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Early Career Researchers on the Value and Use of Preprints

Keywords: scholarly communication, early career researchers, preprints, Harbingers
Słowa kluczowe: komunikacja naukowa, badacze na wczesnym etapie kariery, preprinty, Harbingers

Introduction

Preprints – research papers typically shared online prior to peer review and publication – are thought to offer researchers many benefits. Authors are motivated to post preprints for several reasons: to increase awareness of their work and enhance its visibility, to speed up the dissemination of their research to relevant communities, to enable free and unrestricted access for readers, to obtain expert feedback, and to establish a priority claim on their research ideas, thereby gaining 'scoop protection' (Fraser et al., 2022; Ni and Waltman, 2024). Sarabipour et al. (2019) suggest that preprints should be appealing to early career researchers (ECRs), given their job insecurity and the need to build a career in a very competitive environment. Most notably, preprints, available upon posting, can serve as evidence of ECRs' productivity, a key measure considered for purposes of promotion, hiring and funding, while traditional journal publishing can take months. No less importantly, preprints also enable ECRs to build their presence on social media, where early versions of papers are often discussed, which helps them in their quest to build a professional network.

The question is whether ECRs actually take advantage of the carrier-building benefits that preprints can offer, and if so, to what extent and how. This is why the *Harbingers* studies of ECRs, which focused on their changing attitudes and practices in scholarly communications, have examined the cohorts' views and utilisation of preprints over the past five years[1]. We originally started our exploration of the topic during the COVID pandemic (*Harbingers-2*)[2] when the paramount need to report research findings as quickly as possible became a public priority and boosted preprints. For a report on these findings, see the aerial analysis of the pandemic's impact on ECRs, published in this journal (Nicholas et al., 2023). Now, in *Harbingers-3*, we surveyed them about preprints in the context of an AI-impacted scholarly communications environment[3].

This paper presents the full results of the research on the topic, based on interviews with nearly 70 ECRs in science and social science from around the world in 2024. For an interesting subject comparison, we provide data on what a cohort of Polish arts and humanities ECRs involved in the study shared about

[1] http://ciber-research.com/harbingers.html
[2] http://ciber-research.com/harbingers-2/
[3] https://ciber-research.com/harbingers-3/index.html

their views on preprints. Additionally, we put our current findings in a historical context by summarising our previous findings from preprints for our COVID-era study, which interviewed around 170 international ECRs three times at six-month intervals from 2021 to 2023.

1. Aims

The main aim of the study was to determine ECRs' preprint attitudes and practices in today's AI-impacted scholarly environment. We set out to establish whether they consider preprints an alternative or even a replacement for traditional journal publishing.

A secondary aim was to place the ensuing findings in the context of what we had already discovered during the pandemic (but not fully reported) about ECRs' views and utilisation of preprints.

2. Definitions

2.1. Early career researchers

Given the different, conflicting and country-specific definitions of an ECR circulating (Teixeira da-Silva, 2021), a pragmatic conceptualisation of the term was adopted. Our definition of an ECR focused on the common denominators of their status, that is, their being employed in a research position, but being relatively young and in an early phase of their career, not yet established as permanent faculty: "Researchers generally not older than 40[4], who have received their doctorate and are currently in a research position or have been in research positions, but are currently pursuing a doctorate. In neither case are they researchers in established or tenured positions. In the case of academics, some are non-tenure line faculty research employees".

2.2. Preprints

Preprints are online, freely available, digitally identified and, therefore, citable scientific manuscripts, made publicly available on dedicated, openly accessible servers before traditional, journal-based certification by peer review. Thus, preprints usually refer to works in progress that have not been peer-reviewed and have not been improved based on comments or suggestions from peers and editors (COPE Council, 2018; Fraser et al., 2021; Rieger, 2020). However,

[4] Although by the third stage of the project there now are more participants in their forties because our cohort has aged.

as Tennant, Bauin, James, and Kant (2018) note, the definition of a preprint is somewhat contentious, with various stakeholders and communities interpreting it differently. Indeed, the term appears to encompass many different versions of a research paper, including postprint manuscripts and materials and resources never intended for publication.

2.3. Subject/disciplinary representativeness

The reference to subject/disciplinary representativeness in this paper builds on Fanelli and Glänzel's (2013) findings, which support the 'gradualist' view of scientific knowledge suggested by the *Hypothesis of the Hierarchy of Sciences* – the placing of each field of research, moving from the physical to the social sciences, along a continuum of complexity and softness. Thus, the wide disciplinary area of Social Sciences is divided here into 'hard' disciplines, such as Psychology and 'soft' disciplines, such as Sociology.

3. Literature review

Preprints have been an important part of scholarly communication for a long time, although their prevalence varies by discipline. They are particularly valued in fields where quick dissemination of discoveries is crucial, such as physics, life sciences, and computer science (Smart, 2022; Tennant et al., 2018). In fact, proceeding on the premise that preprints can be full-fledged research objects rather than simply precursors to eventual publication, advocates of the open science movement have even promoted preprints as a means of scientific publishing. With good reason, as Teixeira da Silva, Huang, and Nazarovets (2024) suggest, preprints serve as a valuable platform for openly sharing information with peers and the public. This practice significantly expands access to knowledge, information, and scientific research.

While preprints significantly enhance the direct flow of information in the scholarly community – the very lifeblood of research – they also provide considerable advantages at the individual research level. The literature abounds with discussions of the potential as well as the empirically-proven benefits of utilising preprints for research-work purposes (e.g. Chiarelli et al., 2019; Fraser et al., 2022; Ni and Waltman, 2024; Sarabipour et al., 2019; Smart, 2022; Tennant et al., 2018; Xie et al., 2021). To fully understand the advantages of preprints, their benefits can be grouped into four main categories: accelerating dissemination, establishing priority, gaining attention and visibility, and obtaining timelier and wider feedback.

3.1. Accelerating dissemination

When accelerating the dissemination of research findings becomes a priority, preprints can effectively fulfil this need by providing a faster means of communication than journals, which require more stringent and time-consuming checks before publication. In fact, according to Xie et al. (2021), researchers who use preprints communicate their research results to readers 14 months earlier than in peer-reviewed papers. The rapid data sharing facilitated by preprints during the COVID-19 pandemic exemplifies how essential these resources can be for researchers. Preprints became the standard process for studying the disease and combating its spread, allowing researchers to access previous work quickly and achieve timely results (Watson, 2022).

3.2. Establishing priority

The immediate publication of a research paper via posting a citable preprint gives a researcher priority over ideas and findings, as the practice creates a public record of linkage between a researcher and their discovery. Achieving innovative results first is crucial for building a reputation, especially in competitive research environments involving different laboratories or institutions.

3.3. Gaining attention/visibility

Preprints are currently disseminated under open-access licences and are findable via search engines, making them freely and easily accessible. This can help authors to make their research more visible, and, as Xie et al. (2021) found, increase the number of citations their work receives. Moreover, while journal publishing has been shown to be prone to bias and discrimination in article selection (Brezis and Birukou, 2020), preprint servers offer a more democratic publishing process, thereby increasing the likelihood that some research will become visible.

3.4. Obtaining timely and wider feedback

Preprints allow the early dissemination of newly achieved research results to the research community. This process allows for soliciting wider feedback than what is typically obtained through the traditional peer review process and it does so in a timelier manner.

A researcher can gain significant advantages by choosing to share their research as a preprint, especially since preprints are increasingly accepted in the

academic community and by funders such as the Wellcome Trust and the Gates Foundation, which support the publication of preprints before they are published as journal articles. Google Scholar indexes preprints from all disciplines and makes them searchable on Google and Google Scholar. Crossref now allows preprints to be assigned DOIs and linked to subsequent publishing history, and ORCID has added preprints as a 'work type', enabling authors to document their own preprints in their records (Rieger, 2020). Indeed, the past few years have seen a rapid expansion of the preprint ecosystem, with a veritable explosion of preprint platforms, services and the rate of deposits in them (Rieger, 2020; Tennant et al., 2018; Xie et al., 2021).

However, with all that, posting papers on a preprint server nowadays is a common practice in several disciplines, such as physics and mathematics, even if in other disciplines the practice is less common or hardly done at all (Ni and Waltman, 2024), and despite the just-cited benefits to preprint publication, there remain factors that seem to discourage authors from opting for the possibility. Publishing too early poses a risk of premature media reporting and could lead to work being 'scooped' (Fraser et al., 2022; Sarabipour et al., 2019). However, as Tennant et al. (2018) point out, the risk of being 'scooped' is in fact a fallacy, and the opposite is true, as a preprint defines precedence and 'ownership' of research. Moreover, preprints, as they increase publication volume, contribute to the information overload many researchers experience (Smart, 2022).

The main concern, though, surrounds preprint quality and integrity, as there is no formal peer-review process in place, although, as Xie et al. (2021) show, there are other processes implemented at different servers to help the quality control. Thus, for example, many preprint servers perform checks on completeness, relevance, plagiarism, appropriate language and contents. Nevertheless, the lack of quality control and validation of articles before posting is sometimes seen as an opportunity for bad actors to use preprint servers to post misleading, possibly fraudulent, science (Ni and Waltman, 2024; Smart, 2022).

According to Tennant (2018), the reluctance with which some researchers approach preprint posting may be rooted in insufficient knowledge of the option, including best practices, as well as the perceived benefits and potential negative consequences. This may very well be true when they consider posting a preprint as a first step toward publishing their work, although there may be other, equally compelling reasons. It could be that some research is posted as a preprint simply because the researcher deems it unpublishable, since, as Xie et al. (2021) report, preprints account for only 4% of published literature, and 60% are never published. In fact, the findings of Biesenbender et al. (2024) indicate that this may be the case, as in some cases articles written by the participants in their study were deposited as preprints when difficulties arose during the review process or when articles were rejected.

However, when it comes to the possibility of disseminating their findings solely as a preprint, the reason preventing researchers from doing so appears to be different and related to the current scholarly environment, in which journals

and peer review dominate. Clearly, until preprints are recognised as formal research outputs which can be used to assess scholarly achievements for career and promotion purposes, their utilisation will remain limited.

4. Methodology

4.1. Recruitment of interviewees

National interviewers (from China, Malaysia, Poland, Portugal, Spain, the UK and the US) recruited ECRs, using their local research networks and connections supplemented by mail-outs from scholarly publisher lists. For this pathfinder/pilot phase, each country was originally allocated a potential quota of interviewees (10), but events on the ground did not work out quite according to plan. Malaysia, Portugal and Spain each recruited 10 interviewees. However, in China, AI turned out to be a hot topic with 21 eager ECRs recruited, and in the case of Poland, thanks to local funding[5], 32 ECRs were recruited. Indeed, as noted, for the very first time in the history of *Harbingers*, the availability of local funding in Poland enabled the inclusion of arts and humanities ECRs (22 ECRs). As local considerations delayed interviews in the UK and the US, only 7 ECRs were recruited in time to participate in the pathfinder phase. Given the pilot nature of the project, the imbalance in country coverage was not thought to be a problem, especially as the opportunity to increase the size of the pilot to 91 ECRs, the attraction of extending the study to the arts and humanities and the ability to take a closer look at China, with its growing importance in the international scholarly world, more than made up for it.

Interviewees included both ECRs who participated in *Harbingers-2* and were happy to continue (26), as well as new ECRs recruited to fill the ranks of participants who had left research, no longer qualified as ECRs, or declined due to work commitments or lack of interest.

The breakdown of the ECR cohort by country, discipline, gender and age band is given in Table 1. It is essential to focus on the age distribution of the cohort and the proportion of relatively older researchers involved. This observation is significant for three reasons. First, for convenience, we retained ECRs from previous stages of the project; they were all a year or two older. Second, it is the nature of academic, or any employment, that not everyone moves upward forever. Third, some of the researchers who were ECRs at the time of *Harbingers-2* had since become tenured, so, technically, no longer fit our definition of an 'early career researcher'.

[5] Poland-Art & Humanities: National Science Centre in Poland grant no. 2022/45/B/HS2/00041.

Table 1

Demographic breakdown of the convenience sample in 2024

Discipline										
	CHEM	ENVIR	HUM/ARTS	LIFE	MATH	MED	PHY	SOCH*	SOCS**	Total
N	7	4	23	6	9	12	16	5	9	91
%	8	4	25	7	10	13	18	5	10	100
Country										
	CN	ES	GB	MY	PL	PT	US			
N	22	10	3	10	32	10	4			91
%	24	11	3	11	35	11	4			100
Age										
	Youngest (26–30)	Younger than most (30–34)	Median (35–37)	Older than most (37–39)	Oldest (39–51)	N/A	Median			
N	18	18	18	18	18	1	36			91
%	20	20	20	20	20	1				100
Gender										
			Male	Female						
N			43	48						91
%			47	53						100

* Includes Economics and Business, Geography and Psychology ** Includes Anthropology, Politics and Sociology

4.2. Data collection

Semi-structured, free-flowing interviews of 60–90 minutes in duration were the main source of data. The interview schedule consisted of 7 pages of questions[6], covering an exhaustive range of general scholarly communication questions as well as questions about AI and its impact on research activities. However, this paper focuses principally on a two-part question specifically about preprints, although it also looked for mentions of preprints in responses to all the questions.

4.3. Data analysis

All interview transcripts, having been read and approved by the interviewees, were translated into English where necessary and transferred by the national interviewers to a coding sheet that closely matched the questions of the original interview schedule, while leaving room for information derived from additional

[6] https://ciber-research.uk/download/ECRs_Harbingers%203_Pilot%20Interview_schedule_1610DN.pdf

enquiries or clarifications during the interview process. Thus, the coding sheets, containing both quantitative and qualitative data, could, and often did, generate both types of data. They also captured quotations and, at times, explanatory comments from the interviewers, making them multifaceted.

5. Results

Both the Sloan-funded 2022 'Pandemic' study and the 2024 'AI' study contained a two-part question on preprints asked in a long open-ended interview, which contained around 50 questions about the scholarly communications of ECRs. In addition, mentions of preprints in other questions were identified and analysed; therefore, the scope is somewhat broader than that. Let us first examine the findings of the most recent data (2024), which we will cover in detail in the current AI study. In the main analysis, we focused solely on the 69 early-career researchers (ECRs) in the sciences and social sciences, treating arts and humanities ECRs as a supplementary group, since preprints were not a significant part of their scholarly communication. This method also enables comparison with our earlier study on preprints, which focused exclusively on science and social sciences.

5.1. From the AI Harbingers study

5.1.1. How preprints are regarded

ECRs were asked: Do you consider a preprint to be: a) an alternative to, or a traditional journal publication? Whether yes or no, why is that the case? b) Do you consider a preprint to be a replacement for a traditional publication? Whether yes or no, why is that the case?

This two-part, direct question yielded both quantitative and qualitative data. The coded data was recorded as no, yes or no-answer. There is a clear distinction to be made here between preprints as an *alternative* and as a *replacement* for traditional peer-reviewed journal publication. Thus, while half of all ECRs saw preprints as an alternative (Table 2), only one-tenth considered preprints to be a replacement (Table 3).

Table 2

Is a preprint an alternative to a traditional publication? Country analysis

	Total	CN	ES	GB	MY	PL	PT	US
N	30 (43%)	4	6	3	3	9	5	0
Y	35 (51%)	17	4	0	7	1	5	1
N/A	4 (6%)	1	0	0	0	0	0	3
Total	69 (100%)	22	10	3	10	10	10	4

Table 3

Is a preprint a replacement for a traditional publication? Country analysis

	Total	CN	ES	GB	MY	PL	PT	US
D	1 (2%)	0	0	0	0	0	0	1
N	56 (82%)	18	7	3	10	10	8	0
Y	6 (9%)	2	2	0	0	0	2	0
N/A	5 (7%)	2	1	0	0	0	0	3
Total	69 (100%)	22	10	3	10	10	10	4

ECRs from China and Malaysia were more likely to agree that they were a suitable alternative, and Poles were least likely to think so. Not surprisingly, 11/16 physical scientists were more likely to see preprints as an alternative (Table 4). Medical scientists, by contrast, were not at all sure, with half of them thinking preprints were not an alternative. There was little universal support, even among physicists, with only 2 believing that preprints could replace traditional journal papers (Table 5). In terms of age, the median ECRs (aged 34–37) were most likely to say that preprints were acceptable alternatives to traditional publications. There were no other significant age differences, but there was an interesting gender difference: men were much more favourable towards using preprints as alternatives to traditional publications. Twice as many men as women thought so, although this might partly be due to the fact that hard sciences tend to be male-dominated.

Table 4

Is a preprint an alternative to a traditional publication? Subject analysis

	Total	CHEM	ENV	HUM	LIFE	MATH	MED	PHY	SOCH	SOCS
N	30 (43%)	4	4	0	4	4	6	3	2	3
Y	35 (51%)	3	0	1	2	5	5	11	3	5
N/A	4 (6%)	0	0	0	0	0	1	2	0	1
Total	69 (100%)	7	4	1	6	9	12	16	5	9

Table 5

Is a preprint a replacement for a traditional publication? Subject analysis

	Total	CHEM	ENV	HUM	LIFE	MATH	MED	PHY	SOCH	SOCS
D	1 (2%)	0	0	0	0	0	1	0	0	0
N	56 (82%)	6	4	0	6	9	10	11	3	7
Y	6 (9%)	1	0	1	0	0	0	2	1	1
N/A	5 (7%)	0	0	0	0	0	1	3	1	1
Total	69 (100%)	7	4	1	6	9	12	16	5	9

Regarding the qualitative data and dealing first with the responses concerning preprints as an alternative to traditional paper publishing, the majority of ECRs saw them in these terms:

One Chinese physical scientist, like many others, saw their attractiveness in terms of their speed of duration and currency: "The preprint will be much earlier than the official publication, after having the preprint, you can understand and acquire relevant knowledge through the preprint, and there is no need to choose the original way, because the content of the two is the same".

Another Chinese physical scientist explained the benefits of establishing priority: "Preprints can help protect research ideas from being stolen".

A Portuguese mathematical scientist saw preprints as a means of avoiding costs (APCs): "An alternative, a way of facilitating access and facilitating dissemination without forcing you to buy access to an article".

Another Chinese mathematical scientist provided a very balanced and thoughtful essay, believing that both peer review articles and preprints had their place, but what concerned them most was the possibility of AI-generated preprints: "Firstly, preprints and peer review are still crucial, as preprints currently do not generate much impact. To be precise, unless it is very early and highly impactful work, most people choose to submit their work to specific conferences or journals, undergo peer review, and turn it into a finished product or an acknowledged contribution. If preprints were to replace traditional publications without any peer review process, given that preprints have no threshold, it would create a different value system".

A Portuguese life scientist saw a more limited use of preprints: "They may be something interesting to read, but without peer review, we should not cite them".

Several ECRs did not think they could be a useful alternative. There was a qualified "no" from a Spanish chemist, who could nevertheless see the benefits of claiming priority: "No, because a preprint is not peer-reviewed. It is fine if you have cutting-edge research, you do not get stepped on, but I do not think it is for much more".

Another Spanish chemist, like a few other Spanish researchers, also said no, but because it was not considered in their university assessments: "I do not consider it an alternative because it is not valued in the evaluations".

A Malaysian chemist thought along similar lines: "Malaysian researchers may not obtain recognition for preprints because of concerns about their quality, potential errors. University promotion and tenure criteria prioritise peer-reviewed publications, and there may be a lack of familiarity with the concept of preprints".

However, another Malaysian life scientist echoed the thoughts of some others, when they said they would like them to be considered in evaluations: "The decision to submit or not ultimately depends on the KPI system. I believe that preprints should be recognised as a valid form of publication and receive appropriate marks for it".

Lack of peer review, of course, was the main barrier to use: "I don't consider the preprint server to be either an alternative or a substitute, given that the publications posted here have not been peer-reviewed".

Regarding interview comments about preprints replacing traditional papers, there was, of course, little support. The same reasons were provided for not seeing them as alternatives, but more forcefully: the lack of peer review and not being

counted in university assessments topped the list. For instance, a Malaysian life scientist noted, "The University of Malaya does not see preprints as a valuable form of publication. They think it is just an extra, not a replacement for regular publications. Moreover, preprints are not considered in our performance measures. The reasons may be because of differences in review processes and the importance given to formal scholarly records in traditional publications".

A Spanish medical scientist cited the legitimacy conferred by an approval process: "No, because if it is not subject to an editorial process, it does not seem legitimate to me".

Finally, one Chinese physical scientist stated that they could not be used to secure funding: "There is no substitute for traditional publications, as preprints cannot be used as an evaluation indicator for funds, programs, etc."

5.1.2. Preprint mentions in other (indirect) scholarly communication questions

A keyword search of the interview database also revealed that preprints were mentioned in more than two dozen other questions, underscoring their pervasiveness. However, just one question received more than two mentions, and that was a broad question: Do they think more informal modes of communication (e.g., preprints, tweets, blogs) will play a larger role? This question attracted 12 mentions – mostly positive about the role.

Thus, one US medical scientist believed preprints have a big future: "I see preprints as playing a much larger role in making research available than they did prior to the pandemic".

A Chinese mathematical scientist thought along the same lines: "Additionally, there are preprints, which are like journals but have not undergone peer review or been submitted to conferences or journals. I believe preprints serve a crucial purpose for many articles. If they were not necessary, why would I bother submitting to a preprint server? It would not be beneficial".

Another Chinese mathematician saw a more limited use for preprints as staking a claim to priority: "But it is limited. In the end, it has to be published in a journal, and the preprint only serves to make a registration".

A British chemist thought it all depended on the authors: "A preprint from a good group is worthwhile but would be no use if it were only a preprint. This, however, is a time of change. Unfortunately, there are just too many papers".

At the other end of the scale, a Chinese physical scientist answered the question in these negative terms: "It depends, because these preprints are not tested or peer-reviewed after they are written and will contain garbage or wrong ideas".

5.1.3. Arts and humanities ECRs

Twenty-two Polish A&H ECRs were included in the overall study, but not included in our main analysis. This was because it quickly became clear that journals, especially preprints, were of little significance to them. However, what

we gleaned from them deserves reporting. Thus, the vast majority (21) of the Polish A&H respondents did not use preprints, did not publish in them, or had even heard of them. This quote is representative: "I do not know, in the humanities, preprints are not very relevant. It seems to me that it is relevant in medicine, for example, as was proven during the pandemic, when preprints were used to read about new methods of fighting the virus – I think this is a good thing, especially in such urgent matters. In the humanities, there is no such urgency". It is evident that authority holds more weight than both currency and priority.

The very few who had specific knowledge of preprints used them or published them and admitted that preprints could be an alternative to publications, but certainly not a replacement for them. Tellingly, these were ECRs who obtained their knowledge of preprints from previous questioning about them in Harbingers-2. This is the comment from one: "I use preprints. This is an alternative, but the problem is in recognising. For example, in my library, my preprint is a published text, which also raises further problems whether this text can be accounted for (adding to my output and awarding points)".

5.1.4. A case study country profile

ECRs from Malaysia (along with those from China) were the most likely to agree that preprints are a suitable alternative to traditional papers, thus we provide here, with the help of the national interviewer for Malaysia, a bit more context to better understand their reasoning. Thus, while Malaysian ECRs may understand preprints as a means to share research quickly and gain visibility, very few are familiar with their purpose, platforms, or how they differ from traditional publications. Awareness mainly depends on their academic field, the extent of their involvement in international collaborations (and resulting global exposure), and their familiarity with open science practices. Thus, the Malaysian perspective shows a mixed level of awareness and acceptance. While some ECRs view preprints as a valuable alternative for disseminating research, especially when traditional publications are not immediately feasible, there are concerns regarding the quality of preprints and the lack of formal peer review. Most expressed scepticism about preprints, particularly due to their lack of recognition within Malaysian universities' performance measures, which prioritise peer-reviewed publications for promotion and tenure (e.g. The University of Malaysia perceives preprints as an additional step rather than a substitute for traditional peer-reviewed publications, and preprints are not factored into performance metrics at the university). Moreover, the quality control of preprints was questioned, as some ECRs feel that feedback on preprints often lacks input from subject-matter experts. However, there is an acknowledgement that future ECRs (or more junior ECRs) may be more open to adopting preprints and open science practices. Overall, while preprints are seen as a promising option, the transition to widespread acceptance faces challenges related to institutional recognition, peer review, and academic culture.

Table 6

Marked use of preprints in ECR's own specialism/their own research?

	TOTAL	D	N	Y
CN				
R1	24	0	23	1
R2	23	0	16	7
R3	23	0	17	6
ES				
R1	23	3	17	3
R2	20	3	10	7
R3	20	2	15	3
FR				
R1	17	0	13	4
R2	17	1	9	7
R3	17	0	7	10
GB				
R1	24	1	14	9
R2	23	0	7	16
R3	23	3	10	10
MY				
R1	20	0	18	2
R2	19	4	10	5
R3	14	2	8	4
PL				
R1	22	0	19	3
R2	22	6	12	4
R3	22	1	16	5
RU				
R1	22	0	13	9
R2	20	9	8	3
R3	20	6	12	2
US				
R1	22	0	17	5
R2	21	1	14	6
R3	20	2	10	8
Total R1	174 (100%)	4 (2%)	134 (77%)	36 (21%)
Total R2	165 (100%)	24 (15%)	86 (52%	55 (33%)
Total R3	159 (100%)	16 (10%)	95 (60%)	48 (30%)

5.2. Historical data from Harbingers COVID study

The pandemic brought increased attention to preprints, making it natural to begin asking about them in the aforementioned Sloan Foundation-funded study of the impact of COVID on ECRs. They were seen as a means of disseminating research more quickly, particularly in medical research. We conducted 3 rounds of interviews at 6-month intervals, and the question posed was different: Where research related to the pandemic has been conducted, there has been a marked increase in the use of preprint servers. Is this happening in their own specialism /for their own research, whether research pandemic-related or not? The question then was mainly about the prevalence of preprints.

Table 6 presents preprint data from 3 rounds of interviews conducted during 2020–2022. From the table, it can be seen that there is a general trend towards ECRs recognising the increased take-up of preprints over the two years, with 21% saying so in round 1 of interviews and 30% in the third round. Indeed, a high point was reached in round 2, when a third of ECRs reported a marked increase in preprints. Other features of the table are: 1) the declining use of preprints in Russia; 2) the increased use in France; 3) the generally high levels of use in Great Britain; 4) the low levels of use in Poland. Of course, as we have seen, low levels persist to this day.

Further commentary on round 3: In the US, it was suggested that the increase in preprint numbers could be down to slower peer review and ECRs needing to put recent references in grant applications. France had the highest proportion (10/17), saying the pandemic had led to greater preprint use.

Data from the study can only be regarded as background, as the two cohorts were asked different questions about preprints and differed in their composition and size, although they had about a third of ECRs in common. The COVID study covered around 170 ECRs researching in the sciences and social sciences from 8 countries (China, France, Malaysia, Poland, Russia, Spain, UK and US) and the AI pilot study covered 91 ECRs researching science, social science and the arts and humanities and mainly from China, Malaysia, Poland, Portugal and Spain, with a small representation from the UK and US.

6. Discussion and conclusions

The main message from the research is that preprints have some way to go before they are fully and universally accepted by ECRs (if they ever are). Thus, while half of them thought preprints could be an alternative to peer-reviewed papers (though not necessarily used that way), fewer than a tenth thought they could replace peer-reviewed papers. There was a sense in some quarters – Iberia particularly – that they had lost some popularity since COVID. ECRs from China and Malaysia were most likely to see them as alternatives, and Poles the least likely to. Physical scientists were most likely to see them as alternatives,

and medical scientists the least so. However, the additional A&H sub-study showed that the vast majority of ECRs did not use preprints, publish in them, or had even heard of them (the latter was shared by a sizeable minority of their colleagues in other disciplines). The reasons for this are varied, but it is worth noting that while researchers from the sciences and social sciences operate in fast-moving research environments, there is a need to establish priorities and identify where preprints can be most helpful. In contrast, A&H ECRs are more interested in long-term reputation, depth of subject knowledge, and authority, which preprints cannot really contribute to.

As regards preprints as a replacement for the traditional paper, there was really no support whatsoever, even among physicists, which is not very surprising. A slight indication of acceptance was observed, with ECRs in the 34–37 age group most likely to consider preprints acceptable substitutes for traditional publications.

The main attraction of preprints (as alternatives) was thought to be the speed with which research could be disseminated. However, when pressed for time, ECRs could also turn to grey journals for this, as they publish papers quickly through expedited review. It was also noted that preprints serve as a way to establish research priority. Additionally, it was mentioned that preprints help avoid the pitfalls of peer review, such as dealing with poor reviewers, bypassing a long and cumbersome process, avoiding APCs, and not being behind a paywall. Those ECRs who viewed them negatively said the lack of peer review made them seem suspect and untrustworthy. Preprints could also not be used for assessment purposes, nor could they be cited (a misunderstanding that quite a few ECRs shared), counted towards impact factors or ultimately attract funding. There was a palpable sense that, for many ECRs, preprints lack prestige and could damage careers. Nevertheless, a minority of ECRs said they would have a future, and to speed this along, they would like to receive some form of recognition that could be used in assessments. It was thought that preprints from established research groups would be trusted more.

Among the negatively inclined to use preprints, there seems to be a divide. There are those who are not fully knowledgeable about them, which makes them adopt a conservative stance, simply not trusting preprints. There are those who are informed about preprints, but nevertheless only think traditional publications count, and they do not want their publications to be jeopardised by publishing or citing preprints.

Overall, it would be true to say that ECRs provided more negative than positive comments about preprints, and even those who were more favourably inclined hedged their comments. They could not really be said to be popular or to ignite enthusiasm. There are limited indications that they might be transformative, and only if a revised academic assessment system acknowledges them. Currently, there are few signs that this will happen soon.

Despite the many alleged benefits of preprints listed in the literature, most of our ECRs were not utilising them. The literature review also indicates that

they constitute a very small proportion of published works, with over half of them never being properly published.

Finally, peer review clearly distinguishes traditional paper publishing from preprints. While preprints enable rapid dissemination and establish claims of priority, it is peer review that confers legitimacy, authority, and academic esteem. However, with many early-career researchers complaining about the quality of peer review—particularly in 'grey' journals and predatory APC-driven publications that claim to conduct peer review—this distinction is becoming increasingly blurred. The potential of artificial intelligence to both generate and review publications may further undermine confidence in the process. Automation can accelerate the review process and increase the volume of publications, but it remains uncertain whether it can ultimately enhance quality. Ultimately, quality is a human judgment, and in the case of preprints, it may require each reader to act as a peer reviewer.

It should be noted that this was a preliminary study using a convenience sample, aimed at informing a future, more comprehensive study. Our findings should therefore be regarded more as informed observations that fill a knowledge gap.

Author contributions

Nicholas oversaw the article and wrote much of it. Clark provided the data analysis, technical support and insights. Herman conducted the literature review and provided editing. Świgoń undertook the A&H element and produced the Polish data. The remaining authors conducted their country analyses and provided general feedback on the paper.

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Data availability statement

Data available on request from the authors.

Polish A&H data are available in an open repository: Świgoń, Marzena, 2024, *Preprinty w opinii badaczy na wczesnym etapie kariery w dziedzinach humanistyczno-teologiczno-artystycznych*, https://doi.org/10.18150/DW1FXT, RepOD.

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Summary

This paper reports findings from a study of the impact of AI on early-career researchers' communication, their attitudes towards preprints and their use of them. A convenience sample of 69 science and social science ECRs based mainly in five countries – China, Malaysia, Poland, Portugal and Spain, with initial observations from the UK and US complementing the picture. Interviews were employed, with questions about preprints focusing on whether they could be considered as an alternative or replacement for traditional journal publishing. The main findings, illustrated and supported by numerous verbatim quotes, indicate that half of ECRs accept preprints as an alternative to peer-

-reviewed papers, although they do not necessarily use them as such. Only about a tenth of respondents believed that preprints could replace traditional publications. The primary advantages mentioned of preprints are their speed and ease of dissemination, their function in establishing research territory, and their availability without paywalls. The main disadvantages mentioned include the lack of peer review, which leads to perceptions of suspicion and untrustworthiness, limiting their value for assessment and career advancement. A substantial literature review provides context for these data.

Początkujący naukowcy o wartości i wykorzystywaniu preprintów

S t r e s z c z e n i e

W artykule przedstawiono wyniki badania wpływu sztucznej inteligencji na komunikację początkujących naukowców w zakresie ich nastawienia do preprintów i korzystania z nich. Badanie przeprowadzono na próbie 69 naukowców zajmujących się naukami ścisłymi i społecznymi, głównie w pięciu krajach – Chinach, Malezji, Polsce, Portugalii i Hiszpanii, przy czym wstępne obserwacje z Wielkiej Brytanii i Stanów Zjednoczonych uzupełniają ten obraz. Zastosowano wywiady, w których pytania dotyczące preprintów koncentrowały się na tym, czy można je uznać za alternatywę lub zamiennik tradycyjnego publikowania w czasopismach. Główne ustalenia (zilustrowane i poparte wieloma cytatami) są takie, że 1) preprinty są akceptowane przez połowę respondentów jako alternatywa dla artykułów recenzowanych, choć niekoniecznie są wykorzystywane jako takie, ale tylko jedna dziesiąta uważa, że mogłyby je zastąpić; 2) głównymi zaletami preprintów były szybkość i łatwość, z jaką badania mogły być rozpowszechniane, ich wykorzystanie jako środka do wyznaczania terytorium badawczego oraz fakt, że nie znajdowały się one za paywallami; 3) głównymi wadami był brak recenzji, co czyniło je podejrzanymi i niegodnymi zaufania oraz mało wartościowymi dla celów oceny i rozwoju kariery. Zawarto też przegląd literatury w omawianym zakresie.