HARBINGERS-2 EARLY INSIGHTS

University of Tennessee/CIBER Research

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1.0 Introduction

Fresh from interviewing and coding, all 8 national interviewers were asked to provide what they thought were the early findings and important insights emerging from their countries. This, before they had seen the results of the coding and hypotheses analysis. No more guidance than that on what was required was supplied in order to let interviewers have full reign and provide their own interpretation. Therefore, contributions vary in length and emphasis. Not only does this give us an invaluable heads-up, it also helps in the writing-up of the quantitative and qualitative data, because this provides context and enables us cross-check these insights with the code data. The document also allows us to share experiences/knowledge across the eight countries.

From these early insights only it seems that while it was feared that the pandemic might have a big (negative) impact on early career researchers (ECRs), who are by definition a very precarious community and on the frontline, it has not quite turned out like that. This is possibly because they are a resilient community, quick on their feet and used to dealing with hard-knocks. Most research and scholarly activities have not changed other than moved progressively online. That is not to say, as you will see in the national reports, that there are not problems or difficulties. Perhaps, the biggest positive is that there now seems a much greater awareness of scholarly communications. The pandemic has made ECRs think and talk more readily about such things as (faster) peer review, the role of pre-prints, reputation and open data. They regularly tell us that many of the scholarly activities we asked about in the interviews were trending already before the pandemic and that the pandemic has started very few new ones. Outreach perhaps is the biggest talking point thanks to the pandemic, but something which most do not practice because of reputational requirements (no points awarded), their juniority and because they are unsure as how to do it. In retrospect, our ECRs have grown-up scholarly communications terms and this is in part down to the pandemic.

The position of journals appears rock-solid, warts and all, and ECRs see them as safe and trusted places where peer review can be safely undertaken and accreditation afforded. The reputation system, of course, is also still solidly built on journals, internationally so it appears, which further buttresses their position. This could be why, unlike in the past (H-1), publishers are no longer the scholarly whipping boys. Libraries on the other hand are seen to have just one role (possibly declining in a OA world) and that is a limited one, which is providing convenient access to subscription journals.

Finally, many of our ECRs have to teach as part of their contracts, with it sometimes accounting for as much as 50% of their time. With the massive and widespread shift to remote teaching resulting from the pandemic many are finding they are spending more time teaching because of their alleged superior IT skills in this area and the fact that it just takes much longer to do. This has meant that ECRs' research time has often been squeezed.

2.0 China

Pandemic Impact

The pandemic impacted ECRs differently and widely. During lockdown, those who are undertaking experimental research are the most impacted. They lost time (many months), and in some cases, they lost data or postponed their graduation. Those undertaking fundamental research or social scientists seemed less impacted by the pandemic. However, they struggled with family affairs (e.g., taking care of children, house cleaning, predominantly female ECRs) and research work. In most cases, isolation and lack of social interaction harmed ECRs' creativity, but some ECRs found the good side of the pandemic, for example, less administrative work and a saving of commuting time for research work.

The pandemic also impacted ECRs' research targets and direction. Many ECRs started to think about the "usefulness" of their research to society and other people. The pandemic led to reflection in the academic community. ECRs want to help the country to beat the virus and cure people who suffered from the COVID19. Even for social scientists and those whose research is not related to the pandemic; they also began to think about the question: "How can my work help people. "

In the main ECRs do not feel more precarious than before the pandemic or because the pandemic. But they are aware that because of the pandemic, some funding went to covid-19 related research area and the national economy took a hit, so they are worried about how their wage and research funding will be cut down the line.

Due to the pandemic, ECRs have had to cancel their visiting scholar plans and many ECRs who received overseas PhDs returned to China for jobs. All these new situations make the Chinese feel more precarious and isolated.

Some ECRs are concerned about foreign discrimination against Chinese, and one said she encountered such a thing after the pandemic. An Australian peer said Chinese authors are not welcomed during an international conference.

Online teaching and conferences

ECRs are aware that because of the pandemic, there are more online conferences, meetings and seminars. The advantage of this is that they can join more online conference and meetings easily and cheaply. However, ECRs are missing face-to-face teaching and communication. They like the interactions with "real" people. Online teaching is ineffective and time consuming because they need to re-prepare lectures. Zoom, Tencent online conference, and WeChat are the three main tools for online communication and discussion. ECRs have different attitudes on these online tools. Some like them because they are convenient and save time/money (travel expense), especially for ECRs who have a limited budget/time for travel. Online conferences also provide an excellent way to join more academic conferences. However, some ECRs dislike online conferences because it they are ineffective and without face-to-face interaction and social occasions, they cannot

develop collaborations or obtain deep understanding. Some of them even avoid virtual conferences because they think they are a waste of their time.

Social media and outreach

Used social media for scholarly purposes more frequently and regularly than before (H1). WeChat, Weibo and ResearchGate are the most mentioned. They mainly use these social media platforms for checking information, follow up on other's updates and comments; they still don't use them to disseminate works and take part in outreach. During the lockdown, ECRs used mobiles to "watch what happens." very regularly, they sometimes feel confused about the information they got from social media because there are a lot of fake news and emotional people on social media. ECRs subscribe to science journals' official accounts on WeChat and follow up with "big name" because they want to know what their peers are doing. But they will not read full-text papers on social media and mobile phones because they want to read academic works on their computer screen. ECRs talked about making their research comprehensible to others through social media, but they don't have time or knowledge to do that.

Although they are not expected to communicate their research with the general public, decision-makers, and practitioners, they recognize that outreach is essential for making a research impact beyond academia. They may need help to conduct outreach, and the publishers or journals could help in this regard.

Assessments and authorship policy

All universities/institutions have very clear assessment rules and authorship policies, and most universities and institutions have very clear assessment rules and authorship policies, and most of these rules and guidelines are similar.

For assessment, publications, research projects, and teaching (mentoring) are constantly being evaluated. Chinese ECRs called these three tasks "three big burdens" on their shoulders.

Assessment criteria have not changed despite the pandemic. Still, the new policy (https://scholarlykitchen.sspnet.org/2020/03/03/guest-post-how-chinas-new-policy-may-change-researchers-publishing-behavior/) was issued during the pandemic, so ECRs misunderstand that the assessment criteria have changed due to the pandemic.

Because of the new policy, Chinese ECRs are encouraged to publish papers in Chinese language journals rather than average quality English journals. But good quality English language journals (e.g., WoS indexed Q1 and Q2 journals) are the ideal publication outlets for Chinese ECRs. Their wish list is Q1 and Q2 journals.

They are also subject to an authorship policy regarding the authorship order. Only the first author counts, and the first affiliated institute should be their university when evaluating. They thought this rule prevented collaborations, but they don't think they are the people who have the power to change it.

Open access and sharing

ECRs appreciate the benefits of OA publishing; however, they only publish in WOS indexed OA journals (Q1 and Q2) to help them achieve their KPI. They can afford APC as long as the journal ranking is high. They believe some predatory OA journals lower the quality of academic publishing. They generally thought that the reputation and quality of OA journals are not as good as most traditional journals. No one mentioned IRs, and there is no mandate for that too.

ECRs do not post their pre-prints on a pre-print server, although they have heard of that during the pandemic. They like the idea of sharing the primary findings on the pre-print platform because it may accelerate the innovation of scientific work, but are worried about the quality of pre-print. There are many retractions.

They thought in some disciplines, such as biomedical science, sharing output for free is good for society. They all mentioned the research work on COVID-19 should be open. In terms of the data, they will only share it after it got published by journals. Data is their most valuable asset, and they will make full use of it before share it with others.

Libraries

Not used, not missed. Libraries are seen as digital service providers or places to work.

Publishers

Still play a role in scholarly communication system. The brand represents of quality.

3.0 France

Pandemic Impact

The pandemic impacted ECRs differently. Those who are undertaking experimental research are those who were the most impacted. They lost time (many months) and in some cases they lost data. Those who are undertaking fundamental research are those who are the less impacted and, in some cases, finding advantages to the situation they are in (ex. Moving closer to their families or joining their relatives and friends). In some cases, isolation and lack of social interaction harmed badly ECRs' creativity.

Situation not necessarily more precarious than before the pandemic

Mainly, ECRs do not feel more precarious than before the pandemic or because the pandemic. They observe that funding dedicated to their PhD or Post doc is safe while they see their PI's struggling with all the aspects related to the pandemic (distant teaching, administrative procedures, sanitary procedures). But they are aware that because of the pandemic, some positions supposed to be opened are not. That may mean less opportunity in the long term.

Online Conferences

ECRs are all missing "real" conferences. They miss all the interactions that allow them to meet colleagues, future PIs, have discussion and build collaborations. Virtual conferences are not satisfying to them at all, they are thought to be "cold" places, where interactions are limited. Some of them even avoid virtual conferences because they do not feel comfortable with the way they are supposed to interact. Some think they are a waste of their time.

Online meetings and seminars

ECRs do not prefer online meetings or seminars. They clearly prefer face to face discussions and meetings. Some of them clearly stated that for far away collaborations, online meetings could save time and make things more efficient, but at the same time, they acknowledge that online discussions were not as deep as face-to-face ones. Many ECRs are convinced that budgets will provide less resources for travels (in France and abroad) than was previously the case.

Social Media

They are used, more importantly and more "naturally" than was the case for H1. Twitter and ResearchGate are the most mentioned. They use them regularly and variously to develop their visibility, for current awareness, to "watch what happens", to share with colleagues. Usage expanded with the pandemic, especially during periods of lock downs. They are an integrative part of the way this generation is interacting and building visibility, and in some cases reputation. But most importantly, in the case of the pandemic, ECRs used them to maintain connections, to break their isolation, to show solidarity, to enhance collaborations (distant meeting were frustrating) and in some cases to "speak" to citizens.

Journals importance and peer review

Journals are king for ECRs, whatever their discipline, whatever their gender and whatever the context in which they are performing their research. They are the very corner stone on which ECRs are building their CV, strategies and hopes. Journals are a kind of "currency" that lets them enter the system, be acknowledged. They are already very aware of the important of journals and of their place in a researcher's career. This is why those who are doing experimental research, who were unable to reach their data or lab during the lock downs tried to prepare reviews for submission, "to not to lose everything".

The importance of journals for ECRs is also linked to the fact that they are presented as the only place where peer review is undertaken properly. This is why they do not believe that journals will disappear even though they observe that there are new and interesting informal ways of disseminating. But they do not provide peer review or any reliable process of certification.

Academic career

Many ECRs do not target an academic career now. This is because they are aware how rocky and long is the road. The pandemic made some of them change their mind from an academic career to a career in industry, or in outreach activities. Those who do not plan to stay in academia say they don't want to make "all the sacrifices".

Outreach

ECRs paid very close attention to all the debates, fake news, controversies (Professor Raoult, Vaccines, ...) and media coverage that occurred during the first months of the pandemic. Some of them already involved in some dissemination activities stated that they will try to do their best to enhance this activity even they know that it is not considered in their CV as a "performance". Some became aware of their social responsibility as researchers (even those that do not work on Covid or related topics) to include citizens in their audience and tried to think about ways, methods on communicating science to society. A small number are determined to start a career in outreach activities, doing their best to fill the gap between science and society, fight fake news etc.

Citation Metrics

French ECRs believe in citations but not in citation metrics. They are clearly aware of their importance for the system as many of them mentioned but they think that these metrics do not reflect all dimensions that constitute an academic reputation. Downloads, social media etc. are not well considered still.

Preprints

French ECRs are preprint readers and preprint repository users. They are aware of the increasing importance of preprints thanks to the pandemic, and many of them are aware of the debate about the place of preprints in the scholarly communication system.

However, they do not put their papers in preprint repositories because they are ECRs and they have to look to peer review and publication for their careers.

Contrasted awareness of OA policies

Few ECRs know about OA policies details. Sometimes they even do not know if there is one. Some of them admitted that they should know but, mainly they rely on their PIs for this topic.

Do they have an opportunity to change anything?

Answers to this question are very mixed. Very few of them are still full of hope, some are seeing difficulties and the lock-ins that exist and others are giving up and planning to leave the system. Those who are full of hope are passionate about their research and believing that the new generation will introduce new practices and values that will prevail. Those who see the lock-ins believe that the system is based on old fashioned framework that does not fit with reality and sometimes see their supervisors or PIs as part of the locks. Those who are leaving the system are convinced that only precariousness is waiting for them, that research has become too driven by competition (searching for funding and publishing papers) and that Academia has lost her freedom of doing research the way she wants to do it.

Retractions

No retraction crisis is noticed in their community, only Pr. Raoult is mentioned …

Sharing Data

Data sharing is not a common practice. ECRs did not seem to comprehend all the stakes related to this topic.

Libraries

Not used, not missed. Libraries are seen as digital services or places for work.

Smartphones

Almost not used for professional purpose, because the pandemic made them stick closer to their computer.

Sci-Hub and discovery

It is mentioned as any other resource, it is now "normalized".

4.0 Malaysia

Career

Academic tenure is what the ECRs aimed for, including doctoral students and Post-Doc. They want to be a faculty member. Even doctoral students are not open to other career paths. Most are confident that they can secure a permanent post, or confirmed once fulfilled the publication requirement by the end of this year. This shows that only the publication requirement that hinders them from getting tenured (A perceived lack of WoS-indexed publications is an enormous barrier to tenure). Although a few of them were hired during the pandemic (showing that hiring has not been curtailed), they felt that the pandemic impacted ECRs more than their tenured colleagues due to uncertainty of future employment

Funding

Becoming a Principal Investigator (PI) is a KPI for all academic researchers regardless of academic status, and to be one, ECR must have a research grant. So, they are also tasked with obtaining research funding. Securing research funding is a challenge, especially for those who have shorter track records. Because ECRs are dependent on funding to establish their academic careers, they felt that there should be inclusive funding for ECRs, and that they should not compete with the senior academics. They have either initiated or (thought of) research related to the pandemic, because more funding has been available for COVID-related research. They believe that this would also benefit them in interdisciplinary research collaboration, as well as to secure future funding in interdisciplinary/transdisciplinary research.

Assessment

Productivity is always being judged, and assessment criteria has not changed despite the pandemic. Assessment to ECRs is all about meeting their KPI (Key performance indicator), and ECRs felt that what their universities care most about is research productivity (ECRs were drawn from the 2 top research universities in Malaysia). They are well-versed about the KPI system, and a few even have publishing strategies on how to climb the academic ladder in the next few years (through sharing papers and authorship, interdisciplinary collaboration). ECRs felt that assessment on publication should also include monitoring implementation for progress (acceptance, online first) compared to only number of published papers.

Research environment

ECRs' work life has been impacted because of the pandemic, (especially for those with small children, and caring for wives on maternity leave), but not usually on scholarly communication attitudes or practices. They welcome Working from Home (WFH) because it saves time travelling time to work. Women ECRs seem to be happy WFH compared to men (men prefer a more-structured work environment), the former most probably can tolerate ordinary distractions. ECRs work

remotely entirely, and believe that they spend more time (and too much screen time) and face bigger workload, especially for those who have bigger classes and non-conventional class instruction (e. g design studios, programming labs, experiments). Having a designated office setup at home, has helped them, especially the men, to maintain focus. Mentoring either continued or lessened, in either cases ECRs mentioned that not much institutional support on mentoring, and lack of interpersonal support from mentors during the pandemic. ECRs seem to value career advice and connection to "mentors' network. ECRs highly value peer support /influential peers to deal with the work challenges. The more experienced ECRs do not mind helping one another to secure permanence and confirmation of an academic post. It is established that ECRs do not adopt the reputation-building practices of their mentors and heads of groups to which they belong.

Research work practices

Research responsibilities do not disappear in the pandemic. WFH actually makes ECRs better at some tasks e.g., working on grant applications, and writing, and worse at others e.g., peer-reviewing and presenting at conferences. Those at the stage of data collection through field work (that involve site visits, observations) and lab work are tremendously affected. Abandoned experiments have to be started again after the first Movement Control Order (MCO). Social-distancing restricts the number of people who can be in a lab space at the same time, this requires careful planning and slows research productivity. MCO 2.0 allows them to only come to the lab once a week. ECRs value live communication greatly. I.E., meeting face-to-face. Still using e-mails, but there is a high tendency to use Zoom, Google Meet. MS Teams for virtual meetings with colleagues and collaborators to update them about their research projects and provide opportunity for informal feedback. They however acknowledged that these tools provides fewer convenient opportunities to network or socialize during meetings / discussions. They are maintaining social ties using WhatsApp (most mentioned) and Telegram.

Research productivity

ECRs felt this is a time to be extremely productive, although not everybody achieves that. A few confessed that their goal is to publish more (than required) in 2021 to get permanent or confirmed, or even promoted earlier. Those with family/carer responsibilities confessed experiencing drops in self-perceived productivity. ECRs who currently have more time on their hands because inability to perform experiment and field work, upskill and seek out online learning for academic development and author education. There are a few unique cases where very productive ECRs have been seen as a threat to their senior collages!

Information discovery, usage and evaluation

Every ECR reported using Google Scholar (and PubMed for health sciences) as the key discovery services, which lead them to publishers' platform or repositories that offer open access articles. They also search Scopus and Web of Science databases, and library

databases for full-texts. In cases where they desperately need the full-text, some ECRs will do one of the following:

1. E-mail the corresponding author and ask for the paper
2. Ask help from colleagues elsewhere (especially abroad) who might have the article under their library's subscription.
3. Search the papers on Sci-Hub (rare case).

They are spending more time on their electronic devices (laptop, computer tablet and smartphone) for scholarly purposes, to locate, and communicate information. Many acknowledged they have been reading full text papers on smartphones more since the pandemic. There is a clear distinction between those who read on their smartphones and those who do not: the former felt that they can take their reading with them everywhere they go (a few have the habit of reading before they go to sleep); the latter felt the smartphone is too small for serious reading, where they have to comprehend the text. ECRs do not use informally disseminated communications, those who do read blogs and posters use them only when they originate from trusted authors and organizations. In general, they appreciate the support and services from the library, although they do not use the library as the first or main source of information.

Research dissemination / publishing

Not much difference in reading and publishing, authorship - publishing criteria remain the same i.e., in WoS or Scopus-indexed journals. They rely on quantifiable metrics to determine where to publish - their wish list is Q1 and Q2 journals in both indices. They are also subject to an authorship policy regarding the authorship order. They see social media platforms and applications as useful for research, reputational and networking purposes. ResearchGate although used, is not populated, for the reason that they do not have solid research output to show. Informal communication is conducted through Facebook and Instagram, very few used YouTube, Twitter appears to be of little importance, no one mentioned Tik Tok, and all this need further investigation in following interviews.

Open access publishing

ECRs appreciate the benefits of OA publishing, however they only publish in APC-based journals because of the publication speed that can help them achieve their KPI. Publishing in gold journals is strictly in Q1 and Q2 of WoS, because of the funding / availability of Page Charges from the university exclusively for these journals. Social science ECRs prefer however to publish in more affordable universal open access journals, and make sure these are also indexed in trusted databases or by indexing agencies. ECRs do not post their pre-prints in either a pre-print server or an institutional / subject repository, seems that they only want to see their papers end up in journals because they are subject to university and funder policies that specify the publishing venues of their research.

Open data

Although ECRs informally share their data (with colleagues, students), they will formally share only if mandatory. Those who are in favour of data sharing are willing to do it because they understand its value - reproducibility and good science. Data (code) sharing is a practice among the computer scientists. The excuses for not sharing data are rooted in ECRs' discomfort over possible misuse of their data and losing credit for their work.

Peer review

More confident in peer review and acknowledged learning themselves by peer reviewing others' work. Have started to talk about peer review activities as important to develop scientific careers (build connection with editors) and build reputation on Publon. Still prefer double blind, and majority not experienced OPR either as author or reviewer.

Sharing and collaborating

Mainly remote collaboration and consider/value interdisciplinary collaboration. They felt that it is very necessary for them to continue to foster ongoing collaborations using virtual platforms. Although they missed the in-person environment of a laboratory or field-work, they are optimistic that digital interactions can support collaborative research productivity (especially in writing and grant application). So far, no one mentioned "missing conferences", most probably untenured ECRs in general are not entitled for travel grants from their institutions except if this is being incorporated in the research funding. They seem very comfortable participating in free webinars, and virtual conferences that charge minimal fees.

Reputation building

ECRs view the number of papers, the JIF, citation and h-index as a reflection of scientific achievements. The more experienced ECRs grow their research portfolio, especially though their research performance - they monitoring (and updating) digital presence using Publons, LinkedIn, and ResearchGate, because they have time to do so during the MCO. Most ECRs have taken small steps in building reputation on social media through LinkedIn and Facebook, even Instagram. Most of them announce their publications on Facebook. Science ECRs with more publishing experience (more papers in top journals) highlight their research to the general public (they used the term "science communication"). No mention of Twitter for brand-building though.

Outreach

Although they are not expected to communicate their research with the general public, decision makers and practitioners, they do recognize that outreach is essential for making research impact beyond academia. Currently, ECRs talked about outreach in the form of making their research comprehensible to others through social media. A few felt that it is the job of the outreach officer, and more established researchers because the latter would have more solid output that they can show to the public. Those who have experienced

doing outreach activities felt that it is equally important for everyone in the research team or at every stage of their research career, to be reaching out to public.

Library

ECRs appreciate the online journals and subscription databases, they were not happy about libraries cancelling subscriptions. None specifically mentioned the kinds of help they seek from the library. No one mentioned request for print materials. A few thought that the librarians could do more outreach during the pandemic, apart from just hosting webinars on behalf of publishers.

Harbinger -1

3 ECRs, females and carers. All are active authors in 2020 and two of them have achieved the university's requirement for Associate Professorship. Scholarly practices and attitudes do not change that much - still prize publishing in formal venues and open access journals are targeted to achieve their yearly KPI.

5.0 Poland

In understanding the Polish data, you need to take into account two things: a) the system is traditional and State directed. Professors (full professors and university professors) are very influential and determine everything for ECRs. They preserve the system in their own image. Some ECRs appear to be research apprentices; b) the ECR population in this study is mainly young, junior and inexperienced. However, there are some more experienced respondents who are close to Habilitation - no longer compulsory in Poland from 2018, but still desired by top researchers. These factors meant that in the interviews ECRs are less courageous, are kind of reconciled to the scientific career ladder in Poland (PhD-Habilitation/not obligatory/-Professor of university–Full Professor) and do not engage as they did in other countries. Polish ECRs are simply pragmatic and believe that the system of scientific communication will not change until the system of evaluation of scientists changes.

- In general, a limited impact of the pandemic on the research was observed amongst the Polish ECRs with some exceptions, e.g., one from medical sciences, second from environmental sciences, who had to stop their experiments.
- During the pandemic, Polish universities switched completely to remote working, both research and teaching. The most frequently used platform among the ECRs was Microsoft Teams.
- ECRs appreciate face to face communication, but are very comfortable with online communication that is virtual conferences, meetings and seminars at the local, national and international level as well as online teaching. They have accounts on social media platforms RG and Academia although they're not too heavily involved in them. They use FB, LinkedIn, very rarely Twitter. Generally speaking, the pandemic has not blocked scientific communication.
- The Polish respondents prefer to use social media platforms RG, Academia and other for scholarly purpose via computers, laptops, not smartphones. They do not read scientific full texts on smartphones, probably because of all the time during the pandemic spent at their laptops, where they taught students every day as well as participated in online scientific meetings. They associate the smartphone not so much with professional use as with private use and leisure time.
- Everyone has been affected by the restriction of no international travel for internships and conferences. Some see it as a barrier, but there are also those who like it, such as ECRs with children.
- The pandemic has not affected them more than their older and senior colleagues due to the general working conditions at Polish universities (the relationship between full-time positions at universities and teaching hours); despite of the hierarchy associated with degrees and titles: PhD-Habilitation (not obligatory)-Professor of university–Full Professor it happens that young researchers get their second contract of indefinite duration (the first one is temporary). However, some respondents

believe that they have more knowledge in IT than their senior colleagues and that gives them an important edge.

- The double-blind review system is very popular in Poland; not so keen on open reviews.
- ECRs do not place their articles in institutional repositories, maybe because some universities in Poland do not have their own repositories, including UWM in Olsztyn (majority of the Polish respondents). However, all universities keep bibliographic databases of publications of their employees.
- Polish universities are still in the process of developing open access policies, e.g., UWM in Olsztyn, where most of the respondents come from. For now, the university has received a grant called the Regional Initiative of Excellence, which includes funds for open access.
- Polish ECRs are open to OA, appreciate this trend, have some resources (see above) for paid publications, but the OA factor is not more important than IF/points. The presence of the journal on the Polish ministerial list (journals indexed in Wos/Scopus/Erih+ and Polish journals) and the points assigned to it are crucial. Researchers in Poland are assessed on the basis of a ministerial list of publications and credits for articles and books/monographs, not on the basis of altmetrics or even citations.
- Social media. Most have accounts on RG as well as Academia.edu, upload their articles, but they rather not use them actively, do not care about their indicators and do not attach as much importance to them as to the points gained by publishing in journals from the minister's list. And this is due to the employee evaluation system at Polish universities, where altmetric indicators are not taken into account
- Twitter is not popular among the Polish ECRs.
- Polish respondents try to develop international cooperation, have joint publications with foreign researchers in good international journals. What is characteristic is cooperation is often not financed from grants, possible in topics that do not require large financial outlays. They use mostly email to communicate, but some also mentioned Google Meets, Skype, Webex, and Slack.

Harbingers1. Five respondents are still being monitored; their status has not changed significantly, but two of them are very close to defending their doctoral thesis, the other three, who already had their doctorates, have accumulated a large body of publications for Habilitation.

6.0 Russia

1. ECRs on the whole say the pandemic has had a limited impact on their research. However, there are exceptions and they are researchers from medical sciences and human-related fields where restrictions in the number of participants/subjects made it more difficult to organise experiments/fieldwork and as a consequence delayed or made it difficult to accomplish.
2. Pandemic-induced problems arose in regard to delays in material deliveries, working remotely more, greater reliance on online communication and restrictions on travel.
3. ECRs believe that the pandemic affected their senior colleagues more than themselves due to the fact that they have less knowledge in IT and online communication and they had to learn how to do it, especially in respect to teaching
4. ECRs value live communication greatly. Face-to-face conversation/conferences are the main channel for collaborations and research communication. A clear benefit is that ECRs are able to participate in online international conferences, which they would not have been able to attend if they had to attend in person.
5. For most ECRs open access journals and publishing platforms are no replacement for traditional journals. Cost is an issue.
6. ResearchGate and similar scholarly social platforms tend to be used by more experienced ECRs.
7. ECRs adopt the reputation-building practices of their mentors and heads of groups to which they belong. They show no sign of departing from the traditional.
8. Twitter appears to be little used Russian ECRs but this needs further investigation.
9. New ways of informal communication and connecting to the general public and other researchers are emerging in the form of such services as Ted, Science Slam, Pecha-Kucha. Science slam is a scientific talk where scientists present their own scientific research work in a given time frame - usually 10 minutes - in front of a non-expert audience. The focus lies on teaching current science to a diverse audience in an entertaining way. The presentation is judged by the audience. A science slam is a form of science communication. TED Conferences LLC (Technology, Entertainment, Design) is an American media organization that posts talks online for free distribution under the slogan "ideas worth spreading". PechaKucha Night is a storytelling format where a presenter shows 20 slides for 20 seconds of commentary each (6 minutes and 40 seconds total). At a PechaKucha Night, individuals gather at a venue to share personal presentations
10. ECRs share their results and tell them about their research to young generation: from kids to students. It is a way of working with an audience, getting familiar with future researchers. Such laboratory excursions, meetings, and lecturers are in line with the values of open science and the promotion of scientific information for the general public.

11. Researchers with remote work experience, as well as working with international colleagues, make the assumption that the future of scientific communication and research belongs to research teams, where participants are located in different cities and countries. This is facilitated by the development of services such as Zoom and Google drive. There is also an assumption that the pandemic contributed to the development of such teams, an increase in their number, since it showed that it is possible to work remotely not only in the IT field, but also in science and education. For the research team, this removes the question of searching for participants with certain competencies: if you used to look for them in your city, now you can search around the globe. For a research project, this allows you to immediately go international.

12. Some ECRs see the future of scholarly communications as incorporating such informal methods of communication as TikTok or YouTube. For example, scholarly communication would be simplified, moved to a video formats, evaluated by likes, reposts and views.

7.0 Spain

1. **Resource impact**. ECRs had not experienced many changes in their attitudes and practices regarding scientific communication, but they fear that the resources dedicated to the pandemic imply that there will be less money dedicated to research generally: less projects and less positions for them to remain in research.

2. **Playing the research game**. In most cases the research of Spanish ECRs is not connected with pandemic, but if they have the possibility they try to, somehow, introduce pandemic in their research to get around the above, to take advantage of future projects, have their papers well received by top journals and get them quickly reviewed.

3. **Research delayed.** Some ECRs have experienced considerable delays in their research because they could not work at their laboratory or conduct field research and thus carry out experiments, surveys etc. Pandemic-induced problems arose in regard to delays in laboratory material deliveries as well.

4. **There were some benefits**. Staying at home and not conducting experiments meant that they had the possibility of finishing papers that had been waiting for some time to be finished. During the hard months of confinement, they could send more papers for publishing than ever.

5. **No travelling for PhD researchers**. Pandemic-induced problems arose in regard to restrictions on travelling. Doctoral students complain that they could not go to research at foreign universities, which is compulsory for them and they cannot present their dissertation otherwise. They are worried.

6. **No face-to-face conferences.** Restrictions on travelling imply also the impossibility of attending face-to-face conferences, which makes it more difficult to establish new contacts for further collaboration. In the early stages of a research career obtaining collaborators is critically important to progression.

7. **The wholesale (and permanent?) switch to digital**. Because of pandemic ECRs rely wholly on online communication platforms for teaching and for communication between researchers. There are benefits that come with this switch: a) no time commuting; b) they permit the attendance of courses and conferences in other countries without the costs of travel and accommodation; c) a more frequent connection between researchers that work in different institutions is possible. They hope that those platforms will continue to be used in the future.

8. **ECRs are hit harder than their senior/tenured colleagues.** ECRs undertake a lot of teaching and, of course, a wholesale move to online teaching presents a lot of challenges and is very time intensive. However, in some respects it is easier for them to adapt to the new teaching environment than their senior colleagues

because the systems are more familiar to them and they have the necessary digital skills. What makes the ECRs' lot more difficult though is that they teach many more hours and teach all of the practical lessons where the real problems appear as students need more support there.

9. **Security.** Regarding job and personal security ECRs feel less secure. First, because they do not usually have a private space in which to work and have to share with other ECRs, share laboratories, too. Secondly, they worry about their future career as they do not have a tenured position and consider that the difficulties to get a position might be more difficult in the future.

10. **No changes to the assessment system**. It continues to be as hard, complex and unbending as ever. Success depends a lot on research performance, mainly on publications in high impact journals. Doctoral students need to publish a couple of papers before presenting their dissertation. After reaching a post-doctoral position they have to compete for the few junior positions that exist in research. At universities in order to climb to the next (temporary or tenured) position they need to meet the criteria of ANECA (National Evaluation Agency), where the assessment system takes into account a wide range of activities, but it considers as more relevant research activities (60-70%), particularly papers and mainly papers in high impact journals.

11. **Paper publishing is all for ECRs.** The assessment criteria outlined above are responsible for the obsession of ECRs with publishing in relevant journals and the importance that they give to traditional metrics: JIF and citations. When selecting outlets for publishing research ECRs consider IF, reputation and audience-fit first, more so than Open Access or speed of publication.

12. **Open access journals** are an interesting outlet if they have money from projects to pay for it, but they are not thought a priority. They will publish in them only if they are well ranked. However, ECRs are aware of the advantages of wider dissemination of their research, which comes with OA. Also, the enhanced visibility proffered and the greater sharing possibilities are also attractive features.

13. **The pre-eminence of journals.** They are not convinced that publishing in high IF journals is the best way for communicating research and establishing reputation. They would prefer to see a wider range of outputs involved. But they are constrained by the precarious nature of their position and the fact that they would clash with the one-dimensional assessment system. They feel safer toeing the line.

14. **Pre-prints (and peer review).** However, they don't think that a preprint can be an alternative to an article in a peer-reviewed journal. Although they see possibilities of improving the system (by upping speed of reviewing and introduction of double-blind) they think that the reviewing process is a necessary filter for science.

15. **Altmetrics**. Though wholly focussed on citation metrics for reasons above, they don´t consider relevant the use of altmetrics.

16. **SSNs**. Their use of scholarly social networks is generally not increasing although it seems that Twitter has obtained greater interest and use.

17. **Open Science practices:** sharing data, open peer review, open platforms, preprints etc. are not well known and not frequently practiced. They are not keen on using institutional repositories, will share their research in SSNs when it is published, not before because of competition, which is increasing.

18. **Discovery and access**. Preferences for discovery and access have not changed with regards to Harbingers1: PubMed, WoS, Scopus, Google, Google Scholar and ResearchGate continue their popularity. Reputation of both journal and authors are the main selecting factors when choosing what to use.

19. **Author policy**. There is generally not a written author policy in existence, but practices are well established in the case of scientists and less clear in the case of social scientists.

20. **Reputation building**. In general, ECRs adopt the reputation-building practices of their mentors, but they are very keen about disseminating and communicating their research to the general public. They consider it important and will make a greater effort if they have support and get recognition for these activities. They seem very convinced about the need of involve citizens in research, but they don't practice this much.

21. **Future**. They see the future of scholarly communication as a system that recognises and permits informal ways of communicating research as well as the traditional one using journals of repute. They see its future as an open system without barriers to information and that involves society in research. But a substantial change in the assessment system is need to permit a different scholarly communication system.

22. **Library**. Their view is that the only role for the library is to provide access to contents that are still behind pay walls.

23. **Harbingers1**. The 5 ECRs still monitored haven't progressed much. No one has got a tenured position. However, only one researcher was at the point of applying for another temporary position and was worried. The rest of them (two abroad and another two at universities were more or less comfortable in their position and they can see a future ahead).

8.0 UK

1.   Nature of the cohort and implications for the analysis

The gender division is 17 F and 7 M and there is not any obvious distinction between their attitudes and practices. The touchstone might have been dependents, but the two men with children at school took most of the responsibility of looking after them at home when schools shut.

If we look at the composition of the cohort in terms of how they came to be invited, we find significant differences from the cohort interviewed in 2016 in the Harbingers-1 study. Almost half the 2021 cohort were invited to take part via publicity from Sense about Science (Voice of Young Scientists = VoYs) whereas over half of the 2016 cohort had come via large commercial publishers including 8 from Elsevier. Only five of the 2016 cohort were available again in 2021 and of this 5 only one did not come from an invite provided by a large commercial company but they obviously were part of a minority Might any distinctive difference between the attitudes and practices demonstrated in 2021 and those found in 2016 be at least in part a product of the different origins of the cohorts?

VoYs has a commitment to improving the quality of public discussion about science and they are particularly interested in peer review but they do not have any "political" message for their membership. When the big commercial publishers kept lists of ECRs willing to be questioned about matters of mutual interest the point of keeping such lists was not for brainwashing but to find out what they thought would help them (the publishers) understand what an important part of their audience of authors thought and wanted

One answer to a question about the role of publishers (see section 19 below) suggests that the ECRs were capable of making up their own minds.

There is another way of looking at the formation of the cohort which might be useful.

An important division is between older ECRs usually post doctorals and younger ECRs still working towards a doctorate. At a guess, the mean age of the former group is 34 and the mean age is 25 for the latter group. It will be worth working out what this means in terms of attitudes and practices. The younger group were more reluctant to answer some of the more general question reasonably on the basis that they did not know enough about how the scholarly communication system worked.

There were very few who did not fit into two groups neatly and a quick count suggests that half were older and half were younger ECRs. Equivalents of the PhD candidates of mature age noticeable in H1 were not taking part in H2

As mentioned above, among the older group were 5 H1 originals. Four of these had moved into assistant professor equivalents – a new job with (in three cases) their own group).

The fifth ECR in this category has decided not to look for a job as a lecturer because she found the flexibility of working on soft money appealing without interference from teaching or administrative commitments. Clearly these ECRs had a different level of experience from the majority of the others.

2.   Pandemic impact

There are two ways of looking at the impact of the pandemic. Firstly, the ECRs were asked whether the pandemic has interfered with the progress of the progress of their research and perhaps their career?

ECRs calculated how much time they had lost because of the pandemic in various ways. Sometimes, it was three months and sometimes six. It depended how close you were to submitting when the curtain fell. Most of them had either obtained the extension required or expected to get it.

The big problem as presented was usually not being able to get into their place of work. This was particularly galling if the ECR was engaged in field work or in laboratory work as an important part of the evidence which they would interpret in their dissertation had holes in it. This might be a matter of all their mice dying or chemicals needed but not arriving or lack of access to a powerful machine or not being able to interview directly face to face. Such problems as described might seem for the outsider to be catastrophic, but by the time they were interviewed almost all the interviewees have found work-arounds and were remarkably calm. No-one was giving up. OK the dissertation might be a little thinner but they stuck to it.

A lesser, but still pressing, concern was not being able to travel to a collaborator in another country who was going to show a particular technique etc. One senior ECR and some others were exercised by the fact that some other countries in Europe had been locked down less than we had been and so had been able to do more research. Their dissertation for a PhD or an important paper was less substantial than an assumed rival for posts. Several ECRs who were moving into a new university were not able to move house yet (permission given) or/and were not able to visit their new employer. This was perceived as creating problems – for example getting IT to do what you wanted when you had never met them.

Secondly, the ECRs were asked if the pandemic has impacted directly (causal) on trends in scholarly communication or, maybe indirectly, in that the disturbance caused by the pandemic stimulated thinking about how the system ought to work. There were a lot of these questions often tacked on to other factual questions. The ECRs resisted these questions and when pressed were usually unwilling to suggest direct agency though they were more willing to accept indirect stimulus leading to change.

3. Working remotely from home

Seeing an ECR in their home environment was rather a sad experience. They did look very isolated from other humans, but they were bearing up bravely.

They often had quite a lot to analyse, and it is, indeed, the case that some ECRs have found advantages in working from home, such as the ability to do writing, but overall position is a negative one and there is a whole list of reasons why they miss being at their place of work. It is not just a matter of being able to use laboratories, it is also the loss of contact with colleagues and all the stimulus they get from face-to-face discussions, especially what they do not call any longer the water cooler experience i.e., casual interaction. Several ECRS who had intended to do face to face interviewing learnt to do interviewing by zoom and some learnt programming so that they could do the analysis from home. It was noticeable that such ECRs as soon as they were about to be locked down were ingenious in preparing themselves to work at home. Obviously, those who were handicapped by children at home were more likely to be fed up, but some saw as a benefit the ability to spend time with their spouse and children. One senior researcher rebuked us for concentrating on looking after dependents as a main problem under lockdown thus minimising mental stress – she was possibly thinking of her own situation.

4. Impact on seniors

Most ECRs were willing to answer this question – a few of the less experienced ones claimed they did not know – and a small majority felt that the seniors were more pressed than the ECRs because of the huge increased administration and teaching load, plus children at home that they were carrying. The large minority felt that the ECRs because of their precarious position (not tenured) were worse off and (related) the fact that they were running behind on their research was much more a problem for them.

5. Security

The majority of ECRs did not feel less secure than they had before the pandemic. This was the case even when the ECR seemed to be having a bad time. Several ECRs said that they felt more secure because the grant was the longest that they had ever had, and others were happy to feel secure until they got their doctorate (apparently) not looking any further ahead. Of course, this was a reasonable attitude for those who were able to look forward to moving a step up the ladder at the time of interviewing (probably as many as five), but there were others who felt confident that they were wanted in the future because of the expertise or knowledge they had built up. Their supervisor or PI had told them this. At the same time, this did not mean that they were not unaware of the likely decline in the number of project grants or job being available in their disciplines or sub-disciplines. Few thought in terms of having to change the main thrust of their work. Some had however come to see themselves no longer as representing as a different sort of asset, not so much because of their particular area of knowledge, but rather because of specialised techniques or skills they had or had acquired - to give one example being an expert in the programming language R.

There were few complaints about the quality of mentoring and some very positive remarks about their mentors. It was not always the designated mentors who were doing

the support job but it might be one of the supervisors. Almost all of them had someone to turn to and likewise there were few complaints about unfair assessments.

6. Career plans.

The majority of ECRs continued to aim for an academic career. Not all saw it a research career, which could be in industry, but when pressed they accepted that they would prefer a university position. There was a little hesitancy in seeing the career ladder as inevitable, but industry did not seem to them any more secure. Despite the various press suggestions that a by-product of the pandemic has been a loss of status for the ECRs none of them felt undervalued though some felt overworked.

A few saw ways of making their work fit in with COVID related grants, but they were very much a minority. None of them were keen on striking out in new directions.

Some were put off because the mess-up made by their universities and others because of the stress senior colleagues seemed to be under trying to get grants, but these were definitely a minority. Rather surprisingly none of the social scientists really wanted to get into government or related jobs.

There were at least three who claimed to wish to work on soft money. They did not wish to be tied down by teaching or administration and they were willing to go for a research only post on the academic ladder. The three referred to had at one time expected to climb the ladder in the "normal" way but had now realised that special skills, for example in computer modelling, meant that they were going to be always wanted as part of a team's grant application.

7. Conferences

ECRs missed face-to-face conference and almost all found that virtual conferences did not enable networking to the same degree, but there were compensations in that ECRs were able to get to a lot more meetings and so learn about more research they would like to hear about. This was also true of departmental seminars and workshops where distinguished speakers were willing to come in circumstances which would not happen if they had had to travel. Ideally, hybrid conferences might be the answer in the future, but no-one had experienced one that worked optimally. ECRs considered that a poster was one of the best ways of exposing their work before a publication and at the same time finding out how others in the same field were progressing. Face -to-face meant that you could interact properly, and probe others (aims, methodology and conclusions) and they could to the same to you. There were some interesting perceptions about the role of the poster and what standing beside one at a key conference meant for them – a rite of passage almost which they would not now have. Only a few found the networking areas now provided as part of the more sophisticated platforms any use at all.

8. Reputation

Not all ECRs were able to distinguish between Reputation and Visibility. The question proved difficult. Maybe in future try out a definition of reputation on them?

When it came to the crunch most ECRs believed that publishing in journals with an impact factor was the best way of gaining a reputation. Few of them used the H index mostly because they did not have enough publications to make it worthwhile (or impressive). Some had never heard of it. Even when an H index might seem worth exhibiting on their CVs almost none did this, but some did say that they might provide citations should this be worth doing- an article with enough citations to stand out.

When it comes to where they had published there did not seem in practice to be so much pressure on them to go for high IF or high prestige as there had been in H1. At the same time there were more OA journals mentioned than they would have been in the earlier project. [There is scope for an analysis here comparing their publications (those with enough to make it worthwhile) with where they said they would be submitting according to the ranking of criteria.]

One thing is clear. None of them thought that downloads or altmetrics has anything to do with reputation.

On the other hand, Q2.6 in the IS was answered by most of them very positively and some of them mentioned that DORA was being taken seriously at their university – not the majority, but a significant number. In principle they approved the initiative.

9.   Role of journal

All the ECRs saw the journal article as the optimal way of exposing their research – there was no change here from 4 years back. Blogs and other forms of informal communication were complementary mostly in the sense that they were a way of pointing to the publication. ECRs were introduced to the Open Research Platforms. Few has even heard of them before and none had thought about them as alternatives to traditional journals, but now they looked at a site and partly because the funders promoting them were funders they were well aware of, they were interested. At least one of the ECRs said that if use of these platforms were mandated it was the only way to break the hold of the traditional journals, which were so embedded in the scholarly communication process.

10. Peer review

There was a lot of difference in experience between the older group and the younger group. The latter were only just beginning to publish papers, never mind responding to reviewer comments or doing peer review themselves. This did now however stop the younger group from having views because a number had been to VoYs workshops. There was a dilemma confronting them in the two proposals we put to there as potentially improving peer review. They represented different and to some extent contradictory solutions – open and frightening or suppressing information and avoiding bias. Rather fewer than would have expected had been to VoYs workshops. Indeed, very few had received any sort of training even from their supervisors or PIs. It is therefore not so

surprising that no alternative improvements in the peer review process, e.g., collaborative peer reviewing were offered as advocated by progressive OA companies such as PLOS or Elife.

What was striking among H1 ECRs was the belief that everything was decided by the editor-in-chief (the important figure) and the publisher could be ignored. Under H2 there was no interest shown in even who the editor was – no belief that it was a good idea to have contact with the editor or editorial board. What did remain however was the idea that the reviewers were badly chosen and biased – an explanation for rejection.

11.   Open access

All ECRs believed in open access, but none were happy with having to pay to publish even if they had the funder money behind them. The link between high APCs and the number of rejections had not occurred to any of the ECRs. As has already been mentioned publishing in an OA journal or in a hybrid was normal and often a group or funder demand. It was a "where possible" situation because the money had to be available. Oddly many ECRs did not really seemed to know where the money for APCs was coming from and if pressed, they assumed the university whereas it was probably the funder. It could be argued that this is not the sort of thing you can expect an ECR to know. It is rather the province of the supervisor or the PI. The H2 ECRs seemed on the whole to be less aware of the way funding and publishing worked than was the case among the H1 contingent but in the UK the H1 cohort were rather more experienced with fewer doctoral candidates than was the case in H2.

12. Open science

Most ECRs saw OS as important. Reproducibility was frequently referred to. Most ECRs were keen on making their data freely available, but with a strong contingent from medicine and psychology it was not possible to make "raw" data available. Few of the ECRs have cottoned on to the fact that OS demanded open processes as well as open outputs. Whether data should be recognised as a separate output from the journal was set against the idea that data should be closely associated with the article which was using it as evidence. Quite a few ECRs were also producing software. This usually ended up in GitHub. The question asking what they were doing to be as open as possible did not get much traction. The usual answer was that the methodology should be clearly presented and that this was enough.

13. Visibility

ECRs understood the need to make themselves visible. They responded well to questions about the use of ResearchGate and Twitter

14   Scholarly social platforms

ResearchGate seemed much less used than in H1. There was much less effort to be up to date in the profile and when ECRs were thinking of jobs LINKED-IN was more popular. A

few looked at questions and answers, but none asked questions, and none sought collaborators. Facebook was for personal use only and Academia was not mentioned even among the soft social sciences. Generally, the use of Twitter was the big change, but it was rarely ascribed to the pandemic. Increased use or even use for the first time was often quite recent, but pre-pandemic.

15. Twitter

As a generalisation the use of Twitter was the big change, but it was rarely ascribed to the pandemic. Increased use or even use for the first time was often quite recent but pre-pandemic. Twitter was the best way of building up a following among people in the same field and a tweet was the best way of announcing by a link a new publication. Certainly, the use of twitter was becoming a basic way of communication and it was likely to continue

16. Sharing

It was surprising quite how many ECRs did not consider that sharing early results or ideas was dangerous to their careers. The mantra seemed to be that for the majority sharing was a positive and that feedback from sharing was an advantage to the sharer. Not many were worried about the loss of competitive edge and, when they did, they quoted an older supervisor or PI in justification. There is a good reason for separating Collaboration from Sharing. However, sharing with collaborators was seen as normal as sharing with people in the same group

17. Data

We can make full sense of answers about data until we have some agreed definitions. We know (because we are in this situation along with medical scientists and other social scientists) that we cannot share "raw data" but what can be shared in the way that physical and life scientists can share? There was a clear division between those ECRs who considered that data was a separate output and others who considered that data belonged with article which interpreted it. Serious analysis of this division needs to be undertaken when the ECRs were in the same sub-discipline.

18. Outreach

ECRs were positive to the idea of outreach, but not all of them ticked the boxes for reaching out to the different audiences. Surprisingly, not all ECRs recognised that they should write in such a way that other scientists could understand their message. Medical ECRs were well aware of the importance of reaching the clinicians and sometimes the patients whereas physical sciences showed some interest in industry though not that much. Not all ECRs have anything to offer to the general public but they were not worried about the idea of reaching out to a wider audience.

19   Attitudes to publishers

In 2016 PLOS One was one of the few journals mentioned by name but Elsevier was frequently criticised (by name). In 2021 Nature was regularly mentioned and usually critically because of the costs of their APCs. When there was an opportunity to compare small "mission-led" organisations with large commercial houses such as Elsevier, no one took advantage of this opportunity to criticise the big players by name. The big publishers seem not be the baddies anymore. There was another question about the future role of publishers in the last section of the interview schedule under the general heading of Transformations: again, there were similar views expressed.

20.   Attitudes to libraries

Although ECRs are quite well disposed to libraries and a few have had help with searching, they mostly do not see them as relevant to their research and they think of them as being there for students and for buying books. If anything, there is less interest in libraries even than in 2016.

21.   Preprints

Many of the ECRs did not yet know of places for preprints in their disciplines even when such exists but not surprisingly medical and life scientists were very aware of the new preprint servers in their disciplines. They all recognised the usefulness of getting feedback from posting a preprint (comments would usually come through twitter interactions). However, no-one saw preprints as replacing journal articles. Most ECRs argued for preprints both as a way of establishing their ownership as much as being able to get feedback.

9.0 US

Research related to pandemic
For many ECRs respondents, research was not directly involved with the pandemic. Those who had research projects related to the pandemic benefited primarily from new grant funding and new research projects that would not have happened without the pandemic. Other examples of benefits include Covid-related manuscripts were being reviewed faster and more time to strengthen connections with other collaborators.

Impact on research not related to the pandemic
ECRs working on non-pandemic projects tended to experience both positive and negative impacts. One positive was being more productive (such as more papers and funding proposals written). Another positive example includes the ease of scheduling meetings with human subjects for data collection and expanding research beyond local populations due to remote conferencing.

Those ECRs working in laboratories experienced a variety of negatives. Most laboratories shut down causing reduction in productivity and additional costs. But when labs reopened, there was usually a limit to the number of people permitted in the lab at one time. And if someone got sick, labs had a requirement to be tested before returning. Changes were needed where human subjects were involved such as limiting the subjects to 15 minutes in the lab. Lab supply chain problems were also mentioned. Field work was canceled.

Other negatives include more emails and meetings and not being at full mental sharpness. Recruiting both students and human subjects became more difficult. Some ECRs had to spend more time on teaching due to adjusting to online formats, so reducing research time.

Future funding and research direction
Generally, ECRs' outlooks for future research funding tended to be somewhat more difficult and the pandemic did not lead to any significant changes in the direction of their research.

Pandemic-led re-organization in work
Several mentioned there had been pandemic-related re-organizations related to teaching, research, and administrative changes. But the changes did not cause an many complaints about being overworked or undervalued. Of course, there were there those instances of feeling overworked. Some examples were changes needed for reorganizing human subject research, time spent on online teaching, keeping people motivated and on track, creative energy spent on academic identity visibility due to no conference networking, and even service work related to the student body was mentioned. Most did not think they were overworked or undervalued.

Remote work: Advantageous or disadvantageous?

ECRs experienced both advantages and disadvantages to remote working (and often both were mentioned by the same ECR).

Advantages:

- More flexibility and time to work on research due to not commuting and teaching asynchronous.
- Easier to meet with collaborators outside the university.
- More comfortable collaborating online with other researchers.
- Connecting more with non-academics (a group important to the research) due to more people being more comfortable with Zoom.
- Some students got more immersed in the literature due to not having to juggle experiments.
- The pandemic hit at the time an ECR needed to write about the research rather than collecting data. Had the pandemic hit two years prior, the impact would have been much more severe.

Disadvantages:

- Little-to-no networking for new collaborations.
- Not as likely to share ideas with others.
- Too many meetings.
- Lab research is the primary work and people are not doing many experiments.
- Chaotic home life and lack of focus if ECRs had children
- No work-life balance.

Security

Regarding security in their professions, several ECRs expressed they felt about the same as before the pandemic. Examples from some who felt less secure includes having difficulty with managing lab funding, getting momentum rebuilt for publishing, and lack of possible lab postdoc positions. Considering the pandemic's impact on ECRs employment as compared with their senior or tenured colleagues, ECRs tended to see themselves impacted more or the same.

Assessment

ECRs mentioned several criteria used in their assessments. In general, research, teaching, and service are the three primary categories. By far, the most important was research, which can be subdivided into publications and awarded grant dollars/external funding, and also mentioned was citation record/impact factor. Teaching tended to be mostly student evaluations, though number of courses and student success was also mentioned. Some other mentions included letters from professors in same field from peer institutions and contribution and collaborative work. Most ECRs saw no change in the assessment criteria.

Collaboration

Generally, there tended to be more expression of weakened collaboration related to the pandemic. However, as with other positive/negative-type questions, there were several instances where two different experiences were mentioned. Examples of some changes to collaborations include:

Loss of in-person face-to-face networking, formal engagements (e.g., group meetings, field work) and informal engagements (e.g., having coffee with someone or stopping by someone's office) tended to be the most mentioned collaboration weaknesses, which included conferences and periodic meetings with colleagues and collaborators at either the same institution or at other institutions. Less often were the mentions of strengthening collaborations. Some mentioned new collaborations being made during the pandemic both in the United States and abroad. Improved technology (and Zoom in particular) was mentioned as a collaboration strengthening factor. And though virtual conferences received contempt from some ECRs, there were some who believed presenting at a virtual conference was a possible strengthening event due to the potential for more possible collaborators hearing about the research.

When asked about the potential to lose their completive edge from collaborations and sharing outside of their research group, most participants did not believe there was a loss. Some stated they benefited from such activities.

Career aims, progression and reputation

Most ECRs still aiming for a permanent academic career in a university or similar research organization or they were already in a tenure track position. The few who were not aiming for permanent academic career made that choice mostly to continue research work (at a university or other similar research organization) without the hassle of obtaining grant funding or the teaching requirement.

Most ECRs use at least some citation metrics to gauge academic impact. Some saw citation metrics as being an established, quick, and easy way to gauge impact. Some said citation metrics are important, but not necessarily the most important criterion to measure success.

Most ECRs agree obtaining and building visibility is as important as building reputation. The following are some examples of what ECRs considered outputs for achieving visibility: In-person conference presentations, well written journal articles, participating in professional organizations, talks with practitioners, posts/tweets about article on social media/Twitter, publishing in open access journals, updating their Google Scholar page, posting pre-prints, self-citations, participating in broader conferences outside specific discipline, meeting with seminar speakers, participating in grant panels, and keeping up with career contacts. One ECR made an interesting distinction between visibility (as with Twitter) and 'credible' visibility (as with presentations at conferences).

Several ECRs suggested the pandemic changed their visibility efforts. On the positive side, some examples include more time to check social media platforms and attending/participating in online journal clubs. On the negative side, some examples include loss of visibility due to canceled conferences, cannot attend conferences, cannot engage face-to-face, no dinners after seminars, and less talking with practitioners.

Most ECRs are sympathetic to improving ways in which scientific research output is evaluated by taking into account of openness and transparency factors. A few had made changes in their own practice, some of which include publishing in open access journals, showing all data points, inclusion of more statistical information, being more descriptive in the methods for replication, placing negative results on BioRxiv. Most of these ECRs do not believe the pandemic has driven the changes.

General communication practices
Many ECRs use Google, Google Scholar, and PubMed for formal scholarly publications. Most ECRs did not make a distinction between 'search' and 'locate'. However, some did make the distinction with locating (or obtaining) articles. Some mentioned they located via Google Scholar, PubMed, Sci-Hub, and the university library. Almost no one mentioned going to the library first. A couple few mentioned Google or Google Scholar was much more efficient than having to 'click a bunch of times' before they can search the library system, while knowing they will still miss some relevant information if using a library database search. Most ECRs did not believe the pandemic made any difference in their habits.

Several ECRs search for early-stage/interim research results, data, or code. Some examples of locations mentioned include Google, Google Scholar, arXiv, bioRxiv, ChemRxiv, Twitter, LinkedIn, their group's data collection, government data, and private data from industry collaborators. And most did not believe the pandemic made any difference in their searching/locating habits.

Several ECRs used smartphones for searching but only occasionally reading full-text papers. A few were using smartphones more before the pandemic due to commuting, but less during the pandemic due to not commuting/being home more. Most were not using it more during the pandemic.