

Early career researchers in the pandemic-fashioned ‘new scholarly normality’: voices from the research frontline

David Nicholas; Eti Herman; Cherifa Boukacem-Zeghmouri; Antony Watkinson; David Sims; Blanca Rodríguez-Bravo; Marzena Świgoń; Abdullah Abrizah; Jie Xu; Galina Serbina; Hamid R. Jamali; Carol Tenopir; Suzie Allard

Nota: Este artículo se puede leer en español en:

<https://revista.profesionaldelainformacion.com/index.php/EPI/article/view/87122>

Recommended citation:

Nicholas, David; Herman, Eti; Boukacem-Zeghmouri, Chérifa; Watkinson, Anthony; Sims, David; Rodríguez-Bravo, Blanca; Świgoń, Marzena; Abrizah, Abdulah; Xu, Jie; Serbina, Galina; Jamali, Hamid R.; Tenopir, Carol; Allard, Suzie (2022). “Early career researchers in the pandemic-fashioned ‘new scholarly normality’: voices from the research frontline”. *Profesional de la información*, v. 31, n. 5, e310510.

<https://doi.org/10.3145/epi.2022.sep.10>

Article received on August 25th 2022

Approved on September 18th 2022



David Nicholas ✉

<https://orcid.org/0000-0001-8046-2835>

CIBER Research Ltd
Newbury, Berkshire, RG147RU, UK
dave.nicholas@ciber-research.com



Eti Herman

<https://orcid.org/0000-0001-8526-9081>

CIBER Research Ltd
Newbury, Berkshire, RG147RU, UK
eherman@univ.haifa.ac.il



Cherifa Boukacem-Zeghmouri

<https://orcid.org/0000-0002-0201-6159>

Université de Lyon
Departamento de Informática
69100 Villeurbanne, France
cherifa.boukacem-zeghmouri@univ-lyon1.fr



Antony Watkinson

<https://orcid.org/0000-0002-2317-6557>

CIBER Research Ltd
Newbury, Berkshire, RG147RU, UK
anthony.watkinson@btinternet.com



David Sims

<https://orcid.org/0000-0003-1916-5617>

University of Tennessee
School of Information Sciences
1345 Circle Park Drive, 423
Knoxville, Tennessee 37996-0341, USA
dsims7@utk.edu



Blanca Rodríguez-Bravo

<https://orcid.org/0000-0002-9476-7602>

Universidad de León
Área de Biblioteconomía y Documentación
Campus de Vegazana
24071 León, Spain
blanca.rodriguez@unileon.es



Marzena Świgoń

<https://orcid.org/0000-0003-3600-8349>

Uniwersytet Warmińsko-Mazurski
Wydział Humanistyczny
10-719 Olsztyn, Poland
marzena.swigon@uwm.edu.pl



Abdullah Abrizah

<https://orcid.org/0000-0002-8224-5268>

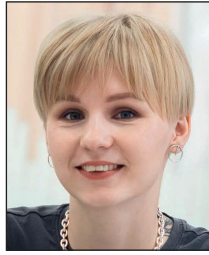
University of Malaya
Faculty of Arts and Social Sciences
Department of Library & Information Science
50603 Kuala Lumpur, Malaysia
abrizah@um.edu.my



Jie Xu

<https://orcid.org/0000-0002-9820-8066>

Wuhan University, School of Information Management
Hubei 430072, Wuhan, China
xuj@whu.edu.cn



Galina Serbina

<https://orcid.org/0000-0003-0196-6010>

Tomsk State University
TSU Research Library
Lenin st. 34a, 634050 Tomsk, Russia
serbina@lib.tsu.ru



Hamid R. Jamali

<https://orcid.org/0000-0003-1232-6473>

Charles Sturt University
School of Information Studies
Locked Bag 588, Wagga Wagga
NSW 2678, Australia
h.jamali@gmail.com



Carol Tenopir

<https://orcid.org/0000-0002-9056-8251>

University of Tennessee
School of Information Sciences
1345 Circle Park Drive, 451
Knoxville, TN 37996-0341, USA
ctenopir@utk.edu



Suzie Allard

<https://orcid.org/0000-0001-9421-3848>

University of Tennessee
School of Information Sciences
1345 Circle Park Drive, 423
Knoxville, TN 37996-0341, USA
sallard@utk.edu

Abstract

After two-years of talking to around 170 early career science/social science researchers from China, France, Malaysia, Poland, Russia, Spain, UK and US about their work life and scholarly communications during the pandemic, the *Harbingers-2* project is in possession of a mountain of verbatim data. The purpose of this paper is to highlight the kinds of comments ECRs are raising, with a focus on those that provide a particular interesting and illuminating take on ECRs' experiences under difficult times. Comments, for instance, that might challenge the established order of things or that presage big changes down the line. The selection of comments presented here were made by the national interviewers shortly after the completion of the last of three rounds of interviews (two interviews in the case of Russia). The understandings, appreciations and suggestions thus raised by the ECRs are insightful and constructive, which is what we might have expected from this cohort who are very much at the forefront of the research enterprise and veritable research workhorses. Sixteen broad scholarly topics are represented by quotes/comments, with the main focus of the comments on a subset of these: research performance and assessment, scholarly communication transformations, networking and collaboration, social media and access to information/libraries, which suggests, perhaps, where the action, concerns and interest mainly lie.

Keywords

Research; Scholarly communication; Early career researchers; ECR; Pandemics; COVID-19; Harbingers project; Impacts; Pandemic consequences; Interviews; Resilience; Country differences; China; France; Malaysia; Poland; Russia; Spain; UK, United Kingdom; US; United States.

Funding

The paper comes from the *Harbingers-2* project: *Early career researchers and the pandemic*, funded by the Alfred P. Sloan Foundation (<http://www.sloan.org>).

1. Introduction

This paper constitutes a companion to the recently published paper on the impacts of the pandemic on early career researchers (Nicholas *et al.*, 2022). It is complementary in that it looks at the same data, but this time bottom-up rather than top-down. Thus, it is populated by quotes and paraphrases of individual ECRs, rather than the summations of individual national reviewers, focuses not so much on broad impacts as on the voices of individual ECRs, and it is organised by scholarly topic rather than by country. Taken together, the two papers provide a rounded picture of ECRs during the time of the pandemic.

For the 'impact' paper, we asked the national interviewers to tell us what they thought were the biggest and most long-lasting impacts of the pandemic on the basis of the reading of their own ECRs' findings. The main conclusion of this

comparative exercise, the biggest impact identified, was that the pandemic had fast-tracked researchers to a virtual and remotely-operated scholarly world, with all the advantages and disadvantages that this state of affairs entailed. As it can be argued that the impacts identified were thus rather widely trailed, we decided to take a bottom-up, more personal approach to the data, which would highlight more its topical individuality and help look for signs of change or interest at a more micro-level.

2. Aims and rationale

Seeking to round out the 'big' picture emerging from the aforementioned 'impacts' paper by presenting micro-level data, the national interviewers were tasked with identifying individual comments, which furnished an illuminating, different or interesting take on ECRs' work life and scholarly communications, and, perhaps, represented an attack on the ways things are currently undertaken by the junior research community. The overarching aim of the paper, then, is to provide an annotated, topic-based selection of the most insightful comments provided by ECRs when they were asked about their work-life and scholarly communications in pandemic-times. The secondary aim is to ground the findings of the 'impact' companion paper with empirical evidence.

3. Background

The *Harbingers-2* project constitutes a two-year extension [2020-2022] to the original, four-year [2016-2019], longitudinal *Harbingers-1* research project¹, which explored the working lives and scholarly communication attitudes/behaviour of 116 junior science and social science researchers in eight countries [China, France, Malaysia, Poland, Russia, Spain, UK and US]. *Harbingers-2* enabled the investigation to continue studying change at a time when the far-reaching effects of the pandemic seemed to have brought about unprecedented and sudden change in scholars' circumstances, too. In *Harbingers-2*, as well, the data are drawn from the aforementioned eight countries, but this time covering more ECRs (177 at the start of the project) and strengthening the representation of disciplines in the pandemic frontline, such as medicine, economics and psychology. The project is coming to an end (October 2022) and the main data collection is complete with the third of three, repeat, semi-directed interviews of around 75-120 minutes in duration having been recently undertaken. The analysis of the mountain of data obtained in the interviews, whilst already underway, will take time, but the overarching impacts and themes emerging from the vast body of information that we have are already clear, as this paper will show on the basis of the voices of ECRs from all around the world.

4. Methodology and data analysis²

The findings reported here are based upon data arising from 3 rounds of repeat interviews, held at 6-monthly intervals over two years. ECRs were recruited by the eight national interviewers, utilizing their local networks and connections, with numbers supplemented by mail-outs from scholarly publisher lists. Each national interviewer was provided with a quota of interviewees in order to achieve representativeness from age, gender and subject point of view, and to ensure that the demographics of national samples are as similar as possible. The recruiting target was between 20 and 24 interviewees per country. The project began with 177 ECRs and finished with 167.

The interview schedule³ contained 54 questions, a mix of closed, open and hybrid ones, covering a wide range of topics: the impact of the pandemic on ECRs' job, status, career aims, assessment, research directions and working life, as well as their views of transformations yet to come in the scholarly enterprise. Essentially, it was an open-ended conversation, guided and punctuated by more direct questioning [i.e., semi-directed], conducted remotely over *Zoom* and similar platforms [because of the pandemic], typically in each ECR's national language. The interviews, 75-120 min in duration, were recorded, with the transcripts returned to ECRs to ensure agreement and to obtain further clarity. Following the ECRs' approval of the interview transcript, a summary was prepared by national interviewers and for this paper the quotes and/or paraphrases of the ECRs' responses entered in these summaries are utilized, occasionally also the observations or insights provided by the national interviewers. More details of the methodology can be found in the companion paper (Nicholas *et al.*, 2022) and on the project website:

<http://ciber-research.com/harbingers-2>

5. Literature review

The magnitude of the disruptive effects of the COVID-19 pandemic on the scholarly enterprise posed unprecedented challenges to early career researchers, as indicated by the extensive, literature-based exploration of their circumstances, published in this journal (Herman *et al.*, 2021), and by the recent update in the companion paper to this article (Nicholas *et al.*, 2022). Indeed, if ECR life has forever been fraught with the characteristic precarity that renders it a particularly trying experience, it became much more so in the critical days of the truly unparalleled uncertainty of the pandemic. It is perhaps not very surprising then to find that junior researchers,

“ The magnitude of the disruptive effects of the COVID-19 pandemic on the scholarly enterprise posed unprecedented challenges to early career researchers. If their life has forever been fraught with the characteristic precarity that renders it a particularly trying experience, it became much more so in the critical days of the truly unparalleled uncertainty of the pandemic ”

having been somewhat neglected in the preceding years (**Nicholas et al.**, 2020), became a hot topic during the virus-induced crisis, with the discussions of their fate spurred on by the ‘horror scenario’ of their turning into a lost generation. Interestingly, though, with all that the cohort was thus very much in the limelight, with a host of scientific studies, expert forecasts and anecdotal accounts centring upon their experiences and predicting their scholarly future, to the best of our knowledge no study attempted to bring their authentic voices in a comprehensive, organised and systematic fashion, certainly not from an international angle, leaving a gap that we set out to fill here.

Thus, ECRs’ first-hand testimonies as to how they have been faring during the pandemic are based on two main categories of sources:

1. Direct quotes brought about as supporting evidence in empirical studies;
2. Anecdotal evidence, reported verbatim, as published personal accounts.

5.1. Direct quotes

Evidence in the form of direct quotes is often cited in studies reporting pandemic-associated findings. This is certainly the case in qualitative studies, but in surveys, too, in which the answers to open-ended questions enable us to hear the authentic voices of ECRs. These are often studies exploring specific topics, of which the widening of the gender divide brought about by the pandemic (**Duncanson et al.**, 2021) and the particular hardships experienced by women (**Smith; Watchorn**, 2020), and especially academic mothers (**Minello; Martucci; Manzo**, 2020), seem to have attracted the most attention. However, there are many additional topics explored, highlighting different aspects of ECR work-life and research communication practices, such as: the effects of the pandemic-wrought financial crisis in Higher Education on ECRs (**Gilbert**, 2021, citing data from **Watermeyer et al.**, 2020 and **Watermeyer et al.**, 2021; **Woolston**, 2021a); academic-research careers (**Woolston**, 2020; 2021b; 2021c; 2021d); burnout (**Gewin**, 2021; 2022); authorship and publishing (**Watchorn; Heckendorf; Smith**, 2020); online conferences (**Hartley**, 2020); and collaboration (**Williams**, 2022).

Some of the studies bringing the voices of ECRs take a more wide-ranging approach to their experiences, but focus on specific knowledge areas, such as ecology and evolutionary biology (**Aubry; Laverty; Ma**, 2021), pediatric pain (**Hartley**, 2020) or autism (**Harrop et al.**, 2021). Others look at the situation of ECRs in specific countries (**Aubry; Laverty; Ma**, 2021, **McGaughey et al.**, 2021; **Morin et al.**, 2022) and even specific HE institutes, such as **Gates & Gavin’s** (2021) research on the impact of Covid-19 on *University of Southampton* Early Career Researchers.

5.2. Personal accounts

Another important source of information on how ECRs have been faring during the pandemic are personal accounts of ECRs discussing their circumstances and experiences, either in general or regarding specific components of their lives and practices. Researchers’ lived-stories, published in the popular media or in special sections of scholarly journals –by now a regular feature in many journals, for example, in *Science*, *Nature* and *Physics World*– often focus on ECRs, widely held to be the cohort most likely to disproportionately affected by the pandemic-incurred hardships (**Baker**, 2020a; 2020b; **Cardel; Dean; Montoya-Williams**, 2020; **Christian et al.**; **Doran**, 2021; **Harrop et al.**, 2021; **Maas et al.**, 2020; **Radecki; Schonfeld**, 2020).

Although these accounts represent anecdotal evidence, they provide authentic insights into various aspects ECR life under the terms of the virus-shaped new normal. Indeed, here again, the topics covered are the ones that appear to have been occupying the minds (and hearts) of commentators on the impact of the pandemic on the scholarly undertaking. Most notably it is the widening of the gender divide and its dire effects on women’s and especially mothers’ productivity (**Ascher**, 2020; **Donald**, 2020; **Fazackerley**, 2020; **Flaherty**, 2020; **Harris**, 2020a; **Kitchener**, 2020; **Langin**, 2021a; 2021b; **Minello**, 2020; **Peters**, 2020), but other aspects of ECRs’ personal and professional lives in a COVID-governed world are featured, too. Thus, for example, the work-lives of ECRs and their ability to pursue their research interests is another much-discussed topic (**Harris**, 2020b; **Penafior**, 2021; **Redden**, 2020), as is their career prospects in the new realities brought about by the pandemic (**Collini**, 2020; **Schleunes**, 2020; **Yan**, 2020) and the shift to virtual conferences (**Kwon**, 2020; **Olena**, 2020).

6. Results

The quotes of more than 50 ECRs from 8 countries are presented here, although with some ECRs making multiple quotes, we are providing more than 70 quotes spread across 16 broad scholarly topics, all with the pandemic in the foreground or background. Each quote is furnished with the discipline and country of the ECR. Above each quote is a strapline which furnishes its key message.

6.1. The new normal is virtual

The pandemic has normalised the wholesale shift to online in the scholarly undertaking [UK]

A soft social scientist⁴ put it this way: *I think the pandemic has normalised virtual and hybrid events, working from home and long-distance collaboration.* Thinking much along the same lines, a medical scientist added: *I believe the pandemic has increased the online presence of the scientific research. This has a great impact on research findings dissemination and information flow.*

A more general acceptance of remote working methods [US]

Many ECRs had to work remotely at some point during the pandemic and missed being on-site or attending in-person meetings. However, the move clearly had its benefits, so much so, that it is in all likelihood here to stay, as a hard social scientist⁵ explains: *A lot of us had to pivot to doing interventions remotely and obviously, like a lot of healthcare, switched to telehealth. And I am glad that we're not seeing a full going back to what was normal before. There does seem to be just a more general acceptance of remote methods, both from an assessment standpoint and intervention standpoint, which means that we can do things like recruiting outside of geographical limitations that we once had, which can make for a more representative sample.*

Remote working methods –an improvement [UK]

I suppose my 'fieldwork' would be seeing participants in clinic, as opposed to remote data collection. This was a shift I really struggled with in the 1st and 2nd year of the Ph.D. as I love clinical work, but I am accepting it now and see the benefits of doing remote data collection as in-person appointments with participants are really time consuming [medical scientist].

And yet: the more it changes the more it stays the same [UK]

There are a lot of changes happening in the way research is disseminated. For example: blogging, twitter, outreach and apps like Researcher are more so used than they were by previous generations. However, traditional journals and scholarly communications still play a central role in the scientific community and it will not change for a long time, in my views [medical scientist].

6.2. Research performance, its assessment and reputation building

Productivity up but not for everything [Spain]

The general sense is that during the lockdowns phase of the pandemic ECRs were more productive thanks to the time they saved by not having to commute to work and because they could concentrate better on their own at home. This was true despite the added effort that distance teaching entailed for those who taught. This is how a chemist summed it all up: *Because of the work done in 2020 I had produced a lot in 2021 and 2022 and had the possibility of improving my position at the university in a year or so.* However, the fly in the ointment was the effect of the pandemic on creativity, as another chemist clarified: *Pandemic was advantageous for writing papers, disadvantageous for generating new results.*

The notion of measuring scientific success by the number of publications is wrong [Russia]

A Russian physicist attacked the whole notion of achieving scholarly success: *I was disappointed because as it turned out, it doesn't really matter what you research, the main thing is to publish, publish and publish in good journals with a high quartile. And the more of these journals you have on your account, the more awesome a scientist you are. There is often absolutely nothing behind this, or there are some studies that in real life turn out to be completely unnecessary and useless. It's just science for the sake of science. You need to do something, and here you are doing something, and there is something you publish.*

Frustration with an evaluation system that place too much emphasis on numbers [Malaysia]

A Malaysian hard social scientist also attacked the evaluation system that is heavily dependent on meeting the challenging quantified key performance indicator (KPI): *Our publication KPI is so astronomically high. I'm not a robot, I don't plan for numbers. I want to do more with research and they should consider the external factors. At the same time, more students are coming in, professional bodies demand, our facilities are not really great either. But it is too much because it's high KPI and this is the only part that made me emotional because I'm tired.*

Metric-based/journal-centred publishing is being questioned [Spain]

ECRs doubt the value of metrics, arguing for a more comprehensive appraisal of scholarly achievements. A hard social scientist opines that *The reputation of a researcher is more than numbers, I do not believe in metrics...*, and a chemist, obviously of the same mind, further clarifies: *Metrics depend on the popularity of the researcher and on its ability in using social media, not only on the quality of the work.*

Metrics are unappreciated [Malaysia]

ECRs acknowledge the importance of metrics but the social scientists especially do not like them: *Producing better leaders, impacting the world. Can I say citation metrics do that?* [hard social scientist]. Another commented that judging the reputation for social sciences by h-index does not work: *Deep inside my heart I know the h-index and the impact factor of the journal you publish in does not capture the knowledge that you have inside* [hard social scientist].

“ The pandemic has significantly impacted on frontline researchers, which ECRs certainly are, despite the fact that they sometimes do not acknowledge that it might be so in the direct questioning, almost as if it would be a weakness to say so. Rather, the impacts tend to spring up when you ask them about run-of-the-mill scholarly activities ”

Metrics are useful for selecting a journal to publish in, but not for personal reputation building [Spain]

ECRs are very interested in journal metrics (IF) to select the outlet in which to publish their papers to best advance their careers: *In my field it is necessary to publish in high IF journals included in Q1 and Q2. I would prefer more flexibility but this is the situation* [hard social scientist]. They are not very interested in personal metrics (such as the h-index), seeing them as less important for showcasing their achievements, although they use them when required: *...for assessment it is necessary to consider all the career of a researcher, not just the h-index* [environmental scientist].

On citations [Spain]

The number of citations of a paper is not a proxy for its evaluation [environmental scientist].

On citations [UK]

According to a hard social scientist, citations *are of some use, but it is who is doing the citing which is important*.

An alternative to citations [Malaysia]

A soft social scientist mentioned that *LinkedIn* is also being used by academics to discuss articles. People there discuss your work immediately after it is published. CEOs, CTOs too. So, we should go towards that, rather than citations which are so self-centredly academic.

Problem with altmetrics [UK]

According to a hard social scientist: *sometimes things go viral on social media because the methods are terrible and people are complaining about the article. Sometimes things go viral on social media because it's an excellent piece of work. You wouldn't be able to distinguish between these two just with a basic social media count indicator.*

6.3. The scholarly system

Publishing –a 'sick' system as it stands and OA is the solution [Poland]

An environmental scientist explains: *I hope that there will be a reform of publishers. I don't understand why academics –authors of publications and reviewers– work on the whole process, while laurels and remuneration are collected by publishers. It is a sick system. I don't want payment for an article, but why should someone else, i.e., the publisher, get it? More and more researchers are realising this. This is at the heart of the OA movement... Open/openness –this is the domain of the younger generation, i.e., openness, transparency. We know everything about each other thanks to social media, this is the domain of our generation and it can be transferred to scientific activity.*

A journal-centric elitist system [Spain]

Impact factors control our lives so says one chemist.

A capitalist enterprise [Poland]

A physicist believes that, irrespective of OA, the trend will be: *Journals will commercialize even more. It is already difficult to publish something for free in my field. These are capitalist times; everyone wants to make money.*

The problem is not so much the system, but the people who inhabit the system [Poland]

There is no problem with the scientific communication system, rather there are problems with interpersonal communication, with the atmosphere between colleagues [chemist].

A generational schism opening up [France]

The bond that used to exist between ECRs and their mentors/PIs are breaking. The relationship between the two generations has deteriorated due to increasingly precarious working conditions engendered by the pandemic, a growing onus to obtain results and to publish, and finally the pressure to find funding. In the resulting oppressive research climate, some ECRs feel that their vision and/or values are no longer in line with those of their mentors. There is a sense that for the necessary changes to take place in the scholarly system, ECRs have to wait for their senior colleagues to leave, or, even worse, as one of the ECRs put it, *to get rid of them*. This largely explains why a sizeable number of ECRs have decided to leave the system. These comments from a physicist are illustrative: *I think we are here at the verge of a big breakdown between junior and senior researchers. Our vision of research, academia and careers do not converge anymore. Seniors and tenured staff are in time pace that are too slow and ECRs are in the emergency of securing their job. We are not in the same realities anymore.*

6.4. Transformations in the scholarly system

Pandemic a game changer in how ECRs are assessed and rewarded? No. [Malaysia]

For an ECR a successful academic career is heavily dependent on meeting the challenging quantified performance standards –Key performance indicators [KPI]. The pandemic brought no relief as this life scientist pointed out: *I think the previous KPI is still doable and we've already geared to that but when the current KPI is proposed, they basically moved the goal. So, we are stressed, when we are one step away from the goal but the goal is moved. The previous KPI is still*

“ The pandemic seems to have further exposed existing weaknesses in the procedures associated with publishing papers and there is definitely an anti-publisher sentiment, especially in the case of Poland ”

okay, but the new one, I don't know, maybe there will be suicide cases in this university.

Pandemic a game changer in how ECRs are assessed and rewarded? Yes. [UK]

A medical scientist has found that post-pandemic there is a big push from university to judge by quality, not Impact Factor, which is a requirement for REF (Research Excellence Framework), too. Her group has a focus group on seeing *how we can improve quality of work for publication, how we can produce more interdisciplinary work, more translationally relevant, and how to increase access to publications* (such as publishing open access).

Publishing will change [Poland]

A rather disgruntled ECR, a computer scientist, reflecting upon the pandemic induced changes, was also critical of current practices and felt there were fundamental changes in the air: *We will move away from publishing in journals behind paywalls and speed of online publishing will be promoted. In five years', time nothing will probably have changed yet, but it seems to me that, sooner or later, non-profit publishers run according to openness principles will take over the role of commercial publishers.*

New forms of journals will emerge [Poland]

A life scientist, plainly disillusioned with traditional journals, and clearly belonging to the novel and innovating camp, told us: *A whole new kind of journal is being created in Texas called PaperScore, where editors are to be replaced by an algorithm. There, you don't have a review system rejecting texts, you just get points for the reviews you do. I had a chance to be employed there, hence I know the subject. I believe that this form of publishing will definitely develop in the future, such is the future of the IT market.*

The future of journals is an app [Russia]

A chemist was undoubtedly thinking transformations in suggesting: *It would also be great for scientific communication to take the form of Steam [a gaming platform] or the App Store. Researchers would take the role of developers and directly provide products [articles] to the audience. Thus, access to articles would be much easier and not dependent on the publisher. And the articles might be available because the price was low due to the large audience size. And the developer [researcher] receives this money and can develop the project.*

ECRs are not in a position to ring in change [Malaysia]

A mathematician pondering on the role of ECRs as harbingers of change said: *Because we are contract, we are not really secure, that's why we just follow whatever the top management required us to do, not even fighting, not even a little fight, we just follow.*

There needs to be a transformation in scholarly communications, but ECRs do not have the time to bring it about [Poland]

Here is an environmental scientist, thinking much along the same lines: *Although I can see that this system is not perfect, I feel the need for change, but I don't have time to address it.*

6.5. Open access publishing

OA publishing helps careers [Spain]

When they have access to money from projects or grants from their institutions, ECRs prefer to publish open access because they believe in its benefits: *The trend should be to publish open access to permit the access to every publication and facilitate the international collaboration among scientists* [hard social scientist].

Most importantly, perhaps, they believe that it will bring them more citations, which will give their careers a lift: *The assessment criteria will increase the importance of publishing open access* [chemist].

For this reason, they take advantage of transformative agreements to publish in hybrid journals. However, as another ECR, a physicist, clarifies: *The assessment should take into account OA publications without taking into account only their impact factor. That will help the promotion of open science.* However, interest in repositories is minimal and most of the ECRs are unaware of the new open access platforms.

OA –a polarizing and largely negative force [China]

Chinese ECRs have very different perceptions of Open Access/Open Data/Open Science. Some are very supportive and understand it well and some are opposed to it and do not understand it well. This difference is mainly traceable to the perceptions and practices prevalent in different disciplines. Computer science ECRs are the most supportive, and many of them already have the experience of publishing with OA journals, or have shared open data/software. ECRs from other disciplines, especially engineering, medicine, and social sciences, exhibit a reserved or even negative attitude toward OA, which, they contend, allows for findings to be made public before its scientific value is confirmed via peer review. Most importantly, it is felt that open access journals have become a new money-making tool for commercial publishers, eager to find new markets, giving rise to the phenomenon of predatory publishing. This, they feel, will hurt the integrity of the scientific communication system. This mathematician ECR explains: *"I think 100% open for all data and research result maybe not a good thing for science development. The problem is not a 'paywall' for us now, it is information overload and the infodemic. We need a filter."* And clearly Open Science is felt to be making matters worse.

6.6. Research ethics

Haste makes waste, and research is no exception [Spain]

Some ECRs suggested that the need, indeed will to publish COVID-related findings quickly led to inadequate quality of some of the research articles that saw light. The repercussions of this state of affairs did not escape ECRs' attention, as a soft social scientist noted: *I am worried about the prevalence of fake news and disinformation brought by the pandemic.*

Scientific ethics are being seriously challenged, with the pandemic in part responsible, leaving ECRs between a rock and a hard place [China]

ECRs widely felt that scientific ethics are becoming ever more important since the pandemic provided a giant electrical shock to the scholarly system. Thus, because of technological developments (spurred on by the pandemic), there are more and more ways of academic misconduct, so that the 'grey area' between what is allowed and what is not is becoming bigger and bigger. Plainly then, it is more and more challenging for ECRs to remain on the right side of the ethical fence and the pandemic provides good cover for bad practices, as this physicist scientist explained: *During the epidemic, much personal information was illegally obtained and exposed, and some researchers used this data to conduct research. Strictly speaking, this is not in line with academic ethics, but many papers based on such data have still been published. I heard of a team that hacked a system during the pandemic, obtained a lot of personal data, used that data to conduct research, and published a paper in a top journal.*

An academic misconduct incurred international scholarly divide has opened up and is proving toxic [China]

Long before the pandemic, academic misconduct scandals involving Chinese researchers (mainly clinical medical researchers) were reported on social media, bringing disrepute to the Chinese scientific research community, a state of affairs that can probably be traced back to the focus on the number of published papers and the impact score of journals in the country's research evaluation system. Things have improved since the introduction of new evaluation policies, which do not prioritise journal paper publishing, but, as a result of the pandemic and China's being accused for it by some, many Chinese ECRs again feel that journal editors and reviewers discriminate against them. The following quote from a mathematical scientist illustrates this: *I've been rejected six times in a row for a paper since the pandemic, and it is something that never happened before the pandemic. I think this has nothing to do with my research and the quality of the paper. It concerns foreign reviewers' attitudes toward our Chinese authors' submissions after the pandemic breakout. Some reviewers' questions are very unreasonable and weird. It can be seen that they did not read my paper carefully at all. Some questions even insinuate. Clearly discriminatory.*

“ The pandemic has shone the light on peer review and its attendant problems, especially (slow) speed and lack of suitable reviewers ”

6.7. Communicating/maintaining contact with peers

Trend towards more informal communication [Poland]

The use of more informal ways of communicating, brought on by the pandemic, is becoming institutionalised: *These changes are probably only related to the development of communication technologies like MS Teams or Messenger, which before the pandemic were probably more informal, but now can be treated as a formal channel of communication (chemist).*

More informal communication –an effect of the pandemic? [UK]

A physicist, asked about a bigger role for informal communications in the scholarly world, said: *A change actually, not because of the pandemic but simply because attracting attention gets your name recognised, which in turn gets you to be more in the minds of people making decisions e.g., for awards or grants.*

The benefits of the move to more informal modes of communication [UK]

I have seen a Tweet that was made by a scientist, wherein he made mention that in his recently submitted grant proposal, he had mistakenly switched the titles of some of his figures –he was trying to call the attention of the reviewers, because they were anonymised. However, one of the reviewers acknowledged this tweet. This may not have been possible without Twitter, and may have led to an instant grant rejection had he not made this important move [life scientist].

Email remains the most reliable way to establish and maintain contacts [Poland]

Email appears to be the elephant in the room. This from a life scientist: *The most reliable way to make contact is by email. I sometimes post on ResearchGate, but I've noticed that some people very rarely go there, don't see the messages, and don't reply.* And this from a soft social scientist: *Mail is the most important. Maybe I would try on Academia.edu or RG to write a message, but only if mail would not work.*

6.8. Networking/collaboration

Collaborations hindered by the pandemic [US]

ECRs said collaborations were hindered in some way –either by not forming or maintaining ties (or both) with collaborators. The reasons most given were the inability to attend in-person conferences or other in-person activities, such as attending meetings and having a coffee together, even running into people on-campus/in an office setting. The greater

difficulties of forming collaborations gave rise to concerns among ECRs that there would be a gap in their future research productivity (computer scientist).

Remote working makes teamwork more challenging [UK]

According to ECRs remote work is rendered more difficult because of the little opportunity it leaves for occasional conversations and the need for more careful planning. This is how a mathematician describes the experience: *...my personality relies a lot on interactive feedback and face-to-face meetings with collaborators. I like regularly working 'together' as in physical proximity, looking at the same screen, drawing plans with pens and paper, and so on. I feel that remote working makes it more challenging to keep teamwork and progress synchronised, depending on the working style and busy schedule of collaborators.* Lending further support to these sentiments, a researcher in environmental sciences says: *Worst thing is lack of creative space with colleagues... working remotely means less contact with colleagues so that the casual contact, which leads to ideas, does not happen.*

Networking is more technically feasible now thanks to the pandemic [Malaysia]

I think one of the permanent changes that definitely affects me is that we realise how powerful technology is in connecting people from one person to another at the other side of the globe. If you really want to put yourself out there, if you want to engage then it can be done. It's easier. The pandemic has taught us a lot. Working with other institutions [medical scientist].

Co-operation and collaboration are more technically feasible now largely thanks to Zoom [UK]

ECRs mentioned that setting up collaborations and maintaining ties were easier with Zoom (versus via emails and phone calls), as the explanations given by two medical scientists illustrate: *Collaboration post-COVID may be easier as people are now used to Zoom etc to meet up across the world;* and: *Achieving formal collaboration post-pandemic is easier because people are keen to have Zoom meetings to discuss plans while before the pandemic, they would have to meet in person which was more difficult.*

A Facebook-like scholarly platform to support collaboration [Poland]

Who would have thought it, when Facebook was introduced in 2004, that a platform modelled on it could be seen as an important tool for enabling collaboration among scholars? As a life scientist explains: *Facebook for scientists –in the sense of matching a collaborator for scientific research, this is the future for IT. It would be useful for such a Facebook for scientists to be more efficient than RG, i.e., to allow voice and text connections, as it is on Messenger, then the community would be more active. The idea is to make such a platform very popular, so that every scientist would want to have something like that. You could create discussion groups there, e.g., on a specific topic.*

6.9. Virtual meetings and conferences

Online conferences –a double-edged sword [Spain]

While everyone agrees that traditional conferences are better for networking, they also recognise that online conferences allow them to present their work and attend conferences in a more comfortable and cheaper manner. Shy researchers or those who want to expand their resume tend to prefer them. However, an environmental scientist pointed out the serious downside for ECRs: *You cannot make new contacts and the level of attention has decreased.*

Online conferences –a double-edged sword [UK]

Hybrid meetings and seminars offer flexibility, however, hinder collaboration and networking [medical scientist].

Traveling to or for work is becoming an endangered activity for many ECRs [Poland]

It was widely acknowledged that teaching remotely is not that satisfactory, but it is felt that remote works well for meetings and conferences. As a physical scientist explained: *I don't know if it makes sense to go back to travelling in the future. Online tools are enough here, I would like to leave them and not go everywhere anymore. Sometimes two or four days were lost. The hybrid form of the conference is also beneficial, those who can come and the rest participate online.*

6.10. Social media

Platforms for sharing ideas? [Poland]

Scholarly social platforms seem eminently suitable for sharing ideas; indeed, it is their proclaimed *raison d'être*, but are they used for the purpose? Apparently not, as a life scientist reported: *Basically, I don't share ideas and information on these platforms (ResearchGate, Academia). I sometimes answer questions there, sometimes recommend interesting articles, more often on RG than Academia.* Another ECR, this time a chemist echoed these thoughts: *I don't share my ideas on these portals, although I have accounts on them, they only serve me to post/upload my publications there.*

ResearchGate use is endemic, but a changing-of-the-guard seems just around the corner [Spain]

The use of social media is common, especially *ResearchGate*, which is used, above all, to showcase publications, and by so doing, to obtain more citations. However, it no longer arouses the enthusiasm of years ago –it seems to have lost its mojo! As a medical scientist put it: *I use social media less for showcasing. I am tired of self-promotion.* However, *Twitter* is gaining ground: *I use Twitter for being updated of science and politics and LinkedIn for having a public job profile [another medical scientist].*

The scholarly march of *Twitter* [UK]

According to a life scientist: *Famous labs are joining Twitter and the old guard have joined in.*

The scholarly march of *Twitter* [Spain]

This from a chemist *I want to dedicate more effort to Twitter when I have more time.*

Tweeting can bring about unwelcome exposure [Spain]

An environmental scientist sheds light on a less known effect of being ‘talked about’ on *Twitter*: *Thinking on being evaluated by followers on Twitter makes me shake with fear!!!*

Tweeting comes with abuse even in a scholarly setting [UK]

On tweeting for visibility, a chemist opined: *I mostly retweet, but I do give links. However, I do not like the abuse and therefore less ready to tweet.*

The social web and scholarly reputation: *TikTok* for visibility [Malaysia]

The highly competitive academic environment means that researchers need to engage in active self-branding to build their reputations. Thus, for example, Malaysian ECRs use *LinkedIn* to build their online narrative by showcasing publications, projects and other research-related outcomes and even a popular video sharing site, *TikTok*, as a physicist reports: *I also use my TikTok for visibility and share my research. I think it's a very powerful tool instead of waiting for seminar to say something. Nowadays just TikTok about your life, and the whole world knows about it.* Researchers are becoming social butterflies...

6.11. Peer review

On the verge of collapse [Spain]

The peer review system needs improvement. ECRs believe that the quality of the reviews had been declining pre-pandemic and things worsened with the pandemic. It is difficult to get competent and engaged reviewers. They also think that for traditional journals the system is slow and in some of the new ones the review periods are too short for comfort. Remuneration for reviewers is an increasingly more prevalent request. This is seen as the solution to the lack of availability of reviewers. An environmental scientist puts it this way: *It is on the verge of collapse. Many articles and few evaluators with time available to conduct a rigorous evaluation.*

COVID has changed peer review [UK]

There are fewer people available to do the work because of COVID [and falling ill] so slowed down the whole process [soft social scientist].

However, the change went deeper than that, as a medical scientist pointed out: *Traditional journals have been “shaken” in a way through the pandemic, they first saw a great increase in submissions with COVID-related research, which decreased the quality of peer review. However, once some of the big scandals occurred with falsified COVID data and the big Lancet retraction, there was new focus on the peer-review process, which I believe it helps refining the system itself.*

Depends very much on the luck of the draw [UK]

A physicist on trust in peer review: *I think that peer-review can fail when you simply don't get the right referees, and this is a major issue. This has sadly resulted in the submission process as requiring luck on whether or not you get ‘appropriate’ referees for the work you submit and they provide constructive feedback. Some referees I feel say some things just for the sake of having to comment sadly.*

Need to remunerate reviewers [UK]

Asked about new approaches to peer review, a physicist said: *I can only think of compensation, peer review is incredibly important and valuable and we should treat it as such via an appropriate compensation. Perhaps even some roles for researchers should be e.g., 5% of their time in the contract be devoted to peer review [physicist].*

6.12. Preprints

Not to be ignored [UK]

I think now preprints are so common that they can't be ignored. So, one reason for my preference is simple practicality. I also like the idea in principle of things being open and available from the moment the paper is finished rather than waiting for potentially months of peer review and revisions [life scientist].

The inevitable result of problems with the peer review system? [UK]

As a medical scientist explains: *There are so many submissions that the peer review process slows down and therefore researchers who want to get recognition use preprints.* To which a life scientist adds: *Because of the constraints of peer review, the time it takes for a paper to get published is now taking longer. However, pre-prints have now made it possible for information to reach a wider audience even much earlier before the peer review process is completed. Through this means, early-stage results, protocols, and ideas can easily be shared with the wider scientific community. This is almost the same with Twitter [life scientist].*

Misconceptions [Spain]

There seems to be a concern that publishing preprints will prevent publishing in a journal, as two Spanish ECRs contended: *Publishing preprints mean to burn out my research before publishing it in journals* [soft social scientist] and *I do not publish preprints because many journals don't accept manuscripts published as preprints* [hard social scientist].

Preprints were commended in particular for their ability to speed up dissemination, as a means of avoiding the peer-review traffic jams and, most interestingly, as a way of enabling outreach to the general public

To be considered a publication, if rewarded [Malaysia]

To submit or not, it goes back to the reward system. I would say preprint should be considered as a form of publication and receive rewards for it [life scientist].

May mislead the public [China]

Chinese ECRs, citing the many retractions of preprint papers during the pandemic, fear that research that has not been peer reviewed will contain errors and mislead the public, whose members by now are more likely to follow scientific developments.

6.13. Outreach**With the pandemic having made the general public more interested in science, academic misconduct attracts greater attention [China]**

Thanks to social media, more reports of academic misconduct are exposed and brought to the public attention, which appears to shed more light on the problem. Indeed, because the pandemic has made the public more concerned about and interested in science and more prepared to participate in the scientific communication, any academic misconduct exposed by the media will become a social problem, attracting extensive public discussion and possibly resulting in negative repercussions. This is how a physicist analyses the situation: *I don't think there is more academic misconduct now than in the past. We heard more just because the social media is everywhere now, any negative news will be on the hot search, plus the negative news in the scientific community can attract everyone's attention. Therefore, the academic misconduct is more reported widely spread. This is a communication problem.*

6.14. Access to information/libraries**More accessibility [Spain]**

A mathematician told us *Having information behind paywalls will decrease in a world with more and more accessibility to the information.*

Pandemic has highlighted the importance of full-text online availability [Poland]

The lockdowns drove home the importance to be accorded to online access to scholarly publications. As a soft social sciences ECR explained: *English articles are in Sci-Hub, but there is a problem with Polish texts. Maybe there will be more e-books. Pandemic showed our expectations for full texts online.*

When looking for information, libraries are at the back of the queue [Malaysia]

When it comes to locating information, a chemist minces few words: *I think libraries have limited tasks that they can help me with. I do not go to the library straight away to request for articles, I Google, go to my friends and students. The last worst-case scenario is that now we have Sci-Hub.*

The changing role of libraries [Spain]

The traditional roles of university libraries are considered less and less necessary, a state of affairs that has striving to acquire new roles, such as the management of OA fees: *Libraries will become less important because in a few years everything will be open access and we shall be working more remotely anyway. Although they have now the new role of managing the transformative agreements* [environmental scientist].

The waning role of libraries [Poland]

According to a chemist ECR, the library will still have an important role in the future, that of the guardian of the integrity of information: *The march of remote services will increase in pace but the risks will be higher. Libraries can put the brakes on pseudoscience and only provide access to verified sources of information.* However, a researcher in life sciences is less optimistic: *Libraries –the great unknown. Their role is declining. You can see that today's students no longer use libraries. They are a storehouse of books, not a place to exchange knowledge.*

Academic libraries no longer useful for researchers [France]

Academic libraries have completely disappeared from the scholarly discourse or even vision. They appear neither to be used as a source of information nor as a working space. The long period of lockdowns had French ECRs leaning more towards pirate libraries, such as *Sci-Hub*. As far as they are concerned, academic libraries are only useful for graduate students, as a life scientist explains: *More focused on students, much less on research.* By the same token a biochemist says: *Libraries will stay for sure but mainly for undergraduate students. I do not see them in the research area.*

Smartphone apps usurping the role of the library [Malaysia]

I use this app called "Researcher" on my phone...use this before I go to bed...using this I can know is my research is still a hot topic or has become outdated...I love this app, read only the title and abstract, but it gives me a lot of ideas. Because of this Researcher app, my phone has been my good friend [an always-on life scientist].

It seems that the popular social media platforms, such as *Twitter* and *Facebook*, are stealing the social scholarly platforms' thunder, with *ResearchGate* being largely marginalised as a promotion and visibility platform and exhibiting a minimum of social engagement.

6.15. Re-evaluation of what is important in life

Work-life balance becomes more important in the wake of the pandemic [US]

A few ECRs came out of the pandemic with the desire to make changes in their work lives, as a researcher in life sciences explained: *I think that this idea of the time is limited and there's only so many hours and they don't match up with all the things that I want to do. So, I need to make choices and work on the things that I want to work on, but also make time for important things like family and not work activities. And I didn't appreciate that as much before.* Another ECR, a medical scientist, summed it all up, saying: *I didn't realize how exclusively I had focused on 'the professional' at the detriment to 'the personal', and I'm just not going to do that anymore.*

6.16. Pursuing an academic career

Despite the pandemic-incurred hardships, ECRs do not jump the academic ship [Spain]

The pandemic and then the Ukrainian war have introduced a feeling of instability into the research system that worries ECRs, as a physicist puts it: *I see possibilities of remaining at the university but I am worried because the economic situation can reduce the possibilities of tenure again, as in the years of the last economic crisis.* Rather than giving up, though, they resolutely work even harder and diversify their efforts to enrich their CV in order to improve their chances of career progression. Thus, for example, an environmental scientist leaves no doubt that whatever it takes, an academic career it is: *For obtaining tenure I will have to wait at least 8 years but I do not mind changing cities or countries!*

Career aspirations have not changed but research motivations have [China]

For all ECRs, engaging in scientific research is their principal interest, and their ideal job is to work in universities and research institutions. They like their work and feel they can realise their self-worth through their work. This is how a physicist put it: *Being a scientist is my dream since I was a child. I like to explore the truth, and I also enjoy quietness and devotion. Even if I encountered difficulties, I never thought about quite my scientist work, as if I would not do any other work.*

However, the sudden outbreak of COVID has made them rethink the value of work and life. Some began to re-evaluate the significance and practical value to society and country of their research. This was particularly evident among medical ECRs: *The pandemic has made the whole society understand and worship the profession of doctors. I began to think about the meaning of my life and profession. Before, I thought it was enough to do good research, produce good results, and publish papers. Now I don't value the publication of papers as I used to. I think that if I can help more patients through my own ability, I will be happier.*

7. Discussion and conclusions

By its very nature, qualitative research shines best through individual quotes ('voices'), captured with minimum prodding or shoehorning, so that people are given space to explain themselves fully and in their own way. In the *Harbingers-2* project we have collected hundreds and hundreds of comments raised by our interviewees, selecting for this paper the most interesting and, possibly, most significant ones in respect to ECRs' work life and scholarly communications. It is the individual, original and the different that are on display here, and, of course, this type of data tends to be absent from quantitative studies, such as the ubiquitous questionnaire survey.

We believe that this paper is important in that random ECR voices have been heard (and published) in the years of the pandemic, as indicated by the literature reviewed earlier, but to the best of our knowledge nobody has presented the information in a systematic (by scholarly topic/issue) and analytic fashion and, crucially, from an international perspective, with ECRs interviewed in their own languages (the exception being Malaysia where English language is widespread), which enabled them to be even more vocal.

It is clear from a myriad of comments that the pandemic has significantly impacted on frontline researchers, which ECRs certainly are, despite the fact that they sometimes do not acknowledge that it might be so in the direct questioning, almost as if it would be a weakness to say so. Rather, the impacts tend to spring up when you ask them about run-of-the-mill scholarly activities. Thus, the ease or otherwise of collaborating, an essential activity, as far as ECRs are concerned, for building a career, was raised a number of times, with the constructive role of *Zoom* in this regard particularly highlighted. It was also thought that ethics is being compromised by the pandemic, especially in China. As we well know, travelling, too, has been hit hard by the pandemic and that has left a big, long-lasting overhang, with remote meetings/conferences by now firmly embedded in the scholarly communication system.

Open access/scholarship –often defined in very broad terms– is clearly a focus of much interesting comment, largely positive, even if the jury is clearly out in the case of China. The pandemic seems to have further exposed existing weaknesses in the procedures associated with publishing papers and there is definitely an anti-publisher sentiment, especially in the case of Poland. The pandemic has shone the light on peer review and its attendant problems, especially (slow) speed and lack of suitable reviewers. Indeed, some ECRs believe it is cracking under pressure, perhaps, 'shell shocked'. The much-touted preprint (perhaps, the pandemic scholarly 'poster boy'), whose fame rose as a consequence of the pandemic, naturally came in for comment, which, it has to be said, is mostly positive (although not effusive). Preprints were commended in particular for their ability to speed up dissemination, as a means of avoiding the peer-review traffic jams and, most interestingly, as a way of enabling outreach to the general public.

“ When you examine the situation from bottom-up, the picture not only is more graphic, granular and personal, but you can also see the seedlings of potential change, or, put another way, the small bumps on the road that might become big enough, if not to derail current research activities and platforms, but to force things in different directions ”

Publishing clearly obtained a boost during lockdowns and working more from home, giving ECRs a feeling that they were more productive. Arguably the most interesting comment, though, talked about replacing the publisher-based system with an app, a bit like the idea of an app, raised by another ECR, meant to side-line the library (see below). Obtaining reputation, another activity held in esteem by ECRs for obvious career reasons, attracted much interesting comment. A wide range of opinions are exhibited here, but there is a consensus that citations should not hold a monopoly on reputation and there is evidence to show that the pandemic has nudged ECRs away from citation metrics towards considerations of research quality, but not altmetrics.

Accessing information, a key part of an ECR's job, not surprisingly, merited much interest. One ECR mentioned the fact that the pandemic has led to an increasing expectation that the full-text of articles should be easily and freely available (and this was said in the context of a *Sci-Hub* comment!) and another proposed an app which would be a good substitute for the library, which, anyway, was felt by some to be under threat, from a combination of open access, remote working and smartphones.

Unsurprisingly perhaps, given that most ECRs are millennials, social media figured highly in terms of interesting quotes. From some of the quotes it seems that the popular social media platforms, such as *Twitter* and *Facebook*, are stealing the social scholarly platforms' thunder, with *ResearchGate* being largely marginalised as a promotion and visibility platform and exhibiting a minimum of social engagement.

Perhaps, though, it is the additional/volunteered comments at the end of the interview that ushered in the most powerful suggestions. Thus, in regard to the pandemic, it was variously expressed that it had normalised virtual and hybrid events, had increased the presence of scientific research and is leading to the breaking of the bonds between ECRs and their mentors.

Of the countries, China and France offer the strongest signs of serious scholarly problems and challenges down the road. In the case of China, a schism is opening out between China and the West and, in the case of France, the schism is internal, an opening out between junior researchers and their tenured colleagues, something that was obviously there before but it now opening more widely because of the pandemic.

When you examine the situation from bottom-up, the picture not only is more graphic, granular and personal, but you can also see the seedlings of potential change, or, put another way, the small bumps on the road that might become big enough, if not to derail current research activities and platforms, but to force things in different directions.

Finally, this 'voices' paper is a companion one and its findings should be viewed in the light of the findings of the earlier 'impact' paper. In fact, it wholly supports the analysis produced in the 'impact' one. It does cover more ground, inasmuch as it mentions topics that were not gone into in detail (or at all) in the impact article, which is significant in itself, but it essentially grounds the overarching findings contained in the 'impact' paper in the empirical evidence of 'voices'.

8. Notes

1. <http://ciber-research.com/harbingers.html>
2. A more detailed explanation of the methodology can be found in the 'impact' companion paper (Nicholas *et al.*, 2022).
3. For the full interview schedule see, http://ciber-research.com/harbingers-2/20201202-H2-Interview_schedule-1.pdf
4. We include among Soft Social Sciences: Anthropology, Politics and Sociology.
5. We include among Hard Social Sciences: Economics and Business, Geography and Psychology

9. References

- Ascher, Dan** (2020). "Mums 'do most childcare and chores in lockdown'". *BBC News*, May 27.
<https://www.bbc.com/news/business-52808930>
- Aubry, Lise M.; Lavery, Theresa M.; Ma, Zhao** (2021). „Impacts of COVID-19 on ecology and evolutionary biology faculty in the United States". *Ecological applications*, v. 31, n. 2, e2265.
<https://doi-org.ezproxy.haifa.ac.il/10.1002/eap.2265>
- Baker, Simon** (2020a). "HE financial crisis risks 'lost generation of researchers'". *Times higher education*, June 11.
<https://www.timeshighereducation.com/news/he-financial-crisis-risks-lost-generation-researchers>
- Baker, Simon** (2020b). "Most early career academics face funding cliff edge, survey suggests". *Times higher education*, May 18.
<https://www.timeshighereducation.com/news/most-early-career-academics-face-funding-cliff-edge-survey-suggests>
- Cardel, Michelle I.; Dean, Natalie; Montoya-Williams, Diana** (2020). "Preventing a secondary epidemic of lost early career scientists. Effects of COVID-19 pandemic on women with children". *Annals of the American Thoracic Society*, v. 17, n. 11, pp. 1366-1370.
<https://doi.org/10.1513/AnnalsATS.202006-589IP>
- Christian, Katherine; Johnstone, Carolyn; Larkins, Jo-ann; Wright, Wendy; Doran, Michael R.** (2021). "Research culture: A survey of early-career researchers in Australia". *ELife*, n. 10, e60613.
<https://doi.org/10.7554/eLife.60613>
- Collini, Stefan** (2020). "Covid-19 shows up UK universities' shameful employment". *The Guardian*, April 28.
<https://www.theguardian.com/education/2020/apr/28/covid-19-shows-up-uk-universities-shameful-employment-practices>
- Donald, Athene** (2020). "Yet another source of inequality?". *Athene Donald's Blog*, 27 April.
<http://occamstypewriter.org/athenedonald/2020/04/27/yet-another-source-of-inequality>
- Duncanson, Kirsty; Weir, Natasha; Siriwardhane, Pavithra; Khan, Tehmina** (2021). "How COVID is widening the academic gender divide". *The conversation*.
<https://theconversation.com/how-covid-is-widening-the-academic-gender-divide-146007>
- Fazackerley, Anna** (2020). "Women's research plummets during lockdown -but articles from men increase". *The Guardian*, May 12.
<https://www.theguardian.com/education/2020/may/12/womens-research-plummets-during-lockdown-but-articles-from-men-increase>
- Flaherty, Colleen** (2020). "No room of one's own". *Inside higher ed*, 21 April.
<https://www.insidehighered.com/news/2020/04/21/early-journal-submission-data-suggest-covid-19-tanking-womens-research-productivity>
- Gates, Lucy; Gavin, James-Peter** (2021). *Key survey findings: Impact of COVID-19 on University of Southampton early career researchers*. Southampton: University of Southampton (Project report).
<https://doi.org/10.5258/SOTON/P0071>
- Gewin, Virginia** (2021). "Pandemic burnout is rampant in academia". *Nature*, n. 591, pp. 489-491.
<https://doi.org/10.1038/d41586-021-00663-2>
- Gewin, Virginia** (2022). "Has the 'great resignation' hit academia?". *Nature*, n. 606, pp. 211-213.
<https://doi.org/10.1038/d41586-022-01512-6>
- Gilbert, Natasha** (2021). «UK academics see the over universities' cost-cutting moves". *Nature*, n. 596, pp. 307-308.
<https://doi.org/10.1038/d41586-021-02163-9>
- Harris, Margaret** (2020a). "Physics in the pandemic: 'A lack of childcare hugely reduces productivity'". *Physics world*, 5 May.
<https://physicsworld.com/a/physics-in-the-pandemic-a-lack-of-childcare-hugely-reduces-productivity>
- Harris, Margaret** (2020b). "Physics in the pandemic: 'Returning to the lab will be hugely beneficial for me'". *Physics world*, 22 May.
<https://physicsworld.com/a/physics-in-the-pandemic-returning-to-the-lab-will-be-hugely-beneficial-for-me>
- Harrop, Clare; Bal, Vanessa; Carpenter, Kimberley; Halladay, Alycia** (2021). "A lost generation? The impact of the COVID-19 pandemic on early career ASD researchers". *Autism research*, v. 14, n. 6, pp. 1078-1087.
<https://doi.org/10.1002/aur.2503>
- Hartley, Caroline** (2020). "Online options for future conferences will have an important positive impact for Early Career Researchers in pediatric pain". *Paediatric neonatal pain*, v. 3, n. 1, pp. 9-11.
<https://doi.org/10.1002/pne2.12044>

- Herman, Eti; Nicholas, David; Watkinson, Anthony; Rodríguez-Bravo, Blanca; Abdullah, Abrizah; Boukacem-Zeghmouri, Chérifa; Jamali, Hamid R.; Sims, David; Allard, Suzie; Tenopir, Carol; Xu, Jie; Świgoń, Marzena; Serbina, Galina; Parke-Cannon, Leah** (2021). "The impact of the pandemic on early career researchers: what we already know from the internationally published literature". *Profesional de la información*, v. 30, n. 2, e300208.
<https://doi.org/10.3145/epi.2021.mar.08>
- Kitchener, Caroline** (2020). "Women academics seem to be submitting fewer papers during coronavirus. 'Never seen anything like it,' says one editor". *The Lily*, 20 April.
<http://shorturl.at/aDLZ1>
- Kwon, Diana** (2020). "After conference cancellations, some scientists find a way". *The scientist*, March 23.
<https://www.the-scientist.com/news-opinion/after-conference-cancellations-some-scientists-find-a-way-67310>
- Langin, Katie** (2021a). "Pandemic hit academic mothers especially hard, new data confirm". *Science magazine*, 9 February.
<https://doi.org/10.1126/science.caredit.abh0110>
- Langin, Katie** (2021b). "'On the verge of a breakdown.' Report highlights women academics' pandemic challenges". *Science magazine*, 9 March.
<https://doi.org/10.1126/science.caredit.abh4450>
- Maas, Bea; Grogan, Kathleen E.; Chirango, Yolanda; Harris, Nyeema; Liévano-Latorre, Luisa-Fernanda; McGuire, Krista L.; Moore, Alexandria C.; Ocampo-Ariza, Carolina; Palta, Monica-Marie; Perfecto, Ivette; Primack, Richard B.; Rowell, Kirsten; Sales, Lilian; Santos-Silva, Rejane; Silva, Rafaela-Aparecida; Sterling, Eleanor J.; Vieira, Raísa R. S.; Wyborn, Carina; Toomey, Anne** (2020). "Academic leaders must support inclusive scientific communities during COVID-19". *Nature ecology and evolution*, n. 4, pp. 997-998.
<https://doi.org/10.1038/s41559-020-1233-3>
- McGaughey, Fiona; Watermeyer, Richard; Shankar, Kalpana; Suri, Venkata-Ratnadeep; Knight, Cathryn; Crick, Tom; Hardman, Joanne; Phelan, Dean; Chung, Roger** (2021). "'This can't be the new norm': academics' perspectives on the COVID-19 crisis for the Australian university sector". *Higher education research & development*, online first.
<https://doi.org/10.1080/07294360.2021.1973384>
- Minello, Alessandra** (2020). "The pandemic and the female academic". *Nature. World view*, 17 April.
<https://doi.org/10.1038/d41586-020-01135-9>
- Minello, Alessandra; Martucci, Sara; Manzo, Lidia K. C.** (2020). "The pandemic and the academic mothers: Present hardships and future perspectives". *European societies*, v. 23, Sup. 1, pp. S82-S94.
<https://doi.org/10.1080/14616696.2020.1809690>
- Morin, Andréanne; Helling, Britney A.; Krishnan, Seetha; Risner, Laurie E.; Walker, Nykia D.; Schwartz, Nancy B.** (2022). "Research culture: Surveying the experience of postdocs in the United States before and during the COVID-19 pandemic". *Elife*, v. 11, e75705.
<https://doi.org/10.7554/eLife.75705>
- Nicholas, David; Jamali, Hamid R.; Watkinson, Anthony; Herman, Eti; Abrizah, Abdulah; Rodríguez-Bravo, Blanca; Boukacem-Zeghmouri, Chérifa; Xu, Jie; Świgoń, Marzena; Polezhaeva, Tatiana** (2020). "A global questionnaire survey of the scholarly communication attitudes and behaviours of early career researchers". *Learned publishing*, v. 33, n. 3, pp. 198-211.
<https://doi.org/10.1002/leap.1286>
- Nicholas, David; Herman, Eti; Boukacem-Zeghmouri, Chérifa; Watkinson, Anthony; Sims, David; Rodríguez-Bravo, Blanca; Świgoń, Marzena; Abrizah, Abdullah; Xu, Jie; Serbina, Galina; Jamali, Hamid R.; Tenopir, Carol; Allard, Suzie** (2022). "Early career researchers in the pandemic-fashioned 'new scholarly normality': a first look into the big changes and long-lasting impacts (international analysis)". *Profesional de la información*, v. 31, n. 4, e310418.
<https://doi.org/10.3145/epi.2022.jul.18>
- Olena, Abby** (2020). "COVID-19 ushers in the future of conferences". *The scientist*, 28 September.
<https://www.the-scientist.com/news-opinion/covid-19-ushers-in-the-future-of-conferences-67978>
- Penaflo, Ben** (2021). "Physics in the pandemic: 'We've been surprised at how easy it's become to do high-level experiments from our homes'". *Physics world*, 1 April.
<https://physicsworld.com/a/physics-in-the-pandemic-weve-been-surprised-at-how-easy-its-become-to-do-high-level-experiments-from-our-homes>
- Peters, Diane** (2020). "Women academics worry the pandemic is squeezing their research productivity". *University affairs*, 7 July.
<https://www.universityaffairs.ca/news/news-article/women-academics-worry-the-pandemic-is-squeezing-their-research-productivity>

- Radecki, Jane; Schonfeld, Roger C.** (2020). *The impacts of COVID-19 on the research enterprise: A landscape review*. Ithaca S+R.
<https://doi.org/10.18665/sr.314247>
- Redden, Elizabeth** (2020). "Empty benches at empty lab tables". *Inside higher ed*, 30 March.
<https://www.insidehighered.com/news/2020/03/30/nonessential-research-has-halted-many-campus>
- Schleunes, Amy** (2020). "Universities issue hiring freezes in response to Covid-19". *Science*, 26 March.
<https://www.the-scientist.com/news-opinion/universities-issue-hiring-freezes-in-response-to-covid-19-67334>
- Smith, Chris; Watchorn, Deirdre** (2020). "The pandemic is making it harder for researchers but women are hit the hardest. 4 findings from 80 countries". *Impact of social sciences blog*, 17 September.
<https://blogs.lse.ac.uk/impactofsocialsciences/2020/09/17/the-pandemic-is-making-it-harder-for-researchers-but-women-are-hit-the-hardest-4-findings-from-80-countries>
- Watchorn, Deirdre; Heckendorf, Esther; Smith, Chris** (2020). *Locked down, burned out: Publishing in a pandemic: The impact of COVID on academic authors*. Berlin, Germany: De Gruyter.
https://blog.degruyter.com/wp-content/uploads/2020/12/Locked-Down-Burned-Out-Publishing-in-a-pandemic_Dec-2020.pdf
- Watermeyer, Richard P.; Crick, Tom; Knight, Cathryn; Goodall, Janet** (2020). "COVID-19 and digital disruption in UK universities: afflictions and affordances of emergency online migration". *Higher education*, n. 81, pp. 623-641.
<https://doi.org/10.1007/s10734-020-00561-y>
- Watermeyer, Richard P.; Shankar, Kalpana; Crick, Tom; Knight, Cathryn; McGaughey, Fiona; Hardman; Joanna; Suri, Venkata-Ratnadeep; Chung, Roger Y-N.; Phelan, Dean** (2021). "'Pandemia': A reckoning of UK universities' corporate response to COVID-19 and its academic fallout". *British journal of sociology of education*, v. 42, n. 5-6, pp. 651-666.
<https://doi.org/10.1080/01425692.2021.1937058>
- Williams, Tom** (2022). "Remote working 'led to missed collaborations and groupthink'". *Times higher education*, August 23.
<https://www.timeshighereducation.com/news/remote-working-led-missed-collaborations-and-groupthink>
- Woolston, Chris** (2020). "Pandemic darkens postdocs' work and career hopes". *Nature*, v. 585, n. 7824, pp. 309-312.
<https://doi.org/10.1038/d41586-020-02548-2>
- Woolston, Chris** (2021a). "The state of science salaries/Stagnating salaries present hurdles to career satisfaction". *Nature*, n. 599, pp. 519-521.
<https://doi.org/10.1038/d41586-021-03041-0>
- Woolston, Chris** (2021b). "Scientists count the career costs of COVID". *Nature*, n. 599 (7884), pp. 331-334.
<https://doi.org/10.1038/d41586-021-03040-1>
- Woolston, Chris** (2021c). "'Keep your options open': postdocs offer advice on academic-research careers". *Nature, Career news*, 25 May.
<https://doi.org/10.1038/d41586-021-01437-6>
- Woolston, Chris** (2021d). "How burnout and imposter syndrome blight scientific careers". *Nature*, n. 599, pp. 703-705.
<https://doi.org/10.1038/d41586-021-03042-z>
- Yan, Wudan** (2020). "Early-career scientists at critical career junctures brace for impact of COVID-19". *Science magazine*, April 7.
<https://doi.org/10.1126/science.caredit.abc1291>