

Early career researchers in the pandemic-fashioned ‘new scholarly normality’: a first look into the big changes and long-lasting impacts (international analysis)

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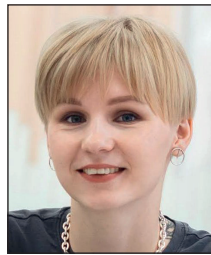
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Abstract

After two-years of repeat interviewing 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 in pandemic-times, the *Harbingers* project is now in possession of a mountain of data on what constitutes a very important academic topic. The purpose of the paper is to share the early highlights of the data, with a focus on the main and lasting impacts of the pandemic. The data presented comes from the national interviewers, who had conducted 3 rounds of interviews with their 20 or so early career researchers (ECRs) over two years and, thus, knew them well. They were asked to provide an ‘aerial view’ by identifying the most important impacts they had detected while things were still fresh in their minds. The main findings are that: 1) ECRs, the research workhorses, have generally proved to be resilient and perseverant and some have prospered; 2) the pandemic has fast-tracked researchers to a virtual and remote scholarly world, with all the advantages and disadvantages that comes with it. The data, however, is nuanced, with significant differences occurring between countries, especially China and France. The paper also updates a literature review on the topic previously published in this journal.

Keywords

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

1. Introduction

Upon embarking on the longitudinal, international *Harbingers-2* research project¹, which had at its heart an exploration of the effects of the COVID-19 pandemic on early career researchers (ECRs)², we published in this journal an extensive, literature-based exploration of the challenges that were facing them one year or so into the crisis (**Herman et al.**, 2021). The host of scientific studies, expert forecasts and personal accounts analysed for the study left little room for doubt: junior researchers were disproportionately affected by the pandemic-incurred hardships, indeed bearing the brunt of the difficulties. So much so, that the ‘horror scenario’ of pandemic-era ECRs becoming a generation of scientists lost to science was at the time a recurrent feature of the prognostications as to the future of the research enterprise (**Baker**, 2020a; 2020b; **Cardel**; **Dean**; **Montoya-Williams**, 2020; **Christian et al.**, 2021; **Harrop et al.**, 2021; **Maas et al.**, 2020; **Radecki**; **Schonfeld**, 2020).

Seeking to learn how ECRs have been coping with the sudden-onset, but relentlessly unfolding unprecedented changes in their circumstances, we set out to ask a host of questions regarding the effects of the virus-dictated disruptions on their careers, on the pace/focus of their research undertakings and on their work-life. Almost

two years on, with the conclusion of the project already in sight (October 2022), we have empirical evidence-grounded answers to the questions we were asking. Indeed, the data obtained from three rounds (two in the case of Russia) of repeat in-depth interviews, conducted over two years with around 170 sciences and social sciences ECRs from 8 countries, converge to form a multi-faceted portrayal of the effects of the pandemic on the scholarly communication attitudes, practices and work-life of novice academics. Our findings will be systematically reported in a series of articles once the data analysis is completed, but meanwhile we shall share in this article the key insights gained into the pandemic-wrought 'new scholarly normality' as seen through the eyes of ECRs, tomorrow's professors, leading researchers and Noble Prize winners, who, after all, will determine how the future of science will be taking shape.

Junior researchers were disproportionately affected by the pandemic-incurred hardships, indeed bearing the brunt of the difficulties

2. Aim and objectives

The paper provides an early heads-up of what appears to be the major impacts of the pandemic on early career researchers emerging from the *Harbingers-2* study.

It does this by:

- (1) Portraying the key features of the country-specific new realities for ECRs, the biggest community of researchers;
- (2) Identifying the main impacts of the pandemic (if any) on ECRs' scholarly views, behaviour and work-life in the 8 case study countries –China, France, Malaysia, Poland, Russia, Spain, UK and US;
- (3) Establishing how ECRs have been coping with the challenges (if any) of their new circumstances in the countries studied.
- (4) Reviewing these early findings in the context of the literature published since our earlier literature review published in this very journal.

3. Context: The *Harbingers* project

The overarching insights reported here come, from the *Harbingers-2 - Early Career Researchers and the Pandemic* research project, funded by the *Alfred P. Sloan Foundation*. The project constitutes a two-year extension (2020-2022) to the original, four-year (2016-2019), longitudinal *Harbingers-1* research project³, led by *CIBER Research* and funded by the *Publishers Research Consortium*, which explored the working lives and scholarly communication behaviour of junior science and social science researchers in the eight case-study countries.

Harbingers-2 enabled us to continue studying change at a time when the far-reaching effects of the pandemic seem to have brought about unparalleled transformations in the scholarly world, too, as it did in all aspects of life and living everywhere. In *Harbingers-2*, too, the data is drawn from the aforementioned eight countries, but this time covering more ECRs and strengthening coverage of disciplines in the pandemic frontline, such as medicine, economics and psychology.

Harbingers-2, thus, continues to examine, mainly through deep and repeated interviews, the work lives, prospects and scholarly communication behaviour of ECRs, albeit with the express purpose of finding out what the consequences of the pandemic were for the scholarly community as seen through the lens of the new generation of researchers. Guided by this overarching aim, we set out to discover whether the pandemic was speeding up/slowing down millennial attitudes-driven changes, already detected in the pathfinding *Harbingers-1* study, whether it was giving rise to additional and different changes, indeed, whether some changes were going into reverse, which countries were doing what to mitigate the hardships encountered in the scholarly environment, and where, in these circumstances, lay actual practices. No less importantly, we sought to establish whether we were witnessing the need for conservativeness becoming the overriding consideration in steering research initiatives and, as such, an inescapable imperative for those who manage to enter the system, or, alternatively, whether we were on the cusp of disruptive developments in the scholarly undertaking, which may bring about far-fetching changes in scholarly attitudes and behaviours.

Critically, the longitudinal nature of the project meant that we were not merely taking a snapshot of a major transition in the scholarly environment, but following and monitoring the process at the grass roots level in order to find out what the new scholarly 'normal' will look like and how the future of science and scholarship appears to be taking shape.

4. Literature review

The process of becoming a full-fledged member in the scholarly community had been a lengthy and gruelling one long before the pandemic became a central force in shaping our lives (Bennion; Locke, 2010; Brechelmacher *et al.*, 2015; Castellacci; Viñas-Bardolet, 2020; McQuarrie; Kondra; Lamertz, 2020; Petsko *et al.*, 2014; Powell, 2015; Vatansev-

er, 2020). Indeed, in many countries it has forever been the lot of an ever-growing cohort of newly-minted PhD holders, aspiring to win the tight race for the limited numbers of permanent academic positions available, to travel a 'rocky road to tenure' (Brechelmacher *et al.*, 2015; Maher; Sureda-Anfres, 2016; Roach; Sauermann, 2017; Xing *et al.*, 2019). With the advent of the pandemic-generated global economic crisis, which brought about further financial stress for Higher Education (HE) institutions worldwide (Baker, 2020a; Lederman, 2021; Radecki; Schonfeld, 2020; Ross, 2020; Thatcher *et al.*, 2020; 2020), things did not bode well for academics.

The developments on the ground soon proved the gloomy outlooks to be realistic enough. The pandemic has profoundly affected the university sector, bringing about, as it did, loss of revenue from fees paid by international students and reduced funding by governments, which worsened pre-existing problematic work-conditions, such as stagnant wages, toxic work environments, bullying and a lack of regard for staff safety and well-being (Gewin, 2022; McGaughey *et al.*, 2021). It is hardly surprising to find then that fewer than half of the 3200 respondents to *Nature's 2021 International Salary and Satisfaction Survey* reported feeling positively about their career prospects, just 47%, compared to 59% of researchers in 2018, a finding that has been traced back to widespread funding shortages, intense competition for jobs and the disruptions of a global pandemic (Woolston, 2021a).

Indeed, 12% of respondents said they had already lost a job offer because of COVID-19, and 43% said that the pandemic had negatively impacted their career prospects (Woolston, 2021b). Tellingly, respondents in industry (64%) were much more likely than those in academia (42%) to be optimistic about their future (Woolston, 2021a). No wonder then, as Gewin (2022) reports, that higher education has not escaped the 'great resignation' –the international wave of worker resignations that began in 2021, including a record 47 million US residents and 2 million UK adults. Beyond the aforementioned financial constraints, it was universities' expectations during the pandemic for 'the same and more' from struggling staff members, which, having sparked a widespread re-evaluation among them of their careers and lifestyles, spurred on a wave of departures.

ECRs, well-aware that employment problems were looming to an even greater extent on their already precarious horizons, were very concerned indeed that the pandemic-triggered financial problems in the academic world were endangering their career prospects (AAS - EMCR, 2020; Baker, 2020b; Byrom, 2020; Morin *et al.*, 2022; SMarTeN; Vitae, 2020; Watchorn; Heckendorf; Smith, 2020; Woolston, 2020; Yan, 2020). With good reason, too: after all, junior researchers, being typically employed on fixed-duration, non-tenure track contracts, as they are, certainly were the most vulnerable cohort in the research community, particularly prone to hiring freezes, layoffs and dearth of job openings that the pandemic was predicted to bring about. Indeed, the literature of the early days of the pandemic focussed on the almost insurmountable challenge that securing a share of a decreasing academic pie posed to novice researchers, with the aforementioned threat of their becoming a generation lost to science cited again and again (Baker, 2020a; 2020b; Cardel *et al.*, 2020; Christian *et al.*, 2021; Harrop *et al.*, 2021; Maas *et al.*, 2020; Radecki; Schonfeld, 2020).

Subsequent developments proved the despondent prognostications as to ECRs' circumstances in pandemic-era academe to be accurate enough, as the results of the aforementioned *Nature's 2021 international salary and satisfaction survey* indicate. Junior researchers did turn out to be especially vulnerable, with more than half (53%) of ECRs, including 65% of all postdoctoral researchers, reporting that the pandemic had hampered their prospects, as compared to 39% of researchers in the later stages of their careers (Woolston, 2021b). Predictably, perhaps, for all of the biggest barriers to career progression, identified in the survey (Woolston, 2021a), must pose even more of a challenge for ECRs: thus, for example, competition for funding, the gravest concern of them all, certainly puts researchers with an as yet less impressive track record of publications at a disadvantage, as does, another important concern cited, the lack of appropriate networks/connections, which, obviously, is more characteristic of the circumstances of novice academics.

Doing research in a pandemic-disrupted world: the case of ECRs

The enormity of the challenges that COVID-19 posed to ECRs truly came to the fore once attempts to fend off the pandemic through measures of social distancing, which morphed from time to time into nation-wide lockdowns, were put in place. Arguably, as some of the tasks comprising scholarly work can be undertaken remotely and/or anywhere (as long as there is a laptop available for the purpose), researchers could have been considered luckier than many. In any case, having no say in the matter, just like anybody else, work from home they did when they had to, juggling research and domestic activities as best as they could.

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“ It has forever been the lot of an ever-growing cohort of newly-minted PhD holders, aspiring to win the tight race for the limited numbers of permanent academic positions available, to travel a 'rocky road to tenure' ”

True, for many researchers working from home had its advantages, the greatest of which was the ability to devote their time to a lot of desk work: data analysis, reading, writing –papers and/or grant applications. Not having to commute was cited as another advantage, as was the absence of 'office distractions' when working in one's own space. The flexibility afforded by the practice of working from home was for some researchers, most notably for those with caring responsibilities, a considerable benefit, too, especially as it was seen as affording greater autonomy in working arrangements (Korbel; Stegle, 2020; Rijs; Fenter, 2020; McGaughey *et al.*, 2021; Woolston, 2020).

“ The pandemic worsened pre-existing problematic work-conditions, such as stagnant wages, toxic work environments, bullying and a lack of regard for staff safety and well-being ”

However, working from home was not for everybody, with the difficulty to concentrate at home and technical problems –organising remote teaching is a case in point– most often reported as hindering progress in research work (AAS - EMCR, 2020; Baker, 2020b; Byrom, 2020; Baynes; Hahnel, 2020; Korbel; Stegle, 2020; McGaughey *et al.*, 2021; McGaughey *et al.*, 2021; Minello; Martucci; Manzo, 2020; Radecki; Schonfeld, 2020; *SMaRteN; Vitae*, 2020; Watchorn *et al.*, 2020; Woolston, 2020). It certainly was not for those whose pursuits involved laboratory or field-based work; thus, for example, the above-noted *Nature Survey* found that the majority of respondents (57%) said that the pandemic had impaired their ability to collect data and a similar proportion (55%) said so with regard to conducting laboratory-based experiments (Woolston, 2021b).

Interestingly, the attempts to sidestep the pandemic-enforced onus 'to shelter at home', through an accelerated shift in the scholarly world to online work, were accorded a mixed reception (Watermeyer *et al.*, 2020). Thus, whilst some researchers enthusiastically supported the practice of going virtual for teaching, collaborating, cooperating and networking, citing its cost –and particularly its time– saving properties (Korbel; Stegle, 2020; McGaughey *et al.*, 2021; Olena, 2020; Weissgerber *et al.*, 2020), others lamented the unsuitability of online communications to support the socialising and networking which are –as they should be– an inherent component of meetings and conferences (Kwon, 2020; McGaughey *et al.*, 2021; Watchorn *et al.*, 2020; Weissgerber *et al.*, 2020).

With the restrictions thus wreaking havoc with researchers' customary practices of working to the extent that they did, going about doing research as per usual did not seem a likely possibility. A daunting prospect indeed for any scholar, but especially so for ECRs, whose admittance as full-fledged members to the research community is forever contingent on an impressive track record of research achievements, most notably as measured by papers published in prestigious and high-ranking journals (Hangell; Schmidt-Pfister, 2017; Hollywood *et al.*, 2020; Müller, 2014; Nicholas *et al.*, 2015; Nicholas *et al.*, 2017; Nicholas *et al.*, 2020).

Indeed, ECRs seemed to be hit particularly hard. Thus, for example, for them, as yet relatively inexperienced and less-well-connected researchers, the inability to meet with their lab head and colleagues posed a greater hardship, as did the bans on travel that brought about a lack of networking and cooperating opportunities (Byrom, 2020; *SMaRteN; Vitae*, 2020; Woolston, 2020). The burden incurred by the pandemic-enforced migration to remote teaching, with its host of practical, technical and pastoral challenges, also increased the likelihood of teaching impinging on the time and energies ECRs need to address the all-important demands of their research work (Aubry; Lavery; Ma, 2021; Gates; Gavin, 2021; Górska *et al.*, 2021; Harrop *et al.*, 2021; Minello *et al.*, 2020; *Vitae*, 2020; 2021; Watchorn *et al.*, 2020; Watermeyer *et al.*, 2020; 2021).

However, with life slowly assuming a semblance of normality, although it may very well turn out to be a new, much more online normality, the initial effects of the pandemic on researchers seem to be wearing off. Thus, for example, a comparison of the findings of two surveys, conducted in two different stages of the pandemic –April 2020 and January 2021– among US and European-based researchers, indicates that a considerable change has taken place in their pursuits over the time-range studied. Thus, by January 2021 the amount of time they were spending on their research had almost returned to pre-pandemic levels, with paper submissions and publications appearing to be holding steady, if not on the rise. However, they were found to have pursued fewer new projects in 2020, suggesting that they may have been working on established topics, writing up existing research, writing more grant proposals and revisiting old data (Gao *et al.*, 2021). The writing on the wall thus seems clear: the scholarly world may be recovering from the pandemic, but the long-term effects of the transformations that occurred in the virus-ruled years are yet to be seen, as are the impacts of these transformations on the academic community in general, and the ECRs, among them, in particular.

5. Methodology and data analysis

The *Harbingers-2* project continues the mixed methodology approach of *Harbingers-1*, as detailed in Nicholas *et al.* (2019; 2020) and on the project website³, as it provides for a high-degree of data triangulation: an ongoing literature review to supply context, deep, open-ended interviews and a follow-up questionnaire survey. The findings reported here, however, represent the key insights coming from 3 rounds of interviews, held at 6-month intervals over two years.

The sample population comprises both ECRs who participated in *Harbingers-1*, and new ones, recruited to fill the ranks of participants who have left research or no longer qualify as ECRs (e.g., because they obtained tenure). ECRs were re-

cruited 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 a measure of 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 (a 6% attrition rate).

“ For many researchers working from home had its advantages, the greatest of which was the ability to devote their time to a lot of desk work: data analysis, reading, writing –papers and/or grant applications”

The interview schedule⁴ 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), in each ECR's national language, except in Malaysia where English is widely used. The interviews, typically 75-120 minutes in duration, were recorded, with the transcripts returned to ECRs to ensure accuracy/agreement and to obtain further clarity.

Following the ECRs' approval of the interview transcript, a summary was prepared by national interviewers, which included:

- (a) coded classification of responses to questions, where applicable, which fitted a five-point scheme, labelled in its generic form: Yes; Maybe yes; Don't know; Maybe no; No;
- (b) direct quotes and/or paraphrases of the ECRs' responses, when provided;
- (c) interviewers' comments, clarifications and contextualisation of what has been said when provided.

The per-interview synopses were then consolidated into a single matrix for each of the three rounds of interviews, which, taken together, form the data base of the entire study.

The analysis of the mountain of data obtained in the interviews, whilst already underway, will obviously take time, but the overarching impacts and themes emerging from the vast body of information that we have are already clear. Indeed, after two years of intensive exploration of ECR life under the terms of the 'new scholarly normality' in their respective countries, the team of national researchers are best placed to identify the main developments on the ground as they were unfolding throughout the pandemic. Thus, the findings reported here are essentially the empirical evidence-based key conclusions that the 8 national interviewers came up with when reflecting on the vast body of information provided over the past two pandemic years by the ECRs in three repeat rounds of interviews.

Finally, it is important to note that our case study countries are reasonably representative, including, as they do, the most renowned scholarly communication players (the UK and the US), the most populated country in the world (China), countries from three continents (Asia, Europe and North America) as well as big and small countries (Russia, Poland and Malaysia).

6. Results and discussion

The remit then, for each national interviewer was to identify what the main impacts of the pandemic had been (if any) on ECRs' careers, on the progress of their research undertakings and on their work-life, to predict whether any of the impacts so identified might turn out to be passing or permanent, and to state how their country cohort, as a generation, could be characterised, with the 'lost' generation in the back of their minds. Having been given freedom to describe the local situation as they saw fit –after all, they live in the same country as their interviewees and are researchers in their own right– the national interviewers were, nevertheless, asked to look at what other countries had said in order to jog minds, to standardise responses and provide comparative statements.

Mindful of the different measures adopted in the different countries to mitigate the impacts of the pandemic and, therefore, seeking to provide a comparative framework to the findings, we have adopted a stringency index to aid us in explaining different country outcomes. The index we used for this purpose –*The Oxford Coronavirus Government Response Tracker (OxCGRT)*⁵– is a composite measure of nine of the response metrics: school closures; workplace closures; cancellation of public events; restrictions on public gatherings; closures of public transport; stay-at-home requirements; public information campaigns; restrictions on internal movements; and international travel controls.

As we have seen, early evidence on ECR life under the virus-dictated rules pointed to a rather disheartening state of affairs. ECRs, as the cohort that is particularly prone to the detrimental effects of the pandemic's putting the brakes on productivity, collaboration and cooperation, were busier than ever and justifiably concerned about their career prospects. However, by now the research environment in our study countries has been re-assuming a semblance of normality, except in China, where some of the strictest epidemic prevention and regulation policies in the world are still in place. Still, as the portrayal of the impacts shows, it is, in many respects, we are returning to a new normality, which, importantly, is by now firmly embedded in the scholarly enterprise and looks as if it is here to stay.

In understanding the following country analysis, we need to bear in mind that, as we have noted earlier, that the national interviewers were not provided with a template or list of potential impacts, but instead, complete freedom as to identify what the big impacts were for their ECRs. This means that each country entry –provided here in alphabetical order–, is organised a little differently, which gives each country its individual character. However, for all countries is furnished: 1) A pandemic stringency statement; 2) Main impacts; 3) Possibly permanent changes; 4) A characterisation of the ECR cohort as a generation.

6.1. China

6.1.1. Pandemic background

The *Oxford stringency index* shows China to have the highest stringency score of all the case study countries and it is still rising, unlike in the rest of the world, a state of affairs that, as we shall see, has had a huge impact on ECRs in the country.

6.1.2. Main impacts/changes

Working from home

This is the biggest impact. Using the internet for remote work and teaching is widespread, as is the use of mobile phones and tablets to search, read literature; all part and parcel of ECRs' work practices. Although the benefits of virtual teaching are doubtful, everyone has become accustomed to it. There are still a lot of researchers working from home. In fact, domestic travel, even to places of work, is still difficult. Inefficiency and "burnout" are the consequences of this.

Productivity/publishing

Some ECRs have adjusted their research directions (and paper publishing) to the pandemic to serve society and appear worthwhile. Hopefully, it is thought, that it will be easier to publish their research. There has been no growth in open access (OA) submissions because of the pandemic, but green OA practices are on the up, which is interesting because such practices are not popular in the other case study countries.

Virtual meetings and conferences

With international, and often in-country travel bans in place, online conferences and meetings are the norm and generally accepted.

Networking/collaboration

For more than two years, China has experienced not only the COVID-19 pandemic, but also the strictest epidemic prevention and regulation policy in the world. Even now many areas of China are still under lockdown, occasionally quarantined, and travel bans are rife. This strict management has effectively stopped the spread of the virus, but the entire country's economy, technology, and culture –and, in consequence, it is universities and staff– have been hit hard. International travel and face-to-face communication have completely stopped, and many laboratory reagents, samples, and equipment that must be imported from abroad cannot be easily obtained. Plainly, then, it is challenging to build new collaborations, but already-built partnerships continue.

Preprints

There has been more use/publishing of pre-prints, helped by the building of *ChinaXiv* funded by the *Chinese Academy of Sciences*

<http://chinaxiv.org/home.htm?locale=en>

Outreach

Outreach is still not practised much, but ECRs are thinking about it more now and is expected to increase.

Re-evaluation of what is important in life

The considerable uncertainty brought about by the pandemic has made everyone, including academics, rethink their work and life. Some ECRs no longer regard work as a priority and pay more attention to their health and family. Some are more devoted to their work, hoping to make more significant contributions to society through their research.

Pursuing an academic career

In general, young people face fewer job opportunities and immense competition, and they often have to work harder than their predecessors to maintain a standard of living. For some young people, no matter how hard they try, they cannot reach their predecessor's work achievement and standard of living. However, the work of ECRs has not significantly been affected by the pandemic compared to other professions in China. No one has lost a job, and no one has withdrawn from scientific research.

Country-specific impacts

In China the political and economic impacts of the pandemic have hit academe hard. Changes to scholarly communication behaviour have been dwarfed by huge societal and political currents. Complicating things further, China has become detached from the other parts of the scholarly world in the wake of the confrontation

“ In China, international travel and face-to-face communication have completely stopped, and many laboratory reagents, samples, and equipment that must be imported from abroad cannot be easily obtained ”

between China and the United States. So much so, that ECRs generally feel that Chinese academics' foreign colleagues, reviewers, and journal editors are reluctant to engage with them.

6.1.3. Possible permanent changes

1. Online communication and teaching will partly replace face-to-face academic communication and teaching.

2. ECRs will be even more stressed than before because of their increasing vulnerability in an already highly pressurised and isolated environment.

3. The gap/misunderstanding/difference between China and the West will widen, perhaps not become permanent, but will last for a decade or so, seriously disrupting scholarly communication and collaboration.

6.1.4. Characterisation of cohort

A resilient generation.

6.2. France

6.2.1. Pandemic background

According to the Oxford stringency index, until quite recently (11 March 2022) France was one of the most stringent countries and getting more 'stringent' (higher than China on March 11) until recently. Seemingly, as a consequence, impacts tend to be big and controversial.

6.2.2. Main impacts/changes

Working from home

The biggest impact. In the post-pandemic period remote working is widespread, indeed, the norm. Online activities (teaching, seminars etc.) have gone back to normal, but online meetings have become commonplace.

Virtual meetings and conferences

Whilst teaching, conferences and seminars are again held face-to-face, online meetings have become commonplace. Hybrid scenarios are thought not to engender the engagement of the participants and attendees.

Outreach

Outreach is the activity that all researchers want to be involved in but few do it, even with the example of the pandemic firmly in their minds. However, what they thought of as being outreach changed in between interviews and became more positive towards it. Thus, while during the first round of interviews, outreach was seen as an emergency activity to help the public to understand science and to fight fake news, by the second round of interviews outreach became more of an activity aimed at finding some meaning in a meaningless world. Outreach was thought to be at the opposite end of the publish or perish credo on the publishing spectrum, and, as such, the place to be. In fact, some of ECRs tried to find jobs in this area, given that current French policies are very favourable towards outreach. Most importantly, even those ECRs who are not engaged in outreach wish they could do so, and those who do it, are doing it in many ways, even by threads on *Twitter*. Certainly academics, who typically judge outreach to be a marginal component of the research undertaking, need to realise that ECRs do not see it that way.

Re-evaluation of what is important in life

The pandemic made an already precarious position even more precarious for French ECRs, hitting them where they are most vulnerable. Indeed, for the majority of ECRs the pandemic just added to a long list of problems they were already facing – the prevailing scarcity of tenured positions, budget cuts and the reforms of the *Higher Education Minister*, which made their employment situation even more precarious and increased the scarcity of permanent positions. No wonder that the two months of total lockdown was very hard on the French cohort and made them sit-up and think. During this period, reflections and introspections focused on the importance –the urgency for some– of finding stability: finding a stable job that would guarantee the serenity and quality of a sedentary life, supposing such a job existed. They sought refuge from the pandemic storm.

Pursuing an academic career

Hardly surprisingly then, the French cohort saw a greater number of ECRs leave the system and the project (15% compared to about 5% in the other countries).

China has become detached from the other parts of the scholarly world in the wake of the confrontation between China and the United States. So much so, that ECRs generally feel that Chinese academics' foreign colleagues, reviewers, and journal editors are reluctant to engage with them

In France what they thought of as being outreach changed in between interviews and became more positive towards it. Thus, while during the first round of interviews, outreach was seen as an emergency activity to help the public to understand science and to fight fake news, by the second round of interviews outreach became more of an activity aimed at finding some meaning in a meaningless world

So, their behavioural change could not have been bigger –they simply left so they were not in the firing line. Those who gave up the race for academic positions have gone into industry, private Catholic universities or into under-qualified positions intended to support research. However, they all hope to return at some point to academic research, and maintain their publishing activity as an insurance policy.

Country-specific impacts

The greater acceptance of working from home as a consequence of the pandemic has brought about an unexpected and unwelcome outcome in France: a class divide has been opening up –tenured seniors work distantly and junior researchers come into work. Indeed, distant working has become a new mark of distinction, a demarcation line between the haves and the have-nots, with novice researchers left feeling abandoned by their senior colleagues. Making things even worse, many ECRs feel that OA is introducing a new inequality between researchers, labs and countries, because it is up to the senior researchers, who hold the academic purse strings, to pay (or not) for publishing in OA or hybrid journals.

Another development characterising France, although not unique to it, is that *Sci-Hub* has become an inherent component of the new normal, so much so, that it has partly usurped the library. ECRs mention it as one of the resources they use daily for their work –on their scholarly dashboard in other words, although they do claim to use it only as a last resort. They certainly do not regard the use shadow libraries as unethical, and, in any case, for them the end justifies the means.

6.2.3. Possible permanent changes

1. The normalisation of distant working for researchers has created an atmosphere where physical presence is synonym for precariousness and distance is synonym of privilege. Besides, efficiency of work, agility and flexibility is less present in the labs where there are many people who are working distantly, which means that in some places, it affected the quality of work.
2. Online meetings are now completely embedded in the daily working life, without any distinction between topics that deserve physical meetings and those that can be dealt with online.

6.2.4. Characterisation of cohort

A resilient generation, bends without breaking and unnerved by events and increasingly protesting and revolutionary.

6.3. Malaysia

6.3.1. Pandemic background

Currently Malaysia shows the second highest Oxford stringency score after China, another Asian country and one where there have been many changes.

6.3.2. Main impacts/changes

Working from home

To slow the transmission of the virus and ease the burden of the health system, the *Ministry of Higher Education* included university closure as part of the physical distancing policy. Mental stress is often cited among academics in Malaysia who have had to migrate to online learning, and this also true of Malaysian ECRs, who teach. Those with caring duties, a high teaching workload –and hence, the need to shift to remote learning– and administrative obligations had the greatest problems, but not for long. Certainly ECRs have proven that they are built to handle stress, have coping mechanisms, and are resourceful. They now rely heavily on the use of web conferencing-based remote learning tools for synchronous teaching, subscribed to by the universities, such as *Zoom*, *Webex* and *Microsoft Teams*. Remote work has definitely become the norm.

Productivity/publishing

There are very little signs of scientific research being significantly disrupted during the pandemic –only those with lab work were really affected. In fact, for most, working from home made some scholarly tasks easier, for instance, working on grant applications, writing their thesis or research reports, and publishing journal articles. ECRs felt this was the time to be extremely productive, and were hopeful that there would be flexibility to work from home even after the worst of the pandemic is over. Those few ECRs, who were not able to conduct some of the research planned under the terms of their grants, were able to change the methodology or replace the content and satisfy their funders. Most were remarkably resilient and resourceful. Those who had been producing fewer research outputs, were also quite confident that they would be able to secure a permanent post once they fulfilled the publication requirement by the end of 2021. At present, academics are back on campus, working on site, as there are concerns that there would otherwise be losses in productivity for those with caring, teaching and administrative demands if working from home continues.

“ The pandemic has brought about an unexpected and unwelcome outcome in France: a class divide has been opening up –tenured seniors work distantly and junior researchers come into work. Indeed, distant working has become a new mark of distinction ”

“ In Malaysia, those with caring duties, a high teaching workload –and hence, the need to shift to remote learning– and administrative obligations had the greatest problems ”

Virtual meetings and conferences

Most ECRs, by now customarily working online and communicating remotely, say that they will shift to online conferences because it saves time and travel-related expenses, which, as a rule, are not covered by their institutions for contract staff.

Pursuing an academic career

Academic tenure is what Malaysian ECRs are aiming for, even the post-doc and doctoral students are not open to different career path. Most are confident of job security and career development if they produce the requisite publications in IF-journals. Their views of IF-factored journals as the gold standard in publishing have not changed because of the need to achieve their KPI (key performance indicator). A few were even hired during the pandemic, because they had *Web of Science*-indexed publications in their CV. At the end of the third round of interviews, more than 15 ECRs have secured a permanent post and another two completed their PhD studies and were offered a research contract.

Malaysians' views of IF-factored journals as the gold standard in publishing have not changed because of the need to achieve their KPI (key performance indicator). A few were even hired during the pandemic, because they had *WoS*-indexed publications

Country-specific impacts

The implementation of the *Movement Control Order* in March 2020 resulted in universities fully switching to online learning. As a result, higher education in Malaysia has changed dramatically with a very distinctive rise in online learning, where teaching is conducted remotely on digital platforms. Even though the government has allowed universities under the *Higher Education Ministry* to reopen the campus in stages from March 1 2022, the institutions must have the required space to accommodate physical classes with strict adherence to the standard operating procedure for teaching and learning sessions and allowed to conduct the sessions in a hybrid manner or online.

6.3.3. Possible permanent changes

1. The big (positive) long-term impact is the use of online platforms and digital tools that make ECRs feel connected to their research team; working remotely continues and becomes the new norm.
2. Remote learning and hybrid classrooms the norm. Academics are at different points in their comfort and skill-set with remote teaching, and universities are cultivating a culture of improvement that would benefit both their students and the faculty.
3. Most ECRs have established a habit of working online and communicating remotely and will shift to online conferences because it saves time and travel-related expenses. They opt for online because they do not have access to institutional funding that covers the registration fees and the other expenses involved (travel, accommodation).
4. The competitive academic environment means researchers need to engage in active self-branding (visibility) to build their reputations and this is seen among Malaysian ECRs –using *LinkedIn* to build their online narrative and adding publications, projects and other research-related outcomes.

6.3.4. Characterisation of cohort

A resilient (and resourceful) generation.

6.4. Poland

6.4.1. Pandemic background

Poland, according to the Oxford stringency index was the least disrupted of all our case-study countries and this partly explains why, as we shall see, Polish ECRs have been impacted the least out of all the case study countries. Indeed, Polish ECRs had relatively little to say on the effects of the pandemic on their scholarly view, practices and work-life.

6.4.2. Main impacts/changes

Working from home

The pandemic brought about an increased and rapid spread of remote forms of teaching in Polish universities (mainly using *Teams*, but also *Google Meet/Zoom/Webex*).

Productivity/publishing

ECRs found remote learning and teaching more convenient and time-saving (for, instance, by a reduction in the time spent commuting to the university). Thus, as they pointed out, they could spend more time on research, which would hopefully improve productivity.

Poland, according to the Oxford stringency index was the least disrupted of all our case-study countries and this partly explains why Polish ECRs had relatively little to say on the effects of the pandemic on their scholarly view, practices and work-life

Virtual meetings and conferences

A direct effect of the pandemic was the growing prevalence of remote meetings: seminars, team meetings, examination boards and conferences. However, opinions

are divided with regard to the shift to virtual meetings, with some ECRs preferring online communication whilst others –face to face.

Networking/collaboration

Some ECRs used the time they were forced to spend at home to take greater care of their 'business cards' on the web, e.g., their profiles and accounts on various media/ services/ platforms, to promote themselves and obtain visibility in the scholarly community.

Country-specific impacts

Polish ECRs were *reluctant to answer directly* questions related to the impact of the pandemic, probably because they did not feel the impact of the pandemic on their work at all, other than, of course, where it came to remote teaching and virtual conferences and meetings. Some of those who worked in laboratories or did field work noted delays in their research (approximately six months due to lockdowns). Moreover, by the time of the third interview, when the war in Ukraine broke out, the concern about it seemed to have replaced the worries (if any) regarding the pandemic, to the extent that the pandemic became unimportant.

6.4.3. Possible permanent changes

1. Due to the convenience and familiarity with *MS Teams, Google Meet, Zoom, Webex*, etc., time will be saved which will lead to increased research productivity.
2. More remote classes offered by educational institutions will help ECRs who are studying for their doctorates as well as those teaching students.
3. Hybrid conferences may turn out to be the best of both worlds.
4. ECRs who were not using *MS Teams, Google Meet, Zoom, Webex*, etc., prior to the pandemic will continue to use them to some extent when connecting with colleagues and potential and existing collaborators.
5. More researchers are likely to care about their online visibility.

6.4.4. Characterisation of cohort

A resilient generation.

6.5. Russia

6.5.1. Pandemic background

Russia initially reacted strongly to the pandemic then then scaled down quickly and, as a consequence, things are very much back to normal, aside from remote working although the conflict in Ukraine means that conference attendance and international collaboration is proving difficult, meaning quite a long period of isolation for many ECRs.

6.5.2. Main impacts/changes

Working from home

At its onset, the pandemic posed many challenges for Russian universities and researchers, most notably because of the need to re-organise work and teaching. Coping with colleagues falling ill was stressful and affected work, for the same amount of work had to be done despite colleagues' absences. However, towards the end of the pandemic universities learned to cope and ECRs have adapted to the situation. Beyond that, by now work, communication and teaching are again done face-to-face. Still, the one big change, which might in the end turn out to be permanent change, is the normalising of hybrid working and communication: working from home, hybrid conferences, online meetings and lectures, using digital services.

Productivity/publishing

Research directions have not changed though, with most ECRs reporting no changes in duties or roles due to the pandemic.

Virtual meetings and conferences

The ban on travel posed a significant challenge to Russian scientists, who were used to actively participating in international conferences before the pandemic.

6.5.3. Possible permanent changes

1. Hybrid conferences are here to stay.
2. Research institutions will be more accepting of working from home.
3. Online meetings will become a normalised.

6.5.4. Characterisation of cohort

A resilient generation.

6.6. Spain

6.6.1. Pandemic background

Spain never occupied a place at the top of the stringency index and is currently the 3rd least stringent.

6.6.2 Main impacts/changes

Working from home

In the case of Spanish ECRs, the main impacts of the pandemic in its first year were the strict restrictions on travelling and the lockdowns. In the main it affected researchers at universities because they had to change their teaching methods to serve distance students. This situation required a significant extra effort, which

meant less research done. However, since then in some institutions face-to-face teaching was slowly reinstated, often as one option afforded by a hybrid teaching system. Thus, face-to-face (masked) and virtual classes were conducted in parallel, with some students attending in person while others followed the classes from home. The hybrid system was very demanding for ECRs who taught. For doctorate students it was a problem not having the opportunity of visiting other universities abroad, which is integral to their studies.

“ In the case of Spanish ECRs, the main impacts of the pandemic in its first year were the strict restrictions on travelling and the lockdowns ”

Productivity/publishing

The impossibility of carrying out field work and the restrictions in laboratory work delayed the collection of new data, but working from home also allowed for greater concentration on work, not wasting time traveling, writing pending papers and publishing more. So, things evened up. By now, with the restrictions almost completely lifted, field and laboratory work are almost back to pre-pandemic times. Publishing open access has become the default way of publishing for most ECRs in Spain –it has become normalised and the pandemic has helped in this. Everyone is positive about sharing data, but this practice has not yet fully penetrated the cohort.

Virtual meetings and conferences

By the current academic year, the situation has normalised, but online meetings and hybrid conferences continue. Holding meetings of all kinds online is here to stay. Everybody has become familiar with *Zoom*-type platforms and it is evident that they can successfully replace trips costly in time and money. Many courses and conferences will continue to use the hybrid format that makes it easier to attract attendees.

Preprints

The popularity of preprint servers, brought on by the pandemic, are not of much interest to Spanish ECRs. They are focused on publishing as much as possible in high ranked journals, preferably open access, if they get money to pay for them. Junior researchers are also suspicious of preprints, fearing that publishing preprints means foregoing the possibility of publishing in a high impact journal.

“ The popularity of preprint servers, brought on by the pandemic, are not of much interest to Spanish ECRs. They are focused on publishing as much as possible in high ranked journals, preferably open access, if they get money to pay for them ”

Outreach

Making lay members of society aware of their research has gained greater prominence among researchers as a result of the pandemic. ECRs, too, believe that it is crucial to get the support of the general public and they make an effort to achieve this, although it is the most experienced ECRs who practice outreach the most, because they are more experienced in research work. PhD students and recent PhDs are still very concerned about peer-to-peer publishing and feel that they need to spend all their time on it.

Pursuing an academic career

Despite the competitive and precarious environment in which they work, Spanish ECRs are positive about their future and rarely think of leaving. They are a resilient generation.

6.6.3. Possible permanent changes

1. Stronger preference for publishing open access will remain.
2. Greater efforts will be made to involve the general public in science.
3. The combination of virtual and face-to-face for meetings and conferences will reign on.

6.6.4. Characterisation of cohort

A resilient generation.

6.7. United Kingdom

6.7.1. Pandemic background

The UK was quite slow to ramp up restrictions initially, reaching a peak in Spring 2021 and dropping sharply towards the end of the study. The UK now is the second least stringent with most things outwardly back to normal, although there is an overhang impacting on ECRs.

6.7.2. Main impacts/changes

Working from home

The central impact of the pandemic on researchers and on their research was being forced to stay at home (especially during the first lock-down) and not being able to go into the lab or the field with, in all cases, a varying loss of results depending on the nature of their work – mice dying was perhaps the most upsetting. This had a particularly severe impact on candidates for doctorates: in almost all cases (10), except those near to finishing, the scope of the research had to be restricted and workarounds discovered.

As to remote teaching – not all ECRs had to teach, but those that did found that teaching virtually rather than in person, because of the pandemic, was less satisfactory from a pedagogic point of view both for the teacher and for the student. Still, when students used to virtual teaching were expected to go back into the classroom, they often did not turn up and concentrated badly.

Productivity/publishing

Research was definitely disrupted in the lockdowns stage of the pandemic. Several ECRs who expected their data to be analysed by another researcher, in accordance with the schedule which had been agreed, found they were not able to hand over their results for this analysis. However, they learnt software and did the work themselves when at home. Indeed, it was their impression that in spite of their short-term inconvenience, they had acquired skills which would be useful to them in the future. Others had a more negative outlook.

The impression is that the pandemic has, if anything, led to an increased emphasis on publishing OA. We did not see any resurgence of green except among the physicists even though some funders were happy with green. It has been suggested that there was a loss of interest in gold OA but this was not found to be the case. They all asserted the millennial beliefs of openness, sharing and transparency and this might explain their interest in publishing OA. However, answers relating to open data did not show any increase in sharing probably because the data produced by ECRs in medicine and social sciences (15 of the total) was usually not available in quantitative form.

Virtual meetings and conferences

It was generally agreed that it would be a pity if the recognised advantages of virtual conferences (cheaper, making the content available to ECRs as well as researchers from lower income countries) were to be lost, but the consensus seemed to be that so far there was no successful format for hybrid conferences. One ECR argued that studying the programme at a virtual conference and following up those speakers whose work interested was a better use of their time than the serendipitous approach that has been popular in the past.

For ECRs lab talks and local seminars have been an excellent way to showcase their early research and this continues to be true virtually and in person. In-person has not entirely taken over, and when they are preferred, it is because they are easier to operate. It is likely that virtual seminars will continue to be part of the way in which scientists cooperate, especially when a very important scholar is visiting.

Networking/collaboration

It was generally agreed that networking leading to collaboration was easier if conducted face to face rather than virtually. Those who, as of the third round of interviews, had been able to attend an in-person conference (sometimes for the first time) found that this was, indeed, the case. However, ECRs were very positive about the new virtual skills (*Teams* and *Zoom* for example) and realised that they could manage networking at a distance. Use of these skills marks a permanent change in preferred scholarly communications. The predecessors to *Zoom*, such as *Skype*, have almost disappeared from sight. There is no reason to suppose that these people will not use these new skills. Many doctoral candidates and post-docs have planned visits to labs and attend conferences, both of which, at the beginning of the pandemic could not be accomplished. The inability to do so was perceived as a serious setback, which, however, by now was seen as much less of a problem.

UK ECRs confirm one change due to the pandemic in their networking/visibility enhancing behaviour: the new predominating use of *Twitter*, which comes largely at the expense of *ResearchGate*. The post pandemic picture sees tweeting a link as active whereas adding a link to your profile on *ResearchGate* is an essentially passive move. It is too early to see the new status of *Twitter* as

“ As to remote teaching – not all British ECRs had to teach, but those that did found that teaching virtually rather than in person was less satisfactory from a pedagogic point of view both for the teacher and for the student ”

“ It has been suggested that there was a loss of interest in gold OA but this was not found to be the case. They all asserted the millennial beliefs of openness, sharing and transparency and this might explain their interest in publishing OA ”

being a permanent change. *Twitter* also provides a forum for some ECRs, especially the senior ones among them, which seems to replace the forums provided by special *Facebook* groups.

Preprints

ECRs did see a relationship between the pandemic and the use of preprints both to achieve visibility and (maybe) feedback, and for looking to see what others were up to. The latter use preceded the former one, which took a while to become normal, but did do so during the course of the project. However, those who put earlier versions of an article on a preprint server did not come from all the disciplines and mostly came from the life and medical sciences (25% each of the cohort). The two physicists in the UK cohort used *arXiv* because this is what physicists do, but preprint servers have never been seen as an alternative to journal publication in physics disciplines. The attitude of the single chemist in the cohort over the period of the project had changed from doubts about putting a version of a paper into a preprint server to a decision to offer to a server with a next publication. For UK ECRs it is possible to see a majority of ECRs using preprint servers more than before COVID and there is no reason to suppose that this change in behaviour will not be continued. Others did not know of an appropriate preprint server in their discipline, including (rather surprisingly) most of the psychologists.

A few ECRs, however, were worried about preprints, qualifying the general approval of preprint use by concern that journalists do not always differentiate between preprints and peer-reviewed articles, either due to ignorance or a wish to get ahead of the pack by highlighting an exciting finding. For example, an ECR working on clinical trials was concerned that decisions about (clinical) trials would be made based on preprints which could lead to negative consequences. One medical scientist decided not to post her work as a preprint because she was worried that the more preliminary stage in her work would be seen as complete. Indeed, although ECRs were reluctant to blame the pandemic for lowering of standards, but pressure to get out papers in COVID related areas was condemned.

Outreach

It was generally agreed that the pandemic has resulted in an increased understanding of how science is done, because of the increased interest in COVID. Trust in science was important and there is no reason to suppose that this was a temporary phenomenon. The majority of ECRs are convinced of the importance of reaching out to the general public and exposing them to good science. Many took part in special workshops for the general public invited by their universities and also stakeholders such as fishermen and farmers but they did not buy into reaching out to policy makers (too junior?). Interaction with industry depending very much of the nature of their research. It is likely that this will continue in the future.

Re-evaluation of what is important in life

The experience of going through the pandemic has led many ECRs to an evaluation of their work/life balance, which might be one of the reasons for some of them taking the decision to leave the academy. The pandemic has highlighted and amplified the poor work/life balance for ECRs (and junior ECRs can see how senior ECRs also suffer). Also, the new emphasis on wider engagement brought on by the pandemic, particularly with the public, seems to have led to a wish among some to do a job which involves more impact and makes more of a difference.

Thus, one ECR's reflection is worth noting, as many other ECRs might well have been in agreement with it:

"I think the pandemic has had a profound impact on our relationship to work. Firstly, there is obviously the disruption itself but I think this has had a cascade effect even when work was allowed to continue. Personally, it has led me to feel like I have had to 'catch up' all the time, leading to even more stress and pressure on myself because you constantly feel like you're not doing enough or falling behind. I have spoken to many who have felt the same, and are trying to develop a healthier relationship to work as a result. I think generally, it has been an inflection point which will have caused many people to stop the 'autopilot' and really question how they do what they do. It's also been an opportunity to see how open-access, sharing information, and funding science can have a positive impact on research and society. I hope that the lessons learnt from the pandemic will make academia a more open, healthy, collaborative and sustainable environment to work in".

Pursuing an academic career

More UK ECRs have decided against staying in the academy than in any other country, planning either on leaving immediately or as soon as a grant runs out/ a job outside comes up. None of the ECRs (about a sixth of them) planning to leave the academy have changed their mind and if anything, their intention has been strengthened. However, ECRs in UK resolutely refused to agree that the pandemic has been the reason for the wish to leave, al-

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“ The experience of going through the pandemic has led many British ECRs to an evaluation of their work/life balance, which might be one of the reasons for some of them taking the decision to leave the academy ”

though the aforementioned re-evaluation of the work/life balance in the wake of the experiences during the pandemic are plainly as the main reason for departure. A secondary or alternative reason is the wish to do something more useful/practical again contrasted with what happens in the university. It is not surprising that in many if not most UK universities there has been a new concern about the needs of ECRs not being met, inclusive of a concern that mentoring should be taken more seriously, and it is probable that this could be marked as a permanent impact of the pandemic.

“I think generally, it has been an inflection point which will have caused many people to stop the ‘autopilot’ and really question how they do what they do”
(British ECR)

Generally, we have noted how UK and US had so much in common regarding scholarly communications but when it comes to the pandemic, we have a very different story. While US ECRs have been discouraged by the pandemic experience but are resilient in deciding to continue their careers in academic research, UK researchers are not so resilient and minded to leave academe. This is because of two factors: 1) the pandemic has highlighted and amplified the poor work/life balance for ECRs (and junior ECRs can see how senior ECRs also suffer); 2) the new emphasis on wider engagement brought on by the pandemic, particularly with the public, seems to have led to a wish among some to do a job which involves more impact and makes more of a difference.

Country-specific impacts

Quite a number of ECRs suggested that COVID had a less serious impact on their work than Brexit, because of the possible loss of funding if the UK is removed from the *Horizon Europe* programme. Overall, ECRs were mostly resistant to ascribing the pandemic as a cause for anything, apparently believing that apart from working from home and the push to the virtual world it had little impact.

6.7.3. Possible permanent changes

1. A majority of ECRs will use preprint servers more than before COVID.
2. The importance of reaching out to the general public is recognised and it is likely that this will continue in the future.
3. ECRs were very positive about the new virtual skills (*Teams* and *Zoom*, for example) and realised that they could manage networking at a distance. Use of these skills marks a permanent change in preferred scholarly communications
4. Virtual seminars will continue to be part of the way in which scientists cooperate.
5. In many if not most UK universities there has been a new concern about the needs of ECRs not being met and this could be marked as a permanent impact of the pandemic.
6. Mentoring will be taken more seriously.

Quite a number of ECRs suggested that COVID had a less serious impact on their work than Brexit, because of the possible loss of funding if the UK is removed from the *Horizon Europe* programme

6.7.4. Characterisation of cohort

A disappointed generation, with the pandemic sowing the seeds of disappointment.

6.8. United States

6.8.1. Pandemic background

The US was middling in terms of stringency but quite late in reducing restrictions.

6.8.2. Main impacts/changes

Working from home

Many ECRs missed being on-site or attending in-person meetings, and many had to work remotely at some point during the pandemic. The benefits of remote work mentioned were the ability to focus without interruptions, flexibility with work schedules, and more time available due to less commuting to/from work. It also led to ECRs creating new ways of obtaining data from human subjects that would not have happened if not for the pandemic. Several ECRs, who had teaching responsibilities, had to shift to remote teaching, with both asynchronous and synchronous methods mentioned.

Women with children at home tended to express more strongly issues with anxiety and, at times, inability to work, at least during the first part of the pandemic (of the three males interviewed, who had responsibilities as a caregiver, there was not much mentioned about childcare). However, remote work gave some of these ECRs the ability to be flexible with their time (e.g., working after putting children in bed at night).

Productivity

There was certainly a hit to research productivity in the early months of the pandemic, with ECRs who worked primarily in labs or with human subjects or with ECRs dealing with childcare and/or health issues (both physical and mental). However, several ECRs were able to maintain a similar level in their research productivity during the pandemic and a few even expe-

rienced an increase in productivity. Shifting to alternative data collection methods, conducting different analyses of existing data, and writing more papers were mentioned. A few ECRs, already engaged in long distance collaborative research projects, switched to remote work. A few ECRs mentioned dropping any activity that was not a priority (e.g., service, peer reviewing), and a few also mentioned that less commuting provided more time for work.

“ Most of those who did attend at least one virtual conference said they stopped doing so. (...) they had other distractions during the conference, whereas when they attended in-person conferences, there was more focus on the speakers and networking ”

Virtual meetings and conferences

A few ECRs also suggested travel for meetings would likely be less after the pandemic because now everyone is comfortable with *Zoom*. However, most ECRs disliked the pandemic-induced move to virtual conferences. Most of those who did attend at least one virtual conference said they stopped doing so. The main reason was they could not manage their time, i.e., they tended to do other work or had other distractions during the conference, whereas when they attended in-person conferences, there was more focus on the speakers and networking. A few ECRs acknowledged that there was less cost with virtual conferences, and more potential and diverse attendees, but said that in the future they would participate in virtual conferences if they were interested only in a few sessions or if there were issues with travel. Hybrid conferences might be therefore the option of choice.

Networking/Collaboration

Many ECRs said that collaborations were hindered in some way –either by not forming or by not maintaining ties (or both) with collaborators. The reasons most given was the inability to attend in-person meetings or conferences, or participating in other in-person activities, such as meeting over coffee or during dinner. Some of those ECRs who mentioned the inability to form collaborations were concerned that there would be a gap in their future research productivity. For example, several ECRs, who had grants going into the pandemic or were awarded grants during the pandemic, noted that obtaining their grants had been helped by in-person interactions with people well-before the pandemic. A few ECRs mentioned, however, that setting up collaborations and maintaining ties were easier with *Zoom* (e.g., versus emails and phone calls).

Peer review and posting preprints

Almost all ECRs complained about peer reviews being very slow during the pandemic and a few mentioned that editors were having trouble finding reviewers. Some also questioned the quality of the COVID-related peer reviews due to the sheer number of those papers that were published during the pandemic. In result, there will be more acceptance and use of pre-prints, which may accelerate research but endanger its quality.

Outreach

Some ECRs suggested that providing COVID-related papers quickly eventually led to confusion in the general public, especially if these had not been peer reviewed.

Re-evaluation of what is important in life

A few ECRs came out of the pandemic with the desire to make changes in their work lives, spending less time on work. These tended to be older ECRs or those closer to the Associate Professor stage of their careers.

Pursuing an academic career

The vast majority of ECRs just kept chugging along, working, overcoming obstacles, and/or innovating, i.e., doing whatever they needed to do to continue down their career paths. This should not be a surprise: reaching the doctoral level in academia typically requires a certain amount of both resilience and perseverance traits, so ECRs must have started off the pandemic as a breed of humans who have already proven they can do what is necessary to keep moving forward with their goals, and demonstrated these traits throughout the pandemic.

6.8.3. Possible permanent changes

1. Research institutions more accepting of work from home.
2. Continued use of virtual human subject data collection methods.
3. Decrease in travel due to more comfort with *Zoom*.
4. More remote classes offered by education institutions.
5. More acceptance of remote work for parents with children.
6. ECRs who were not using *Zoom* prior to the pandemic would likely continue to use *Zoom* to some extent when connecting with colleagues and potential and existing collaborators.
7. Move to hybrid conferences.
8. Due to slow peer review during the pandemic, more acceptance and use of pre-prints, which may hurt science as much as it helps science.
9. Less time spent on work.

6.8.4. Characterisation of cohort

A resilient and perseverant generation.

7. Conclusions

Without doubt, the biggest finding to emerge from the project has to be that ECRs proved the doomsters wrong, not only did they survive, but some prospered and their future prospects (in an increasingly virtual world) look good, if turbulent for Chinese, French and Russian ECRs. Thus, the project started out with 177 ECRs and finished with 165 after two long COVID years of being interviewed. Just above a 6% attrition rate –most leaving research or unable to spare the time then, despite the fact that the world and academe faced one of the greatest challenges it has ever had and still faces it to some extent, especially in China. Hardly anyone 'lost' their precarious job. This is why we prefer to refer to our ECRs, not as the lost or broken generation, but as the resilient generation.

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With the exception of the UK cohort who we can more aptly describe as the resilient and disappointed generation because the pandemic had provided the time and opportunity to reflect and re-think their career paths, which meant some did, or were planning, to jump ship.

There is much in common in regard to the pandemic impacts felt internationally and there is a general consensus as to what the permanent changes are going to be, so policy makers would be advised to wake up to what ECRs told us. After all, these researchers represent the biggest group of researchers, are on the research frontline and really constitute the research work horses undertaking all the scholarly communication activities as they do.

Behind most of the changes that have occurred lies the transition to working from home (WFH) or at a distance and the consequent move to the virtual world this brings with it for all kinds of activities once conducted physically –teaching, collaborating, networking, meeting etc. Thus, many of the scholarly activities once conducted largely physically are now undertaken remotely and virtually and appear firmly embedded in the scholarly enterprise. It is felt that this transition will prove to be cost effective and productive, more convenient and generally welcomed, but not by all. It follows then, that there will be greater acceptance of working from home as a consequence and this will be of particular benefit to parents who have children and researchers that like having a thinking space. WFH, however, can have unintended and unwelcome outcomes as the French experience shows, with a class divide opening up –seniors, in charge of their own destiny, work distantly and junior researchers coming into work to manage the laboratories and do the lectures.

Another, perhaps less hyped manifestation of working in a digital environment is the greater need to establish a virtual identity and presence, and we can clearly see how *Twitter* and *LinkedIn* in particular have benefitted here. Even *TikTok* is being touted by Chinese and Malaysian ECRs in this regard, often to the cost of *ResearchGate* and *Academia.edu*, who have the appearance of waning giants.

As to conferences, everyone believes that hybrid conferences will become the norm, although it is recognised, they are not perfect, but costs, convenience and accessibility wins out for ECRs especially as they are back of the queue when travel and accommodation expenses were handed out. The playing field has been levelled for them.

There is a belief, but not as universally exhibited: 1) that preprint servers will be here to stay, especially as a consequence of slow peer review, but the downside is it may hurt science as much as it helps science; 2) of the increased importance of reaching out to the general public and it is likely that this will continue into the future.

China, though, is the odd one out and has become isolated because of containment policies and international politics, which it will take many years to emerge from, with ECRs more stressed than before because of their vulnerability in a highly pressurised and isolated environment, which favours those in a tenured post and those already in collaborations. The gap/misunderstanding/difference between China and the West is expected to widen, so, interrupting the international flows of scholarly communication and collaboration. The Ukraine conflict is doing something similar to Russia researchers.

The new normal then is an increasingly virtual one, with all its attendant perfections and imperfections. Given the fact that ECRs are somewhat better at operating in the virtual world than their seniors (we were frequently told this was so) we can end on a good news note in respect to the future of the early career researcher. However, a small word of warning, there could be a black cloud over the horizon, with existing generational differences and tensions having been further exposed and exacerbated by the pandemic, especially so in the cases of China and France.

“ The biggest finding to emerge from the project has to be that ECRs proved the doomsters wrong, not only did they survive, but some prospered and their future prospects (in an increasingly virtual world) look good, if turbulent for Chinese, French and Russian ECRs ”

8. Notes

1. *Harbingers-2 – Early Career Researchers and the Pandemic*:

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

funded by the *Alfred P. Sloan Foundation*:

<https://sloan.org>

2. Our definition of the term focusses on the common denominators of their standing in the scholarly world, i.e., their being employed in a research position but, being young and in an early phase of their career, not yet established as researchers: Researchers who are generally not older than 45, who either have received their doctorate and are currently in a research position or have been in research positions, but are currently doing a doctorate. In neither case are they researchers in established or tenured positions. In the case of academics, some are non-tenure line faculty research employees.

3. <http://ciber-research.com/harbingers.html>

4. For the full interview schedule see:

http://ciber-research.com/harbingers-2/20201202-H2-Interview_schedule-1.pdf

5. <https://ourworldindata.org/grapher/covid-containment-and-health-index?tab=chart&country=CHN~USA~GBR~ESP~FRA~RUS~MYS~POL>

9. References

AAS; EMCR-Early; Mid-Career Researcher Forum (2020). *Impacts of COVID-19 for EMCRS*. National survey report, August 12. Australian Academy of Science.

<https://www.science.org.au/files/userfiles/support/documents/covid19-emcr-impact-report.pdf>

Aubry, Lise M.; Laverty, 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>

Baynes, Grace; Hahnel, Mark (2020). "Research practices in the wake of COVID-19". In: *Digital science report. The state of open data 2020*. London: Digital Science; Figshare, pp. 22-25. ISBN: 978 1 9993177 5 1

<https://doi.org/10.6084/m9.figshare.13227875.v2>

Bennion, Alice; Locke, William (2010). "The early career paths and employment conditions of the academic profession in 17 countries". *European review*, n. 18, S1, S7-S33.

<https://doi.org/10.1017/S1062798709990299>

Brechelmacher, Angelika; Park, Elke; Ates, Gülay; Campbell, David F. J. (2015). "The rocky road to tenure - career paths in academia". In: Fumasoli, T.; Goastellec, G.; Kehm, B. M. (eds.), *Academic work and careers in Europe: Trends, challenges, perspectives*. Cham: Springer, pp. 13-40. ISBN: 978 3 319 10720 2

Byrom, Nicola (2020). "COVID-19 and the research community: The challenges of lockdown for early-career researchers". *eLife*, n. 9, e59634.

<https://doi.org/10.7554/eLife.59634>

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>

Castellacci, Fulvio; Viñas-Bardolet, Clara (2020). "Permanent contracts and job satisfaction in academia: Evidence from European countries". *Studies in higher education*, v. 1, n. 15.

<https://doi.org/10.1080/03075079.2019.1711041>

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>

Gao, Jian; Yin, Yian; Myers, Kyle R.; Lakhani, Karim R.; Wang, Dashun (2021). "Potentially long-lasting effects of the pandemic on scientists". *Nature communications*, v. 12, 6188.

<https://doi.org/10.1038/s41467-021-26428-z>

- 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** (2022). "Has the 'great resignation' hit academia?". *Nature*, n. 606, pp. 211-213.
<https://doi.org/10.1038/d41586-022-01512-6>
- Górska, Anna-Maria; Kulicka, Karolina; Staniszevska, Zuzanna; Dobija, Dorota** (2021). „Deepening inequalities: What did COVID-19 reveal about the gendered nature of academic work?”. *Gender, work and organization*, v. 28, n. 4, pp. 1546-1561.
<https://doi.org/10.1111/gwao.12696>
- Hangel, Nora; Schmidt-Pfister, Diana** (2017). "Why do you publish? On the tensions between generating scientific knowledge and publication pressure". *Aslib journal of information management*, v. 69, n. 5, pp. 529-544.
<https://doi.org/10.1108/AJIM-01-2017-0019>
- 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>
- 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>
- Hollywood, Amelia; McCarthy, Daniel; Spencely, Carol; Winstone, Naomi** (2020). "'Overwhelmed at first': the experience of career development in early career academics". *Journal of further and higher education*, v. 44, n. 7, pp. 998-1012.
<https://doi.org/10.1080/0309877X.2019.1636213>
- Korbel, Jan O.; Stegle, Oliver** (2020). "Effects of the COVID-19 pandemic on life scientists". *Genome biology*, v. 21, n. 113.
<https://doi.org/10.1186/s13059-020-02031-1>
- 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>
- Lederman, Doug** (2021). "Higher ed workforce shrank by 4% in fall 2020". *Inside higher ed*, December 14.
<https://www.insidehighered.com/news/2021/12/14/higher-ed-workforce-shrank-4-fall-2020>
- 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>
- Maher, Brendan; Sureda-Anfres, Miquel** (2016). "Young scientists under pressure: What the data show". *Nature*, v. 538, n. 7626, pp. 444-445.
<https://doi.org/10.1038/538444a>
- 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>
- McQuarrie, Fiona A. E.; Kondra, Alex Z.; Lamertz, Kai** (2020). "Do tenure and promotion policies discourage publications in predatory journals?". *Journal of scholarly publishing*, v. 51, n. 3, pp. 165-181.
<https://doi.org/10.3138/jsp.51.3.01>
- Minello, Alessandra; Martucci, Sara; Manzo, Lidia K. C.** (2020). "The pandemic and the academic mothers: Present hardships and future perspectives". *European societies*, v. 23, n. sup1.
<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>

- Müller, Ruth** (2014). "Postdoctoral life scientists and supervision work in the contemporary university: A case study of changes in the cultural norms of science". *Minerva*, v. 52, n. 3, pp. 329-349.
<https://doi.org/10.1007/s11024-014-9257-y>
- Myers, Kyle R.; Tham, Wei-Yang; Yin, Yian; Cohodes, Nina; Thursby, Jerry G.; Thursby, Marie C.; Schiffer, Peter; Walsh, Joseph T.; Lakhani, Karim R.; Wang, Dashun** (2020). "Unequal effects of the COVID-19 pandemic on scientists". *Nature human behaviour*, v. 4, n. 9, pp. 880-883.
<https://doi.org/10.1038/s41562-020-0921-y>
- Nicholas, David; Herman, Eti; Jamali, Hamid R.; Rodríguez-Bravo, Blanca; Boukacem-Zeghmouri, Chérifa; Dobrowolski, Tom; Pouchot, Stephanie** (2015). "New ways of building, showcasing, and measuring scholarly reputation". *Learned publishing*, v. 28, n. 3, pp. 169-183.
<https://doi.org/10.1087/20150303>
- Nicholas, David; Jamali, Hamid R.; Watkinson, Anthony; Herman, Eti; Abrizah, Abdulah; Rodríguez-Bravo, Blanca; Boukacem-Zeghmouri, Chérifa; Xu, Jie; Świgoń, Marzena; Polezhaeva, Tatiana** (2020a). "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; Rodríguez-Bravo, Blanca; Watkinson, Anthony; Boukacem-Zeghmouri, Chérifa; Herman, Eti; Xu, Jie; Abrizah, Abdulah; Świgoń, Marzena** (2017). "Early career researchers and their publishing and authorship practices". *Learned publishing*, v. 30, n. 3, pp. 205-217.
<https://doi.org/10.1002/leap.1102>
- Nicholas, David; Watkinson, Anthony; Boukacem-Zeghmouri, Chérifa; Rodríguez-Bravo, Blanca; Xu, Jie; Abrizah, Abdulah; Świgoń, Marzena; Clark, David; Herman, Eti** (2019). "So, are early career researchers the harbingers of change?". *Learned publishing*, v. 32, n. 3, pp. 237-247.
<https://doi.org/10.1002/leap.1232>
- Olena, Abby** (2020). "COVID-19 ushers in the future of conferences". *The scientist*, September 28.
<https://www.the-scientist.com/news-opinion/covid-19-ushers-in-the-future-of-conferences-67978>
- Petsko, Gregory A.; Anderson-Thompkins, Sibby; Bernard, H. Russell; Greider, Carol; Plummer, James; Reece, E. Albert; Schwartz, Nancy; Stephan, Paula; Tracey, Lorraine; Turner, Michael** (2014). *The postdoctoral experience revisited*. Washington, DC: National Academies Press. ISBN: 978 0 309 31446 6
<https://doi.org/10.17226/18982>
- Powell, Kendall** (2015). "The future of the postdoc". *Nature*, v. 520, n. 7546, pp. 144-147.
<https://doi.org/10.1038/520144a>
- 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>
- Rijs, Chantelle; Fenter, Frederick** (2020) "The academic response to COVID-19". *Frontiers in public health*, n. 8.
<https://doi.org/10.3389/fpubh.2020.621563>
- Roach, Michael; Sauermann, Henry** (2017). "The declining interest in an academic career". *PLoS one*, v. 12, n. 9, e0184130.
<https://doi.org/10.1371/journal.pone.0184130>
- Ross, John** (2020). "Pandemic's impact on Australian research 'protracted'". *Times higher education*, May 11.
<https://www.timeshighereducation.com/news/pandemics-impact-australian-research-protracted>
- SMArteN; Vitae** (2020). *Release of initial findings to sector following response to COVID-19 survey*, 17 May. The Student Mental Health Research Network; Vitae.
<https://www.vitae.ac.uk/news/vitae-news-2020/release-of-initial-findings-to-sector-following-response-to-covid-19-survey>
- Thatcher, Arran; Zhang, Mona; Todoroski, Hayden; Chau, Anthony; Wang, Joanna; Liang, Gang** (2020). "Predicting the impact of COVID-19 on Australian universities". *Journal of risk and financial management*, v. 13, n. 9, p. 188.
<https://doi.org/10.3390/jrfm13090188>
- Vatanever, Asli** (2020). *At the margins of academia: Exile, precariousness, and subjectivity*. Leiden: Brill. ISBN: 978 90 04 43134 8
- Vitae** (2020). *The impact of the COVID-19 pandemic on researchers in universities and research institutes*. 8 October 2020.
<https://www.vitae.ac.uk/impact-and-evaluation/covid-19-impact-on-researchers>

- Vitae (2021). *The impact of the COVID-19 pandemic on researchers and research - Wave 2*. June 2021.
<https://www.vitae.ac.uk/vitae-publications/the%20impact%20of%20the-covid-19-pandemic-on-researchers-and-research>
- 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>
- Weissgerber, Tracey; Bediako, Yaw; De-Winde, Charlotte M.; Ebrahimi, Hedyeh; Fernández-Chiappe, Florencia; Ilangovan, Vinodh; Mehta, Devang; Paz-Quezada, Carolina; Riley, Julia L.; Saladi, Shyam M.; Sarabipour, Sarvenaz; Tay, Andy** (2020). "Point of view: Mitigating the impact of conference and travel cancellations on researchers' futures". *eLife*, v. 9, e57032.
<https://doi.org/10.7554/eLife.57032>
- 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>
- 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>
- Xing, Yanmeng; Zeng, An; Fan, Ying; Di, Zengru** (2019). "The strong nonlinear effect in academic dropout". *Scientometrics*, v. 120, n. 2, pp. 793-805.
<https://doi.org/10.1007/s11192-019-03135-7>



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