Research on the Collaborative Development Paths and Strategies of Scientific Journals and Preprint Platforms: Postprint

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Abstract

[Purpose] To explore synergistic development pathways between scientific journals and preprint platforms, propose synergistic development strategies, and provide reference for constructing new academic communication models in the open science era.

[Methods] Representative cooperation cases between scientific journals and preprint platforms were selected internationally. Using a descriptive case study approach, characteristics of existing typical cooperation models were summarized and organized to extract synergistic development pathways between scientific journals and preprint platforms.

[Results] The study identifies three synergistic development pathways between scientific journals and preprint platforms at the current stage: platform development-driven resource synergy, user demand-driven process synergy, and open science-driven goal synergy.

[Conclusion] It is recommended that scientific journals and all preprint stakeholders fully recognize the benefits of synergistic development, continuously strengthen synergistic development awareness, formulate synergistic development policies promptly, and jointly construct a synergistic development ecosystem.

Full Text

Preamble

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Collaborative Development Path and Strategy of Scientific Journals and Preprint Platforms

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Abstract: [Purpose] This study aims to explore the collaborative development path between scientific journals and preprint platforms, and propose strategies for their collaborative development, providing a reference for constructing a new academic communication model in the open science era. [Methods] We selected representative international cases of collaboration between scientific journals and preprint platforms, adopted a descriptive case study approach, summarized and 梳理 ed the characteristics of existing typical cooperation models, and extracted the collaborative development paths. [Findings] The study identifies three collaborative paths: resource collaboration driven by platform development, process collaboration driven by user demand, and goal collaboration driven by open science. [Conclusion] It is recommended that scientific journals and preprint stakeholders fully recognize the benefits of collaborative development, continuously strengthen collaborative development awareness, promptly formulate collaborative development policies, and jointly build a collaborative development ecosystem.

Keywords: scientific journal; preprint platform; preprint; open science; collaboration

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Article 95 of the *Law of the People's Republic of China on Science and Technology Progress (2021 Revision)* stipulates: "The state shall strengthen the construction of academic journals, improve the exchange mechanism for scientific research papers and scientific and technological information, promote the development of open science, and facilitate the exchange and dissemination of science and technology" [1]. On December 14, 2023, UNESCO released the first edition of *Open Science Outlook 1: Status and Trends Around the World*, which

indicates that open science practices are increasing globally and across multiple disciplines, and that only through collective collaboration and coordination can truly global open science be achieved [2]. This changing environment requires academia and the industry to examine academic communication from an open science perspective and explore new, sustainable academic communication models. Scientific journals and preprint platforms are the primary communication modes in the open science academic exchange system. Investigating their collaborative development helps build a more open, inclusive, transparent, equitable, and diverse new academic exchange system, which holds significant value and impact for promoting efficient knowledge dissemination and exchange in an open science environment.

The collaborative development of scientific journals and preprint platforms is key to constructing a new academic exchange ecosystem in the open science era, and related issues have attracted researchers' attention. Tan Chunhui et al. [3] found that setting up journal navigation is an exciting demand function for preprint platform stakeholders. Liu Jingyi et al. [4] conducted text analysis and mining on preprint policies from 120 international journals, constructed a policy dimension mechanism model for journal preprint policies, and provided recommendations for collaborative development policies. Dong Hairong et al. [5] conducted a comparative analysis of scientific journals and preprint platforms in high-energy physics in terms of dissemination, evaluation, and operation, suggesting that the two should form a mutually beneficial and complementary relationship, actively explore cooperation pathways, and achieve collaborative win-win outcomes. Zheng Ang et al. [6] analyzed the development status of preprint platforms and open access journals, found that the two are complementary, and proposed strategies for their collaborative ecological development mechanism and a connection process for publication and release. Xu et al. [7] explored and verified the consistency in impact between preprints and their journal versions. Klein et al. [8] found that the textual content changes minimally from preprint to final published version. Li Chuwei et al. [9] and Liu Jingyi et al. [10] both concluded from case analyses that collaboration between scientific journals and preprint platforms is deepening, and that their collaborative development can effectively promote the construction of an open science exchange system.

Collaborative development between scientific journals and preprint platforms is an important pathway for enhancing knowledge dissemination speed in the open science environment and a key route for promoting the prosperity of the academic exchange ecosystem. Existing research shows that collaborative development is a globally concerned issue, with scholars mostly focusing on its importance and significance, yet lacking in-depth analysis of specific collaborative models and summaries of collaborative development paths. Accordingly, this study takes representative cases of collaborative services between scientific journals and preprint platforms as samples, reveals their cooperation models, excavates and analyzes their collaborative paths, and proposes strategies for their collaborative development, providing reference for building a mutually

beneficial, symbiotic, effectively complementary, and sustainable new academic exchange model.

1 Research Objects and Methods

This study defines preprints and preprint platforms as follows: Preprints are manuscripts (submitted or accepted versions) by authors before submission to journals for publication that have not undergone rigorous peer review, typically released through preprint platforms in the shortest time in open access form, granting authors network-first rights for their achievements and providing the academic exchange system with the latest and fastest dissemination and utilization channels. Preprint platforms are platform systems that receive authors' submitted manuscripts (preprints) and post-publication papers (postprints) and provide open exchange services for these research results.

From the perspective of collaborative cooperation between scientific journals and preprint platforms, and based on comprehensive consideration of representativeness, influence, and novelty, we selected representative international collaborative service cases for analysis. Using a case study approach, we conducted institutional website surveys combined with relevant literature research, focusing on the interactive behaviors and collaborative logic between scientific journals and preprint platforms. We summarized and 梳理 ed the characteristics of existing typical cooperation models and extracted the collaborative development paths and mechanisms. Case details are shown in Table 1 .

2 Collaborative Models Between Scientific Journals and Preprint Platforms

Our investigation reveals that current collaboration between scientific journals and preprint platforms primarily unfolds through interaction and cooperation based on their respective manuscript resources and review resources. According to the dominant entity, cooperation models can be divided into preprint platform-dominated resource sharing models, journal publisher-dominated service-driven models, and academic community-dominated open review collaboration models. These three models differ in interaction methods and cooperation depth.

2.1 Preprint Platform-Dominated Resource Sharing Model

One highlight of preprint platforms is their aggregation of preprint manuscripts and open public comments, though other resources or functions are relatively limited. Therefore, they mainly rely on their open resources to collaborate with scientific journals, forming a preprint platform-dominated resource sharing model, as shown in Figure 1 [Figure 1: see original paper].

On the one hand, preprint platforms' manuscript resources consist primarily of author-uploaded preprint manuscripts that are publicly released after simple

platform review. While preprint platforms meet authors' needs for rapid and convenient academic exchange, most authors still require formal publication. Therefore, preprint platforms cooperate with certain open access or preprint-friendly journals, allowing authors to transfer their preprints to specific journals with one click after release, reducing repetitive work in journal submission. For example, ChemRxiv's Direct Journal Transfer service supports authors in transferring preprint manuscripts to journals published by the American Chemical Society, Chinese Chemical Society, Royal Society of Chemistry, German Chemical Society, and European Chemical Publishing Association, after which the journals contact authors for additional details needed for peer review [11]. The B2J service of bioRxiv and M2J service of medRxiv work similarly.

On the other hand, open comments on preprint platforms constitute their review resources. When journal editors review a preprint manuscript, they can reference public comments on the preprint platform to make initial screening judgments. Journals with direct cooperation relationships with preprint platforms place greater emphasis on manuscript comments. For instance, PLoS Genetics announced in 2016 that it would employ a dedicated editorial team to identify preprints suitable for journal publication [12], where preprint editors would identify candidate manuscripts based on their judgment, comments on preprint platforms, and some automated tools. In 2019, the Public Library of Science (PLoS) partnered with bioRxiv to launch a preprint commenting pilot aimed at connecting preprint comments with journal peer review. In this pilot, for submissions also released as preprints, journal editors would regularly collect user comments on bioRxiv and send valuable comments to reviewers as supplements to peer review opinions [13].

However, the number of public comments on preprint platforms is generally small, and comment content lacks standardized norms, making their reference value uncertain. Therefore, the preprint platform-dominated resource sharing model is actually only the initial stage of resource collaboration. To truly deepen the use of preprint content and enhance preprint quality and visibility, deeper participation from scientific journals and even academic communities is needed.

2.2 Journal Publisher-Dominated Service-Driven Model

Currently, the four major international publishers (Elsevier, Springer Nature, Wiley, and Taylor & Francis) have all cooperated with preprint platforms through acquisition or investment. Compared with preprint platforms, journal publishers possess richer and more professional resources, such as professional editorial teams, high-level reviewers, and mature article checking and polishing technologies. Therefore, relying on their own resources and integrating preprint platform resources, journal publishers have developed various author services, injecting new vitality into preprint academic exchange and spawning many new business formats, as shown in Figure 2 [Figure 2: see original paper].

2.2.1 Preprint Processing Editorial services centered on author-submitted manuscripts are part of the author services provided by journal publishers. Relying on their strong editorial teams and technical support, journal publishers edit and process preprint manuscripts and conduct quality control, improving overall preprint quality. On the one hand, preprint platforms invested in, operated, and maintained by journal publishers often have more powerful functions and more diverse article types. For example, preprints on Authorea can be complete manuscripts submitted to journals, white papers, or blog posts, as well as datasets, code, charts, interactive visualization files, etc. On the other hand, preprint manuscripts edited and released by journal publishers are often more standardized in format and highly readable. For example, in In Review, if authors agree to release a preprint during submission, the manuscript undergoes two processing stages: journal editor quality control checks and technical staff preprint deposition, as shown in Figure 3 [Figure 3: see original paper] [14]. In the preprint deposition stage, technical staff convert the manuscript to HTML files, assign DOIs, and release them on the platform using CC-BY licenses, improving user experience by eliminating the need for additional downloads. Notably, format-processed preprint manuscripts may appear similar to formally published articles, potentially causing confusion among the public or news media, a practice some journal publishers do not endorse. For example, Elsevier explicitly states: "Preprints should not be added to or enhanced in any way to make them appear more like or as a substitute for the final version of the article" [15].

2.2.2 Branded Preprints For research production, both journal platforms and preprint platforms are "gold mines" where "gold" and "impurities" are mixed, requiring readers or users to screen and select according to their needs. The difference lies in their "gold content ratio." Manuscripts received by journal platforms generally have some quality assurance, and combined with reviewers' evaluation, journal platforms often have higher "productivity" than preprint platforms. When journals combine their brand value to aggregate preprint manuscript resources, they form branded preprint services. Branded preprint services are primarily dominated by journal publishers, with preprint platforms opening special channels specifically for storing preprint manuscripts received by certain journals, forming preprint resource collections for specific journal publishers.

Elsevier and SSRN's First Look distinguishes between Branded and Non-Branded services. Branded services centrally release all preprints related to a journal, tag the abstract pages of these preprints with journal labels, while whether to publicly disclose the review process progress is decided by the journal itself. Unlike most SSRN partner journals, The Lancet neither provides peer review progress indicators nor states that SSRN-provided preprints are The Lancet publications or are necessarily under review by its affiliated journals. The reason is that The Lancet has established a two-way submission mechanism with SSRN, where authors can not only choose to agree to release preprints

when submitting to the journal (with the journal uploading manuscripts to SSRN), but also directly transfer manuscripts from SSRN to The Lancet and its sub-journals with one click, thereby facilitating interaction in manuscript resources.

2.2.3 Open Peer Review Peer review is the soul of scientific journals. With experienced reviewers and rigorous review procedures, scientific journals can strictly control article quality, making peer review the main distinguishing feature from preprint platforms. Cooperation between journal publishers and preprint platforms in open peer review has two meanings: First, open peer review is one of the actions by which journal publishers support open science. The open science movement promotes openness throughout the research process, also requiring review process transparency. Preprints released through Springer Nature's In Review service and Wiley's Under Review service both include peer review timelines, clearly showing each stage from submission, acceptance, to formal publication. Second, adding journal review status to preprint articles enhances credibility and clarifies background information. For authors, preprints with the status of "under consideration by a specific journal" can better demonstrate first rights, alleviating concerns about plagiarism or scooping to some extent. For readers, peer review timelines are important references for judging preprint article quality, and they can understand article publication history and identify potential collaboration opportunities through journal editorial processing behaviors.

Journal publisher-dominated open peer review differs from open review. In In Review and Under Review services, submitted manuscripts are still blind-reviewed by reviewers, with reviewer comments visible only to authors, while preprint platforms only publish processing results and timestamps at each stage.

2.3 Academic Community-Dominated Open Review Collaboration Model

To promote preprint review, enhance preprint quality, and advance preprint culture, refereed preprints have gradually emerged as a new type of preprint, and some open review platforms for preprints have been established. Journal editors or reviewers play important roles and are often valued more by open review platforms due to their professionalism, forming an academic community-dominated collaboration model between scientific journals and preprint platforms. This model solves three problems: first, the lack of peer review for preprints; second, who should conduct the review; and third, how reviewed preprints can connect with the existing journal academic publishing system [16]. The process of solving these three problems constitutes the cooperation pathway between preprint platforms and scientific journals, forming the academic community-dominated open review collaboration model, as shown in Figure 4 [Figure 4: see original paper].

First, under academic community leadership, the open review collaboration

model actually integrates preprint platform manuscript resources and scientific journal review resources. Open review platforms themselves do not provide manuscript hosting services but only provide pathways for reviewers to publish comments on existing preprints, with their main output being refereed preprints with comments. For example, PREreview provides reviewers with three commenting methods: structured pre-reviews formed according to website prompts, templated pre-reviews using the website's suggested basic framework, and free-form pre-reviews where reviewers can freely express themselves [17].

Second, open review includes both public comments and peer review. At the current stage, public comment functions are mainly provided by preprint platforms, while open review platforms focus more on building peer communities to collect and publish more professional review comments, promoting communication among small peers. For example, the Preprint Journal Club promoted by PREreview [18] simulates journal operation models, freely initiated by researchers to organize small peers to review preprint manuscripts, with review comments published on PREreview with separate DOIs and possibly sent directly to preprint authors to promote two-way communication.

Finally, after the content and organizational frameworks for open review are established, timely positioning by journals enables smooth connection between preprint academic exchange and traditional journal publishing processes. In 2020, eLife launched the preprint curation platform Sciety, aiming to decentralize peer review responsibilities, improve the quality and usability of published research, and accelerate the publication of relevant reviewer comments [19]. Currently, 26 groups recommend refereed preprints, with registered entities mainly being spontaneous peer communities and journal publishers, including open access journal PeerJ and data journal GigaScience. Furthermore, Review Commons also represents authors in recommending high-quality refereed preprints to 28 journals under EMBO Press, eLife, PLoS, American Society for Cell Biology, and The Company of Biologists [20], thereby accelerating the publication process. This shows that some leading journal publishers have actively integrated into open review cooperation, incorporating preprint review and recommendation into their own review and publication processes.

Different from the first two cooperation models, cooperation based on open review is actually a proactive behavior by scientific journals toward preprint platforms, mainly focusing on preprint manuscripts and their review comments, with the primary purpose of enhancing the influence of high-quality preprint manuscripts and thereby increasing the influence of scientific journals.

3 Analysis of Collaborative Paths Between Scientific Journals and Preprint Platforms

Synergy brings order is a classic summary of synergy theory. Therefore, some scholars believe that synergy refers to "the coherent ability of elements to each other, demonstrating the coordinating and cooperating nature of elements in

the overall development and operation process" [21]. Combining synergy theory perspectives, collaboration between scientific journals and preprint platforms is mainly reflected at two levels: first, internal elements of things or systems cooperate with each other, meaning the new academic exchange system centered on preprints and the traditional academic exchange system centered on scientific journals complement and depend on each other, with various resources continuously integrating and complementing; second, during the transformation process of things or systems from one ordered state to another, the independent and random movements of internal elements become coherent interactions, thereby generating new qualities. Specifically, based on resource interaction and process coupling, scientific journals and preprint platforms jointly function around new goals, thereby 催生 ing new academic exchange models and pushing the academic exchange system forward, as shown in Figure 5 [Figure 5: see original paper].

3.1 Platform Development-Driven Resource Collaboration

Resource collaboration between scientific journals and preprint platforms mainly manifests as the transmission of manuscript resources between both parties, which can be either unidirectional or bidirectional [22], with the main purpose of integrating resources to expand influence. Relatively speaking, resource-based collaboration is the initial stage of collaborative development, often determined by their respective development needs, reflecting efforts to break through development bottlenecks and supplement platform shortcomings. On the one hand, preprint platform manuscripts need peer review, iterative updates, and formal journal publication to prove their content quality; otherwise, under the current academic evaluation framework, the academic value of preprint platforms would be greatly diminished. On the other hand, scientific journals need to accelerate publication through preprint platforms, can select or customize needed manuscripts from preprint platforms, and can also enhance journal article influence through preprints, such as download counts, citation frequency, and community attention, achieving post-publication version iteration updates through preprint platforms. Therefore, driven by platform needs, preprint platforms actively seek cooperation with scientific journals to integrate into the academic exchange system as soon as possible, while scientific journals also incorporate preprint platforms into their business segments through funding or even self-building, with both parties complementing each other's advantages.

Resource collaboration is the first step in cooperation between scientific journals and preprint platforms. However, influenced by the current academic evaluation system, some scientific journals have not fully recognized the benefits of collaborative development and still view preprint platforms as competitors. In reality, scientific journals and preprint platforms have a co-opetitive relationship, and scientific journals need to transform their mindset as soon as possible and actively integrate into the development trend of preprint-based new academic exchange.

3.2 User Demand-Driven Process Collaboration

Process collaboration between scientific journals and preprint platforms is a dynamic synergy, mainly reflected in the interconnection and co-construction of user services. In fact, the user groups served by scientific journals and preprint platforms largely overlap—namely, researchers—yet researchers have different needs for each. On the one hand, researchers hope their latest research results can be quickly and widely disseminated through preprint platforms to enhance academic influence and value; on the other hand, they also hope to obtain professional feedback from peers to facilitate formal publication and gain official recognition from the academic community. Therefore, from the perspective of meeting researcher needs, collaborative development between scientific journals and preprint platforms has a certain inevitability.

With the active involvement of journal publishers and their rich resources, their collaboration has ultimately materialized into various preprint services around each link of the journal publishing process, such as format conversion and processing before manuscript release, centralized release of journal-branded preprints, and open comments and open peer review after preprint release. Process collaboration also represents the dynamic integration of two academic exchange systems, where various elements gradually unify around the main line of the journal publishing process through interaction. This process is the concrete manifestation of synergy bringing order, and also shows that process-based collaboration can develop richer and more convenient user services, thereby promoting mutualistic and collaborative development.

For some small and medium-sized scientific journals, developing preprint services requires certain costs, and some may lack relevant financial or resource support, making it impossible to provide preprint services or sustain them. Therefore, scientific journals can start by formulating preprint-friendly policies, integrate relevant resources, and actively seek cooperation with large preprint platforms to provide better services for journal users.

3.3 Open Science-Driven Goal Collaboration

After completing resource and process integration and adaptation, scientific journals and preprint platforms must rely on higher-level goal collaboration to achieve further development. The aforementioned open review collaboration model is goal-level collaboration centered on the open cooperation concept and content evaluation orientation of the new academic exchange ecosystem in the open science era. On the one hand, by integrating open resources from scientific journals and preprint platforms, more extensive cooperation oriented toward openness is promoted. Led by academic communities, preprint platform manuscript resources and journal publisher review resources are separated from their inherent systems, more fully integrated, and launched as high-quality refereed preprints through open review platforms. In this process, resource content integration, organization, and final output all 贯穿 the concept of open coopera-

tion.

On the other hand, through process adaptation, academic evaluation can be promoted to return to content evaluation. From the perspective of the publishing process, the main difference between scientific journals and preprint platforms lies in the review stage: scientific journals adopt expert review after submission and before publication, making publication decisions based on opinions from a few experts; preprint platforms adopt public review after release and before submission, comprehensively opening manuscript content to all peers and the public while increasing release speed. Open review platforms integrate the advantages of both, providing professional opinions from peer communities before submission to form refereed preprints with peer comments. Thereby, reviewers can set aside restrictions from specific journal operational strategies, such as scope or volume limits, and focus entirely on manuscript content, value, and contributions. Moreover, refereed preprints can reduce duplicate work for editors and reviewers, accelerate the publication process while promoting a return to the original purpose of academic exchange.

Goal collaboration can be considered an ideal state, as it requires not only deep integration of scientific journals, preprint platforms, and academic communities, but also requires a discipline or industry field to possess a certain level of open science culture and preprint literacy to provide a favorable environment for developing the new academic exchange ecosystem in the open science era. From the three collaborative paths described above, it is evident that scientific journals, as traditional and academically recognized exchange methods, possess richer resources and more discourse power in collaborative cooperation with preprint platforms. In the early stages of preprint emergence, scientific journals' perceptions and attitudes could even affect the survival of preprint platforms [6]. Therefore, as an important component of the new academic exchange ecosystem in the open science era, scientific journals should actively exert subjective initiative, correctly understand and actively utilize preprint platforms, and promote healthy competition and collaborative development.

4 Strategies for Collaborative Development Between Scientific Journals and Preprint Platforms

4.1 Fully Recognize the Benefits of Collaborative Development

Currently, the slow publication speed and high difficulty of scientific journals cause delays in researchers' academic ideas and viewpoints, adversely affecting their establishment of academic discourse rights. Correspondingly, the core concepts of preprint platforms are public welfare, openness, inclusiveness, and transparency, which can effectively accelerate the release of researchers' achievements. Especially in the open science environment, preprint platforms are gold mines of significant academic value, incubators for major research results, catalysts for scientific and technological innovation, important platforms for nurturing new ideas, and crucial high grounds for academic discourse rights. Increasing

numbers of researchers at home and abroad are paying attention to and using preprint platforms. Therefore, to solve their own difficulties and pain points in academic exchange and meet researchers' needs for academic exchange and dissemination in the open science environment, scientific journals need to collaboratively develop with preprint platforms, and preprint platforms should also focus on collaboration with scientific journals, fully recognizing the benefits and compensating for their own deficiencies.

(1) Scientific journals should first support preprint platform construction. Preprints and preprint platforms are important components of the global open science strategy and national high-end academic exchange platforms, and scientific journal support for preprint platform construction is also a national scientific strategy need.

(2) Scientific journals need to move toward open publishing. The open science cause is an important strategy for global scientific development, and collaborative development between scientific journals and preprint platforms is a preferred method for adapting to academic exchange transformation.

(3) Scientific journals need to leverage preprint platforms. Preprint platforms feature efficient exchange and open dissemination, helping accelerate the rapid release of academic achievements and greatly speeding up academic exchange.

(4) Preprint platforms are supplements to scientific journals. Through collaborative development, the two can mutually reference the future in healthy competition.

4.2 Continuously Strengthen Collaborative Development Awareness

Currently, scientific journals still have issues such as slow review processes, rigid peer review, and strict control over publication volume that concern researchers, and should recognize the challenges these issues pose to their own development. By contrast, preprint platforms have faster review speeds, implement open peer review, and have no strict limits on the number of results released, accelerating the dissemination of academic ideas and viewpoints. Although preprint platforms also have shortcomings, their advantages far outweigh their disadvantages. Beyond rapidly releasing researchers' achievements, preprint platforms can also help researchers obtain network-first rights for their achievements, with preprint platform timestamps serving as powerful evidence in cases of plagiarism to protect researchers' intellectual property rights.

All stakeholders should actively support this new phenomenon of preprints rather than questioning or demanding perfection. One cannot use scientific journal publishing standards to demand preprint platforms, and vice versa. Preprint platforms and scientific journals have different positioning, models, goals, and strategies. Preprint platforms are indispensable components of open access and open science, together with scientific journals constituting important subjects of

academic exchange. Therefore, both scientific journals and preprint platforms should strengthen collaborative development awareness, objectively view each other's advantages in development, strive to become partners, strengthen cooperation and synergy, and jointly build a new academic ecology in the open science environment.

4.3 Promptly Formulate Collaborative Development Policies

The key guarantee for collaborative development between scientific journals and preprint platforms is strong supporting policies. Policies should support effective connectivity and efficient cooperation between scientific journals and preprint platforms, maximize the elimination of researchers' concerns and worries about using preprint platforms, and promote openness in scientific endeavors. Policy dimensions should focus on academic misconduct handling, academic reward evaluation, data open sharing, and preprint support, comprehensively cultivating and enhancing researchers' preprint literacy, fully standardizing and explaining the above content, and encouraging and supporting researchers to first-release manuscripts on preprint platforms.

Scientific journals and preprint platforms should collaboratively carry out value-added services such as paper detection, preliminary evaluation, polishing, open review, and network-first release, achieving a balance between paper quality and release speed [23], and supporting high-quality preprint papers as stage research results to be included in academic evaluation references [24]. At the policy level, comprehensive promotion should be given to formulating preprint policies by national, regional or disciplinary, academic institutional, and journal academic communities, providing foundations, directions, and strategic guidance for collaborative development from multiple points and aspects, further clarifying the direction of collaborative development, enhancing researchers' awareness of preprint platforms, standardizing stakeholders' preprint platform usage behaviors, and supporting the prosperity and sustainable development of the open science cause.

4.4 Jointly Build a Collaborative Development Ecosystem

The original purpose of paper publication should be academic exchange, which is inseparable from achievement first-release, release speed, and quality control. Especially in the open science environment, we should actively promote academic exchange from "evaluating papers by journals" to "evaluating papers by content," from controlling publication volume to publishing as much as deserved, and from strict peer review to open peer review. The new academic exchange ecosystem is jointly constituted by scientific journals, preprint platforms, database platforms, new media, and academic conferences, with each part interdependent and complementary, forming a stable model of healthy competition and collaborative development that maximally ensures the survival and strengthening of the academic exchange ecosystem.

For scientific journals and preprint platforms—the focus of this study—they should firmly base themselves on researchers' needs in all links of academic exchange, absorb each other's advantages, and jointly build a new ecosystem for academic development, which also requires participation and synergy from the national academic community.

(1) Researchers: Rapidly release papers on preprint platforms to achieve fast exchange of research results, enhance preprint literacy, and treat preprints and preprint platforms as important information sources.

(2) Journals: Treat preprint platforms as partners with complementary advantages for collaborative win-win outcomes.

(3) Libraries: Include preprints in collection resource systems, revealing, providing, and utilizing the latest research results.

Overall, all academic communities should support preprint platform construction and build a new academic exchange system in the open science environment.

5 Conclusion

In the open science era, the value and impact of preprints and preprint platforms in social, application, and academic aspects cannot be underestimated, and all stakeholders should actively pay attention to and value them. Especially for scientific journals, if they resist change and remain conservative, preprint platforms constitute a threat and competitors; if they embrace change and pursue open innovation, preprint platforms are development opportunities and partners. Overall, all stakeholders should recognize that as important components of high-end academic exchange platforms and key links in the new academic exchange ecosystem, collaborative development between scientific journals and preprint platforms helps maximize the interests of the academic community, promote sustainable academic exchange development, and drive the prosperity and organic development of the open science cause.

This study deeply explores the collaborative paths and proposes further development strategies from the perspective of collaborative services between scientific journals and preprint platforms. Its limitation lies in that the selected cases may only be typical representatives and cannot fully cover all aspects of their collaborative services. Future research can further expand sample sizes, enrich case types, and conduct more comprehensive studies on their collaborative development.

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Collaborative development path and strategy of scientific journal and preprint platform

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Abstract: [Purposes] This study aims to explore the collaborative development path between scientific journals and preprint platforms, and to propose the collaborative development strategy of scientific journals and preprint platforms, so as to provide a reference for constructing a new academic exchange model in the era of open science. [Methods] We selected representative international cases of collaboration between scientific journals and preprint platforms. With

a descriptive case study approach, we summarized and sorted out the characteristics of existing typical cooperative models and extracted the collaborative development path between scientific journals and preprint platforms. [Findings] The paper identifies three collaborative paths for scientific journals and preprint platforms: resource collaboration driven by platform development, process collaboration driven by user demand, and goal collaboration driven by open science. [Conclusion] It is recommended that scientific journals and preprint stakeholders fully recognize the benefits of collaborative development, continuously enhance their awareness of collaborative development, promptly formulate policies to support collaborative development, and jointly foster an ecosystem conducive to collaborative development.

Keywords: Scientific journal; Preprint platform; Preprint; Open science; Collaboration

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Note: Figure translations are in progress. See original paper for figures.