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ARTIFICIAL INTELLIGENCE

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Preserving scientific integrity in academic publishing: Navigating artificial intelligence, journal policies and the impact factor as a quality indicator

Mahmut Enes Kayaalp[1] | **Stefano Zaffagnini**[2] | **Michael A. Mont**[3] | **Jon Karlsson**[4] | **Bruce Reider**[5] | **Olufemi Ayeni**[6] | **Thomas Heyse**[7] | **Henning Madry**[8] | **Elmar Herbst**[9] | **Giuseppe Milano**[10,11] | **Volker Musahl**[12] | **Roland Becker**[13] | **Michael T. Hirschmann**[14,15]

Correspondence

Mahmut Enes Kayaalp, Department of Orthopedics and Traumatology, Istanbul Fatih Sultan Mehmet Training and Research Hospital, University of Health Sciences, 34752 Istanbul, Turkey.
Email: mek@mek.md

Abstract

The integration of artificial intelligence (AI), the rise of mega-journals, and the manipulation of impact factors present challenges to scientific integrity. These trends threaten the core principles of objectivity, reproducibility, and transparency. This editorial highlights two categories of threats: (1) external pressures, such as AI misuse and metric-driven publishing models, and (2) internal systemic flaws, including the 'publish or perish' culture and methodological fragility. Mega-journals, characterized by high-volume publishing and broad interdisciplinary scopes, improve accessibility and accelerate dissemination. However, the emphasis on publication volume might weaken the rigour of peer review. To navigate these challenges, the authors propose a balanced approach that harnesses innovation without compromising scientific integrity. Proposed solutions include mandating AI transparency through frameworks like Consolidated Standards of Reporting Trials–Artificial Intelligence, and redefining impact metrics to emphasize reproducibility, mentorship, and societal impact alongside citations. Scientific journals should promote career opportunities less on publication quantity and more on quality. Global cooperation, via initiatives like the San Francisco Declaration on Research Assessment and the Committee on Publication Ethics, is essential to standardize ethics and address resource disparities. This editorial proposes solutions for researchers, journals, and policymakers to realign academic incentives and uphold the ethical foundation of science. By fostering transparency, accountability, and equity, the scientific community can preserve its ethical foundations while embracing transformative tools, ultimately advancing knowledge and serving society.

Level of Evidence: Level V.

KEYWORDS

artificial, bibliometrics, ethics in publishing, intelligence, peer reviews, periodicals as topic

For affiliations refer to page 1155.

Abbreviations: AI, artificial intelligence; CONSORT-AI, consolidated standards of reporting trials–artificial intelligence; IF, impact factor; TOP, transparency and openness promotion; WOS, web of science.

THE FRAGILE WHOLENESS OF SCIENCE

Integrity, rooted in the Latin word *integer*, meaning 'whole', represents science's unbroken commitment to truth, rigour and societal trust. Today, this wholeness faces unprecedented threats. Is the danger external, eroding integrity from outside or internal, arising from systemic flaws in research practices and reward systems? It is both external pressures like AI misuse and metric-driven publishing and internal vulnerabilities such as the hypercompetitive incentives of academia, acting like a multifaceted erosion akin to a virus-induced cancer.

While the fundamental principles of science, such as objectivity, reproducibility, and transparency, are timeless, defending them now requires confronting modern challenges. How can we leverage technological progress without compromising accountability? How do we expand global research collaborations while maintaining universal standards? How do we balance the pursuit of visibility through popular topics with the necessity of methodological rigour? These questions underscore the urgent need to recalibrate science's ethical compass, one that must navigate both systemic flaws and philosophical dilemmas.

SYSTEMIC DISRUPTIONS: TECHNOLOGY AND PUBLISHING TRENDS

Artificial intelligence (AI) provides undeniable benefits, accelerating data analysis, improving surgical precision, and expanding access to knowledge [13]. However, its misuse, creating undetectable synthetic data, perpetuating biased conclusions or overwhelming journals with AI-generated submissions, threatens scientific trust, possibly on a larger scale [1, 22]. Unlike isolated human errors, AI flaws are systemic, scalable and still difficult to detect [28]. Similarly, the proliferation of predatory and mega-journals through extensive networks increases accessibility, but on the other hand, it risks prioritizing quantity over quality [11]. A previous study showed that the number of possibly predatory journals outnumbers legitimate orthopaedic journals [30].

These external pressures amplify pre-existing internal challenges within academia. Issues like the replication crisis and statistical fragility, particularly in fields such as orthopaedics, highlight systemic problems, not to mention the lack of open science practices in orthopaedics [3]. The prevailing 'publish or perish' culture pushes researchers to prioritize the rapid production of high-impact papers over in-depth studies. This trend is evident in residency applications in the United States, where candidates now submit four times more publications than a decade ago, though the extent of their individual contributions is often unclear [16]. When academic advancement prioritizes metrics over mentorship and methodological rigour, the integrity of science is undermined. The tension between producing high-quality, groundbreaking research and adhering to the 'publish-or-perish' culture remains a defining challenge for early-career researchers. This dilemma is deeply rooted in systemic academic pressures, where short-term incentives often clash with the pursuit of long-term impact. Metrics like publication counts and journal impact factors (IFs) prioritize rapid output over transformative work, pushing researchers to fragment findings into incremental studies rather than pursue riskier, in-depth projects. Peter Higgs, who published only 22 papers over six decades before earning a Nobel Prize, exemplifies how transformative discoveries often require time and intellectual freedom, luxuries increasingly rare in today's hypercompetitive academic landscape [14].

IMPACT FACTORS: RESHAPING THE CURRENCY OF CREDIBILITY

The impact factor remains a contentious metric, susceptible to manipulation through excessive self-citations, curated theme issues on high-impact topics and editorial pressure on authors to cite within the same journal, and the inclusion of an excessive number of non-citable items, such as editorials or commentaries, which do not count in the denominator but inflate the IF when cited [9, 17]. Publisher business models heavily influence these practices, journals under profit-driven frameworks are more likely to engage in metric gaming [26].

By prioritizing metrics over scientific rigour, these dynamics threaten to undermine both research integrity and real-world health outcomes. To enhance credibility, stakeholders should consider transitioning to more holistic evaluation frameworks. Initiatives like the San Francisco Declaration on Research Assessment advocate assessing research based on its intrinsic contributions rather than journal reputation [4]. Journals could implement transparency measures, such as 'reproducibility badges' for studies that share open data or code. Similarly, funders and institutions should reconsider using IF as a primary criterion for hiring or promotions.

Early-career researchers, particularly in fields like orthopaedics, would benefit from evaluations that prioritize mentorship, methodological innovation and societal contributions, rather than just publication counts.

JOURNAL POLICIES, HIGH-VOLUME PUBLISHING MODELS AND THE SURGE OF OPEN ACCESS

The rise of mega-journals, characterized by broad interdisciplinary scopes and high acceptance rates, sometimes exceeding 50%, has expanded access to

scientific publishing, though their 'soundness-only' review policy may still, in practice, involve assessments of novelty or relevance, potentially leading to inconsistent standards and a shift toward quantity over rigour [11, 29]. In recent decades, the number of publishers has remained stable, while the number of articles per journal has risen significantly, largely due to the rise of open-access mega journals [27]. However, concerns persist over diluted peer review and the persistence of the 'file drawer effect', where studies with negative or null results, though scientifically valuable, are often underreported or rejected by journals, highlighting the ongoing need to support the publication of well-conducted studies regardless of outcome [11].

Coordinated self-citation practices, along with citations between sister journals, journals within the same publisher network, further distort scholarly communication. Some of these publishers exhibit self-citation and sister journal citation rates exceeding 45 times the expected baseline, a 4455% increase compared to the 60%–70% average observed among other publishers [24]. This extreme deviation reflects aggressive strategies to inflate IF metrics through cross-citation networks spanning entire publisher portfolios, targeting articles that influence IF calculations [24].

A critical distinction exists between *editorial* and *publisher-driven* cascading. Editorial cascading occurs when a rejected manuscript is redirected to a sister journal within the same publishing group based on reviewer/editor feedback, aiming to streamline author resubmissions while maintaining quality. In contrast, *publisher-driven* cascading involves systematically funnelling rejected submissions to sister journals without editorial oversight, primarily to monopolize content and amplify cross-journal citations within their portfolio [24, 25]. Mid-tier journals have raised concerns about losing submissions to larger publishers exploiting this tactic, exacerbating market consolidation [25].

A rigorous review process and robust editorial control, two of the most important protections, can help to preserve the integrity of science despite these issues. However, the publishing sector's financial constraints make this goal more difficult. Journals have to make money if they are to stay sustainable; often this is done via article processing fees, which have fuelled the growth of predatory journals, publishers that value profit above quality and skip meaningful peer review. A study in which a purposely defective paper was accepted by more than half of 300 open-access journals examined shows this by exposing peer review systematic failures, even among journals from leading publishers [2]. This underscores the critical importance of maintaining high editorial and peer-review standards.

SYSTEMIC RISKS AND ACCOUNTABILITY

The proliferation of journals, whether large or small, amplifies risks when editorial standards waver. While journals can align with frameworks like the Transparency and Openness Promotion (TOP) Guidelines to balance accessibility with rigour [19], self-regulation may be insufficient. In response to manipulative practices, Clarivate re-evaluates the indexing of journals suspected of metric manipulation. Journals under review are temporarily labelled 'On Hold' in the Web of Science (WOS) Journal Master List, suspending new indexing and excluding their articles from IF calculations during evaluation. If breaches of standards are confirmed, Clarivate may delist the journal and retroactively remove all its articles from the WOS [1]. However, enforcement remains inconsistent: only a small number of journals have been delisted to date, highlighting gaps in accountability [26].

All journals, irrespective of size, must uphold stringent peer review standards. Aligning missions with the TOP Guidelines [19] allows journals to champion both accessibility and rigour, but systemic credibility demands external oversight. Funding bodies and universities should mandate regular audits of peer review processes in mega-journals and advocate penalties, including delisting, for breaches. Databases like WOS must expand proactive monitoring, as exemplified by Clarivate's 'On Hold' mechanism, while ensuring retroactive delisting is applied decisively to confirmed violators. By combining internal reforms (e.g., adopting TOP Guidelines) with external accountability (e.g., database sanctions and institutional audits), the academic community can mitigate predatory practices and reaffirm credibility. While open-access publishing offers a democratizing model, issues of scientific integrity, such as peer review quality and citation metric manipulation, are not exclusive to it and can also occur in subscription journals. Only through concerted, system-wide oversight can any publishing model, open or subscription-based, maintain both accessibility and rigour.

THE PARADOX OF PRESERVATION AND PROGRESS

Scientific progress inevitably brings change. Just as Newtonian physics gave way to Einstein's theory of relativity, AI is transforming, and will continue to transform, how scientists test hypotheses. However, progress without preserving fundamental ethical and scientific principles may lead to a collapse of scientific pillars. While Edmund Burke warned that radical change disregarding tradition risks disorder and instability [8], Immanuel Kant viewed autonomous, rational agents as the source of moral authority [6]. This

philosophical tension analogously mirrors the dilemma of honouring existing knowledge while embracing innovation in academic publishing. The AI-derived insights hold little value if their methods are opaque; similarly, mega-journals undermine their mission if they lower methodological standards.

Balancing tradition with innovation is challenging. Like the human body's renewing cells while maintaining identity, science must evolve without losing its ethical and methodological core. This means rigorously validating AI tools rather than banning them outright [12]. It should involve rewarding transparent statistics and reproducible research over mere citation counts. Stakeholders should measure success by researchers' contributions to human health and knowledge, prioritizing societal impact over citation-based metrics [4]. Ultimately, sustaining scientific integrity requires aligning incentives with transparency, reproducibility and the broader impact of research.

A PATH FORWARD: DIAGNOSING THE PROBLEM

Threats to scientific integrity manifest in two forms: (1) external manipulations like AI misuse and rigid publication metrics that replace nuanced assessments with quantitative benchmarks and (2) systemic pressures embedded in journal policies that prioritize quantity and popularity over quality and novelty. Combating these challenges demands interventions that address both surface-level risks and the deeper structural drivers.

Journals must lead by example, adopting guidelines that promote open data repositories, peer review and publication processes, such as TOP Guidelines as preferred practice [19]. Submissions should undergo structured audits of AI use, following frameworks like Consolidated Standards of Reporting Trials–Artificial Intelligence (CONSORT-AI) and Standard Protocol Items: Recommendations for Interventional Trials–Artificial Intelligence [5, 15], to ensure technological innovations enhance rather than erode transparency. In addition, impact metrics must evolve. Instead of relying solely on citation counts, they should also recognize factors like reproducibility, patient-centred outcome reporting, and transparent methods for reporting basic science results, all through dedicated badges.

Academic systems should shift their reward structures. Grants, promotions, and training programs should prioritize methodological rigour, mentorship excellence, and transparent practices over publication volume [23]. Restoring trust demands collaboration across stakeholders, journals, funders, institutions and researchers, to champion reforms that elevate accountability, interdisciplinary collaboration, and societal relevance. Such a culture shift would not only mend integrity but also accelerate innovations that serve both science and public good [19].

Yet, this is not a call to resist change. Certainly, AI, global collaboration and interdisciplinary inquiry are indispensable to modern science. In subsequent sections, we outline actionable strategies for editors, institutions and researchers to recalibrate academic publishing. Integrity, after all, is not a static artefact but a dynamic compass: guiding science not toward what it *has been*, but what it *should be*.

ARTIFICIAL INTELLIGENCE IN PUBLISHING: TOOL OR TROJAN HORSE?

Artificial intelligence has inevitably altered the scientific landscape, offering tools to accelerate discovery while introducing ethical quandaries (Table 1). One should note that AI can analyze vast datasets, predict molecular interactions and even help draft manuscripts, capabilities that democratize research for resource-limited institutions, underlining the supportive importance of this modality in assisting authors with manuscript preparation [13, 20]. Yet, its misuse can threaten integrity on a large scale. For instance, AI-generated text can obscure methodological flaws, while synthetic data might bypass peer review undetected [21]. A recent study surveying experienced peer reviewers found that they often struggled to distinguish between AI-generated, AI-paraphrased and human-written content [7].

The path forward lies in thoughtfully integrating AI into research while safeguarding scientific integrity [12]. Journals could adopt transparency mandates that encourage authors to disclose AI tools used in writing, data analysis, or image generation, without penalizing researchers or biasing editorial decisions [12]. Methodological sections should clarify how AI systems were trained, validated and audited to enable reproducibility. It is, however, crucial that the AI's role should remain assistive, complementing rather than replacing human expertise. This is particularly important to emphasize today, as recent advances have shifted freely accessible AI tools from assistive aids to collaborative systems [13]. Authors must retain accountability for all claims, ensuring they fully understand and endorse their work. Frameworks like the CONSORT-AI guidelines offer a blueprint for balancing innovation with rigour, promoting ethical AI use without stifling its potential to advance science [15].

GLOBAL SOLUTIONS FOR A GLOBAL CRISIS

Science's globalization has both benefits and risks. While international collaboration accelerates progress, inconsistent standards across regions can lead to

TABLE 1 Key risks of artificial intelligence (AI) misuse in scientific publishing.

Risk area	Description	Potential impact
Hidden methodological errors	AI-generated text can present flawed methods in polished, convincing language.	Undermines scientific rigour and hampers reproducibility.
Undetected fabrication	AI tools may fabricate data, images or references that appear plausible but are, in fact, hallucinations.	Compromises the integrity of the body of evidence and makes it easier for fraudulent scientific claims to be spread.
Peer review	Synthetic data and AI-drafted content can bypass standard peer review.	Reduces the effectiveness of traditional quality control processes.
Plagiarism and authorship	AI-paraphrased or lifted content can blur authorship and raise originality concerns.	Complicates intellectual property rights and accountability.
Reviewer detection challenges	Reviewers struggle to distinguish AI-generated from human-authored content.	Enables deceptive use of AI to go unnoticed during peer review.
Deskilling and overreliance	Authors might depend on AI for critical thinking and writing.	Erodes domain expertise and accountability in research.
Lack of transparency	Vague rules or fear of stigma could cause AI contributions to remain unreported.	Reduces confidence in published work and compromises repeatability.

Abbreviation: AI, artificial intelligence.

predatory practices. The accuracy of research claims depends on various factors, including statistical power, inherent biases, the volume of competing studies, and most importantly, the proportion of real relationships being explored compared to false correlations in a field. Scientific conclusions are more prone to error when studies are underpowered, effect sizes are small, or research methods lack rigour (e.g., excessive flexibility in experimental design, outcome selection or data analysis) [10, 18]. Moreover, structural issues add to the challenges, such as insufficient hypothesis refinement, conflicts of interest and competition among research teams that prioritize quick claims of statistical significance over replicability. Simulation models show that, in many research contexts, false claims can outweigh true ones [10].

To address these issues, we need collective action to preserve scientific integrity. Global consortia like the Committee on Publication Ethics should standardize ethical publishing training and improve statistical robustness across research communities. Open-access platforms like arXiv and the Open Science Framework can help bridge resource gaps by sharing peer review services and datasets across borders. Furthermore, journals in high-income countries could subsidize publication fees for researchers in low-resource settings, ensuring geographic diversity without sacrificing quality.

CONCLUSION

As Marie Curie reminds us, 'Nothing in life is to be feared; it is only to be understood'. Let us confront today's challenges with courage: diagnosing systemic flaws, understanding their roots, and addressing them together. The tensions we face, from the alluring efficiency of AI, to the compromises of mega-journals, to the distortions of IFs, are not signs of collapse, but opportunities to reflect and rebuild. Scientific integrity, like the Latin word *integer*, which signifies an unbroken whole, requires rigour, transparency and ethics to remain indivisible.

Preserving scientific integrity is not about retreating to tradition, but instead renewing the ethical foundation of science. It demands a balance between transformative technologies and accountability, the accessibility of mega-journals and rigorous scrutiny, and the pursuit of metrics and humanity. The solutions proposed, transparency mandates (including reproducibility and open data sharing), methodological badges, and collaborative global networks aimed at enhancing scientific integrity, such as the TOP Guidelines, are neither radical nor punitive; they are pragmatic steps to realign science with its highest purpose: advancing knowledge for the greater good.

Our journals pledge to lead by example, committing to rigorous transparency standards such as requiring reproducibility, open data sharing and clear methodology reporting, while also prioritizing research that addresses musculoskeletal diseases and covers emerging developments, to co-create a future where integrity anchors progress, and impact is measured by lives transformed, not citations amassed.

However, neglecting these principles and science risks cascading setbacks. Flawed data and unvetted assumptions could unravel years of progress, diverting efforts into dead ends and wasting our collective ingenuity. Science thrives on

continuity; without it, the edifice crumbles. The path forward is clear. Together, we can ensure that every step upward on the staircase of progress rests on solid ground. Isaac Newton's words resonate anew: 'If I have seen further, it is by standing on the shoulders of giants'.

AUTHOR CONTRIBUTIONS

All listed authors have contributed substantially to this work. All authors have read and approved the final manuscript to be submitted and published.

AFFILIATIONS

[1]Department of Orthopaedics and Traumatology, Istanbul Fatih Sultan Mehmet Training and Research Hospital, University of Health Sciences, Istanbul, Turkey

[2]II Clinica, IRCCS Istituto Ortopedico Rizzoli, Bologna, Italy

[3]Sinai Hospital of Baltimore, Baltimore, Maryland, USA

[4]Department of Orthopaedics, Sahlgrenska University Hospital, Sahlgrenska Academy, Gothenburg University, Gothenburg, Sweden

[5]Department of Orthopedic Surgery and Rehabilitation Medicine, University of Chicago Pritzker School of Medicine, Chicago, Illinois, USA

[6]Division of Orthopaedic Surgery, McMaster University, Hamilton, Ontario, Canada

[7]Red Cross Hospital Frankfurt, Frankfurt, Germany

[8]Center for Experimental Orthopaedics, Saarland University, Homburg, Germany

[9]Department of Trauma, Hand and Reconstructive Surgery, University of Münster, Münster, Germany

[10]Department of Medical and Surgical Specialties, Radiological Sciences, and Public Health, University of Brescia, Brescia, Italy

[11]Department of Bone and Joint Surgery, ASST Spedali Civili, Brescia, Italy

[12]Department of Orthopaedic Surgery, UPMC Freddie Fu Sports Medicine Center, University of Pittsburgh, Pittsburgh, Pennsylvania, USA

[13]Department of Orthopaedics and Traumatology, University Hospital Brandenburg/Havel, Brandenburg Medical School Theodor Fontane, Brandenburg an der Havel, Germany

[14]Department of Orthopedic Surgery and Traumatology, Kantonsspital Baselland, Bruderholz, Switzerland

[15]Department of Clinical Research, Research Group Michael T. Hirschmann, Regenerative Medicine & Biomechanics, University of Basel, Basel, Switzerland

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ORCID

Mahmut Enes Kayaalp https://orcid.org/0000-0002-9545-7454
Stefano Zaffagnini https://orcid.org/0000-0002-2941-1407
Olufemi Ayeni https://orcid.org/0000-0003-4219-8564

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