Preprints: What you need to know before posting your work

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A preprint is an academic manuscript that has been shared publicly via an open-access platform but has not been formally peer reviewed.

Preprints have long been used in the physical sciences to propose ideas, announce results quickly, and gain feedback from fellow researchers to develop the work further. In recent years, preprints have started appearing in other disciplines, including the life sciences, social sciences, medicine and healthcare, education, and law.

Posting a preprint offers some clear benefits to authors and readers, but posting in certain disciplines remains contentious.

If you are not familiar with reading or posting preprints, you may wonder if you should be creating a preprint of your work.

To help you decide whether sharing your work as a preprint is the most suitable option for you, in this article we cover the following topics.

1. Features of preprints
2. Value of posting preprints in sharing work early and openly
3. Potential pitfalls of posting preprints in certain disciplines
4. Examples of preprint platforms
5. **Checklist of 12 considerations** to help you decide if posting a preprint is the right choice for your latest manuscript
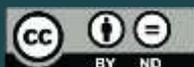
1. Features of preprints

Preprints are manuscripts that often look like journal papers but have not been peer reviewed and are not formatted to a particular journal's style. They are the "author's version" of the paper (before any improvements are made via peer review, journal copyediting, etc.). Preprints do not imply that the work described is of low quality.

Preprints can be posted on an open-access platform (e.g., a preprint server or other public repository) or on an institutional or personal website. Platforms and repositories often focus on specific fields of study. For example, the oldest and probably best-known preprint server is aRxiv (pronounced "archive"), which hosts preprints in physics, mathematics, and computer science, among other fields. Although preprints are not peer-reviewed, they may be screened or moderated to prevent inappropriate content from being posted on platforms or in repositories.

Preprint servers enable readers to post feedback about preprints they are interested in, which allows the authors to develop their research and improve their manuscripts before submitting the work to a journal. Not all preprints are later published in journals, but many are.

Authors can update their preprints at any time before journal submission, and they should decide whether or not they want any new updates they post to be automatically logged and time-stamped. Although the details will differ among preprint servers, timestamps are simply a record of when different versions of a work were posted. Many preprint servers offer the automated process of version control, which includes assigning timestamps and giving access to older versions of the preprint.

Preprints often have a digital object identifier (DOI) assigned, which makes them a permanent record of the scientific work. The DOI enables the preprint to be cited clearly by other researchers, to be connected later to a fully developed journal paper, and to be listed in a CV/resume if a final journal paper is not published or until one is published. If authors later find a problem with the content of their preprint, the DOI means that the preprint cannot be fully deleted from the public record. However, the authors can formally apply to withdraw the preprint, which removes the content but retains metadata such as the authors' names, preprint title, and DOI. The preprint is marked as "Withdrawn" and the reason for the withdrawal is posted (see examples of formal withdrawal processes for preprints here and here). Withdrawing a preprint is like retracting a published paper, so authors need to take care to avoid this whenever possible. Also, copies of the original preprint may continue to be available via general search engines.

Like manuscripts submitted to journals, preprints should follow best publication practices, specifically ethical requirements such as those regarding informed consent, participant anonymity, plagiarism/text overlap, and permissions for reuse of images. All authors must agree to each version of the preprint to be posted.

Authors should consider the license under which they publish their preprint (e.g., Creative Commons CC0 or CC BY). For example, the publisher Wiley states that authors should retain copyrights to their work when posting to a preprint server and preferably assign a "no re-use" licence. ASAPbio provides a clear licensing diagram that explains what rights and permissions are conferred by the different Creative Commons licenses and no license at all. These licenses affect how the preprint can be shared and reused by others.

Historically, authors in some fields faced barriers to posting preprints. For example, the preprint policy of *Nature* has moved from opposition, to tolerance, and now to active encouragement. In the past, many journals considered a preprint to be prior publication and would not accept it as a submitted paper. Now, more journals and academic publishers have come to accept and promote preprints, particularly as open science has gained ground. Some journals and publishers even allow the direct transfer of preprints from a preprint server to their journals, making submission of a final preprint version to the journal easy. However, not all journals and publishers allow preprints, so always check your target journal's instructions for authors before posting a preprint.

2. Value of posting preprints in sharing work early and openly

Preprints offer a number of benefits to authors and their readers (e.g., colleagues, peers, funders, and the public).

- **Speed:** Preprints allow you to share your work quickly, without having to wait for weeks or months for peer review comments. This lets you get feedback quickly from other researchers around the world to develop your work, rather than just two or three peer reviewers for a manuscript submitted to a journal. This can be helpful especially if you want to announce controversial findings and get rapid feedback. You can then improve your preprint by incorporating helpful feedback before submitting it to a journal.

- **Evolution:** You can update your preprint as many times as you want before submitting it to a peer-reviewed journal, and time-stamping each update (via version control or manually) is a record of the evolution of your work.

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- **Visibility:** Preprints also offer greater visibility for your paper. Your publicly available preprint may be read by some readers who might not read your final journal paper if it is behind a paywall. Also, if your preprint is posted on a large preprint server and has a DOI assigned, more people can potentially discuss and cite your work early, ahead of it being written up and published in a journal. A preprint may also attract attention from potential research collaborators.

- **Priority:** You can establish priority for your work in a preprint, which is important for securing intellectual property rights and raising the profile of your research.

- **Impact:** Sharing your work early via a preprint can be a big plus in a fast-moving field, so your work can have a greater impact on the direction of future research. Listing a preprint on your resume can help showcase research that has not been published in a journal, and citing your preprint can help provide further explanation of your work in funding applications.

3. Potential pitfalls of posting preprints in certain disciplines

Valid concerns about posting preprints have been voiced in some disciplines more than others. Let's look at some potential pitfalls of posting a preprint that authors should avoid.

- **Speed:** In biomedical sciences especially, there is concern that posting findings early in a preprint (i.e., before they have been formally peer reviewed to assess their integrity) may lead to actual harm. For example, if a study reaches incorrect conclusions about the safety or efficacy of a drug, patients could be harmed. In fact, there is a warning for readers (researchers, the media, and the public) about the misuse and misinterpretation of preprints posted in the health sciences on medRxiv. This is one of the concerns being debated about the ethics of preprints across all scholarly disciplines.

- **Visibility and impact:** Some journals will not publish work that was made public in a preprint, and this may affect which journal you later publish in and thus your work's visibility and impact.

- **Priority:** Some people have argued that preprints give away ideas to other researchers, potentially allowing them to "scoop" the work by creating and submitting a journal paper on the work before you do. While this could conceivably happen, it seems unlikely that someone could replicate your work
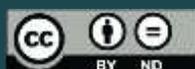
well enough and quickly enough — also, many preprints are time-stamped, which actually establishes your priority.

In some disciplines such as mathematics and physics, posting a preprint is standard practice and there may be few, if any, pitfalls to consider. However, in other disciplines such as in medicine and healthcare, authors should always check that their target journal allows preprints before posting one.

4. Examples of preprint platforms

Lists of preprint platforms (or preprint servers) are available online. You can find a server targeted to your field on this sortable list or in this article, although you should then always check the suitability of the publicly available platform, repository, or website carefully yourself.

Another option is to host your preprint on a regional server, such as AfricArxiv or indiaRxiv, which may be a good choice for work involving those regions or local languages. However, some regional preprint servers have recently had funding difficulties, with the Indonesian preprint repository INA-Rxiv recently closing.

Preprint server	Quick facts	Fields
aRxiv	• Hosts 1.6 million preprints • Uses aRxiv ID for citations	Physics, astronomy, mathematics, electronic and electrical engineering, computer science, quantitative biology, statistics, mathematical finance, and economics
bioRxiv	• 37,648 preprints posted its first 5 years • Uses DOI for citations	Animal behavior and cognition, biochemistry, bioengineering, bioinformatics, biophysics, cancer biology, cell biology, developmental biology, ecology, evolutionary biology, genetics, genomics, immunology, microbiology, molecular biology, neuroscience, paleontology, pathology, pharmacology and toxicology, physiology, plant biology, scientific communication and education, synthetic biology, systems biology, zoology

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| PsyArXiv	• Launched in Dec 2016 • Uses DOI for citations	Clinical psychology, cognitive psychology, developmental psychology, educational psychology, linguistics, neuroscience, quantitative/psychometric methods, social and personality psychology
SocArxiv	• Hosts 4,848 preprints as of Feb 2020 • Launched in 2016 • Uses DOI for citations	Arts and humanities, education, law, social and behavioral sciences
medRxiv	• Launched 2019 • Uses DOI for citations • Offers direct transfer to various journals, including *BMJ Open* and *PLOS Medicine*	Addiction medicine, allergy and immunology, anesthesia, cardiovascular medicine, dentistry and oral medicine, dermatology, emergency medicine, endocrinology, epidemiology, forensic medicine, gastroenterology, genetic and genomic medicine, geriatric medicine, health economics, health informatics, health policy, health systems and quality improvement, hematology, HIV/AIDS, infectious diseases, intensive care and critical care medicine, medical education, medical ethics, nephrology, neurology, nursing, nutrition, obstetrics and gynecology, occupational and environmental health, oncology, ophthalmology, orthopedics, otolaryngology, pain medicine, palliative medicine, pathology, pediatrics, pharmacology and therapeutics, primary care research, psychiatry and clinical psychology, public and global health, radiology and imaging, rehabilitation medicine and physical therapy, respiratory medicine, rheumatology, sexual and reproductive health, sports medicine, surgery, toxicology, transplantation, urology
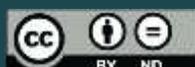
| SportRxiv	• Launched Aug 2017 • Uses DOI for citation	Sport, exercise, and rehabilitation sciences
ChemRxiv	• Collaboratively operated by the American Chemical Society, Chinese Chemical Society, Chemical Society of Japan, German Chemical Society, and the Royal Society of Chemistry • Uses DOI for citations • Launched 2017	Agricultural and food chemistry; analytical chemistry; biological and medicinal chemistry; catalysis; chemical education; chemical engineering/industrial chemistry; earth, space, and environmental chemistry; energy; inorganic chemistry; materials science; nanoscience; organic chemistry; organometallic chemistry; physical chemistry; polymer science; theoretical and computational chemistry
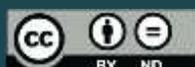
5. Checklist of considerations for posting a preprint

1	What benefits will you gain from posting a preprint (e.g., establishing priority; getting a DOI that makes your preprint a permanent part of the scholarly record and easily citable; getting feedback from the community to develop the work further before formal peer review for a journal)?
2	Does your first-choice journal allow preprints?
3	Do your other shortlisted target journals allow preprints (in case your first-choice journal rejects your submitted paper)?
4	What is the most suitable place to post your preprint (e.g., a preprint server, another public repository, your team's website or webpage)?
5	Do you want your posted preprint to be time-stamped to establish authority?
6	Do your coauthors all agree to posting the preprint?
7	Does your preprint follow best publication practices (i.e., meets ethics requirements for informed consent, participant anonymity, no plagiarism, no text overlap, permissions for use of previously published images, etc.)?
8	What type of license best meets your needs (e.g., Creative Commons CC0 or CC BY)?
9	What type of identifier will be used by people citing your preprint (e.g., DOI, arXiv ID, URL)?
10	Is a version control system available?
11	Which preprint format is needed (usually PDF) and what is the file size limit?
12	Can you directly transfer the final version of your preprint to your target journal, if you want to do this? (Some journals allow you to opt-in to this extra functionality when first posting your preprint.)

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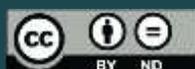
Summary

The place of preprints in scholarly publishing is changing rapidly, and the option to post preprints is becoming more widely available. Preprints provide the latest, often early, results of research, similar to hearing about preliminary results at a conference, and so can provide insights and inspiration about the current direction of the field. Also, many platforms allow commenting, which can contribute to the development of the preprint, similarly to what happens to a journal paper during peer review. Readers should bear in mind that preprints have not been formally peer reviewed, and authors who want to cite preprints should bear in mind that some journals discourage *excessive* citation of preprints in published articles and require preprints to be cited in a particular way (e.g., *Nucleic Acids Research*).

If you decide to post a preprint, you need to consider more than just whether there is a suitable preprint server available in your discipline; for example, should also consider the license used (e.g., Creative Commons CC0 or CC BY), the identifier used for citing your preprint (e.g., DOI, arXiv ID, or URL), the extra functionality that might be available (e.g., version control and direct transfer for journal submission), and publication ethics.

If you would like to delve more deeply into the topic of preprints and publication ethics, you can read some discussion papers on handling preprints issued by the Committee on Publication Ethics (COPE) and a comprehensive report on the transformative role of preprints published by Knowledge Exchange in September 2019. You can also watch a video of a 2019 panel discussion posted on the COPE website that includes "a lively discussion with the panel and the audience, spanning the range of views on preprint ethics".

And if you have any questions about preprints, our team is here to help!

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