association between was observed between JSC rates and JIF. This may imply that coercive self-citation is more common in sport science journals with low JIF, while those with high JIF may be more likely to deliberately increase JIF through other means, such as increasing the publication of articles that do not contribute to the denominator when calculating JIF. Conversely, this association may also be a by-product of lower impact journals having more niche topic areas, whereby those journals aligned with specific research topics get cited less often by the broader literature but are more likely to get cited in that same journal due to topic relevance.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s11192-024-05096-y.

Author contributions HB designed the research, collected, analysed, and interpreted the data, edited, and revised the manuscript; BS designed the research, interpreted the data, edited, and revised the manuscript; FS interpreted the data, drafted, edited, and revised the manuscript.

Funding Open Access funding enabled and organized by CAUL and its Member Institutions.

Declarations

Conflict of interest The authors declare that they have no competing interests.

References

Chorus, C., & Waltman, L. (2016). A large-scale analysis of impact factor biased journal self-citations. *PLoS ONE, 11*(8), e0161021. https://doi.org/10.1371/journal.pone.0161021

Coccia, M. (2020). The evolution of scientific disciplines in applied sciences: Dynamics and empirical properties of experimental physics. *Scientometrics, 124*(1), 451–487. https://doi.org/10.1007/s11192-020-03464-y

Falagas, M. E., & Alexiou, V. G. (2008). The top-ten in journal impact factor manipulation. *Archivum Immunologiae Et Therapiae Experimentalis, 56*(4), 223–226. https://doi.org/10.1007/s00005-008-0024-5

Fong, E. A., & Wilhite, A. W. (2017). Authorship and citation manipulation in academic research. *PLoS ONE, 12*(12), e0187394. https://doi.org/10.1371/journal.pone.0187394

Gardner, W., Mulvey, E. P., & Shaw, E. C. (1995). Regression analyses of counts and rates: Poisson, overdispersed Poisson, and negative binomial models. *Psychological Bulletin, 118*(3), 392. https://doi.org/10.1037/0033-2909.118.3.392

Garfield, E. (1999). Journal impact factor: A brief review. *CMAJ, 161*(8), 979–980.

Gazni, A., & Didegah, F. (2021). Journal self-citation trends in 1975–2017 and the effect on journal impact and article citations. *Learned Publishing, 34*(2), 233–240. https://doi.org/10.1002/leap.1348

Giri, R. (2019). Influence of selected factors in journals' citations. *Aslib Journal of Information Management, 71*(1), 90–104. https://doi.org/10.1108/AJIM-07-2017-0170

Giri, R., & Chaudhuri, S. K. (2020). Effect of common extraneous citation optimizing factors on journal impact indicators. *Journal of Scientometric Research, 9*(1), 63–69. https://doi.org/10.5530/jscires.9.1.7

Halperin, I., Vigotsky, A. D., Foster, C., & Pyne, D. B. (2018). Strengthening the practice of exercise and sport-science research. *International Journal of Sports Physiology and Performance, 13*(2), 127–134. https://doi.org/10.1123/ijspp.2017-0322

Hanson, M. A., Barreiro, P. G., Crosetto, P., & Brockington, D. (2023). The strain on scientific publishing. *Digital Libraries*. https://doi.org/10.48550/arXiv.2309.15884

Heathers, J., & Grimes, D. (2022). The mechanics behind a precipitous rise in impact factor: A case study from the British Journal of Sports Medicine. Open Science Framework. https://doi.org/10.17605/OSF.IO/4C6XA

Heneberg, P. (2016). From excessive journal self-cites to citation stacking: Analysis of journal self-citation kinetics in search for journals, which boost their scientometric indicators. *PLoS ONE, 11*(4), e0153730. https://doi.org/10.1371/journal.pone.0153730

Hopkins, W. G. (2010). Statistics used in observational studies. In E. Verhagen & W. van Mechelen (Eds.), *Sports injury research* (Vol. 1, pp. 69–81). Oxford University Press.

Knudson, D. (2015). Citation rate of highly-cited papers in 100 kinesiology-related journals. *Measurement in Physical Education and Exercise Science, 19*(1), 44–50. https://doi.org/10.1080/1091367X.2014.988336

Krauss, J. (2007). Journal self-citation rates in ecological sciences. *Scientometrics, 73*(1), 79–89. https://doi.org/10.1007/s11192-007-1727-7

Mahian, O., & Wongwises, S. (2015). Is it ethical for journals to request self-citation? *Science and Engineering Ethics, 21*(2), 531–533. https://doi.org/10.1007/s11948-014-9540-1

Martin, B. R. (2016). Editors' JIF-boosting stratagems—Which are appropriate and which not? *Research Policy, 45*(1), 1–7. https://doi.org/10.1016/j.respol.2015.09.001

Mimouni, M., Ratmansky, M., Sacher, Y., Aharoni, S., & Mimouni-Bloch, A. (2016). Self-citation rate and impact factor in pediatrics. *Scientometrics, 108*(3), 1455–1460. https://doi.org/10.1007/s11192-016-2025-z

Nuzzo, J. L. (2021). Letters to the editor in exercise science and physical therapy journals: An examination of content and "authorship inflation. *Scientometrics, 126*(8), 6917–6936. https://doi.org/10.1007/s11192-021-04068-w

Sanfilippo, F., Tigano, S., Morgana, A., Murabito, P., & Astuto, M. (2021). Self-citation policies and journal self-citation rate among Critical Care Medicine journals. *Journal of Intensive Care, 9*(1), 15. https://doi.org/10.1186/s40560-021-00530-2

Schekman, R. (2013). How journals like Nature, Cell and Science are damaging science. *The Guardian, 9*, 12.

Siler, K., & Larivière, V. (2022). Who games metrics and rankings? Institutional niches and journal impact factor inflation. *Research Policy, 51*(10), 104608. https://doi.org/10.1016/j.respol.2022.104608

Smith, R. (1997). Journal accused of manipulating impact factor. *British Medical Journal*. https://doi.org/10.1136/bmj.314.7079.461d

Sri-Ganeshan, M., Walker, K. P., Lines, T. J., Neal-Williams, T. J. L., & Taylor, D. M. (2021). Author and journal self-citation in Emergency Medicine original research articles. *The American Journal of Emergency Medicine, 50*, 481–485. https://doi.org/10.1016/j.ajem.2021.09.005

Tao, Y., & Lv, X. (2023). Research hotspots and trends on sports medicine of athletes: A scientometric analysis from 2003 to 2023. *Medicine*. https://doi.org/10.1097/MD.0000000000035254

Van Noorden, R. (2017). The science that's never been cited. *Nature, 552*(7684), 162–164. https://doi.org/10.1038/d41586-017-08404-0

Vanclay, J. K. (2012). Impact factor: Outdated artefact or stepping-stone to journal certification? *Scientometrics, 92*(2), 211–238. https://doi.org/10.1007/s11192-011-0561-0

Vose, D. (2008). *Risk analysis: A quantitative guide*. Wiley.

Wilhite, A. W., & Fong, E. A. (2012). Coercive citation in academic publishing. *Science, 335*(6068), 542–543. https://doi.org/10.1126/science.1212540

Yu, T., Yu, G., & Wang, M.-Y. (2014). Classification method for detecting coercive self-citation in journals. *Journal of Informetrics, 8*(1), 123–135. https://doi.org/10.1016/j.joi.2013.11.001