

Generation Covid

Following a survey on the impact of the pandemic on early-career researchers, **Megan Maunder, Áine O'Brien, Jack Reid, Dominic M. Bowman, Fred Richards** and **Steven Gough-Kelly** sift the data from Generation Covid.

The Covid-19 pandemic continues to have a significant impact on the astronomy and geophysics community. The response to the pandemic brought challenges, including: difficulties home-schooling children; sharing work spaces with housemates, family and neighbours; and delays or cancellations of experiments, conferences and other key research activities. In addition, many faced new or existing physical and mental health conditions alongside stress and work pressure that reached an all-time high.

However, these issues have not been experienced equally and universally, even within the academic community. We have found that early-career researchers (ECRs), because of the transient and typically unpredictable nature of studentships and short-term contracts, together with their home situations, are affected to a greater extent than those in more established positions.

In December 2020, the newly formed RAS Early Careers Network Committee conducted a survey of early-career RAS Fellows, in order to assess the effects of the pandemic, and to identify demographic groups who would benefit from targeted support. We invited responses from those working towards a PhD, or who had completed their PhD within the last six years. Our definition of 'early career' excludes career breaks; that is, a person who completed their PhD seven years ago but took a one-year break is defined as an ECR.

Here we provide an outline of the effects of the pandemic on the wider RAS community, and share practices reported in the survey, on how best to support ECRs in future.

Scope of the survey

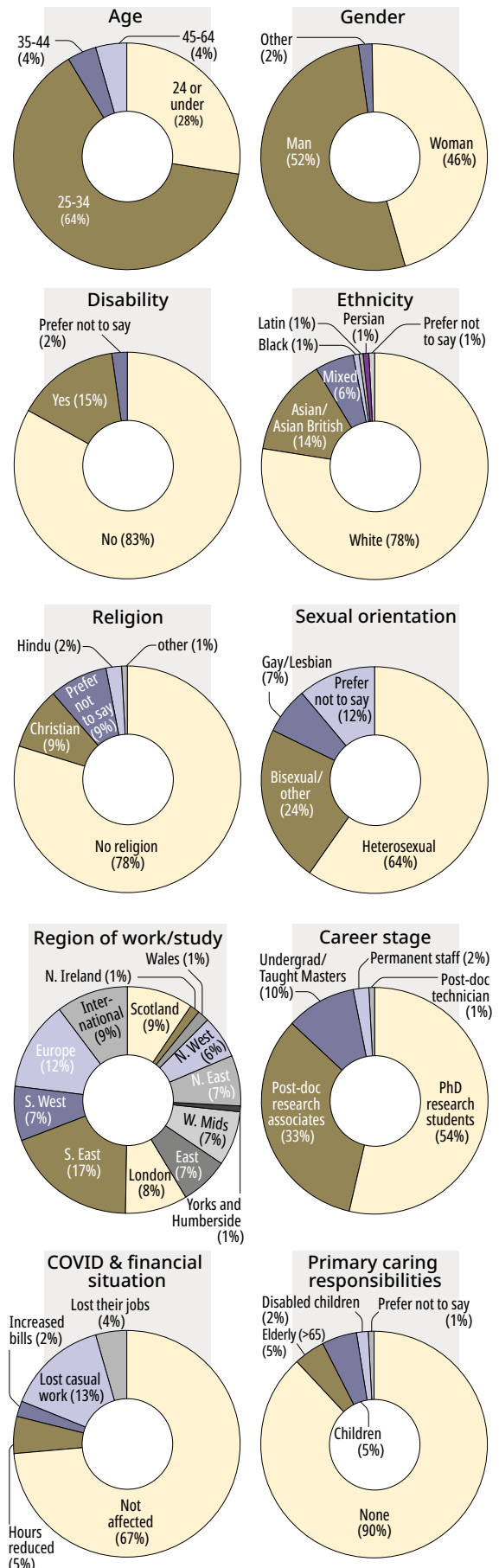
The survey ran from 18 December 2020 until 30 January 2021 and attracted 138 anonymous responses. The questions included demographic information, reports on progress and delays, researcher development, and future plans. The questions allowed participants to add their own text-based comments in addition to tick-box categories. When the survey took place UK Research & Innovation (UKRI) had not announced its plans to support phase 2 (non-final year) extensions, but did so afterwards.

The survey provided an indication of the issues facing ECRs, and a snapshot of how ECRs were feeling at that point. While the responses were dominated by the effects of the pandemic, they raised some issues that are likely of longer standing, and reports about the astrophysical community in other countries have picked up some more established issues (Webb *et al.* 2022).

Demographics

Figure 1 shows all our demographic data, but for the rest of this report we disaggregate by only the

Demographics of the respondents



1 Demographic data. Please note that cumulative percentages may not add up to 100% due to rounding errors; we rounded percentages related to demographic data to one decimal place and all others to whole numbers for readability.

two largest reported gender categories (male/female) and career stage, in order to preserve anonymity within our small sample. Age range 25–34 accounts for the majority (64%) of responses, and postgraduate researchers (PGRs) for the majority (54%) by career stage. We direct those interested in a comparison to the demographic data across the sector to McWhinnie (2017).

Around 10% of our respondents were taught students. Whilst we do not analyze their responses further in order to prioritize analysis relevant to ECRs, we include some information here. Taught students were least likely to experience delays (36% reported no delay, and only 7% delays of more than six months) or to anticipate further delays (14%, in comparison to 53% of PGRs and 58% of post-doctoral researchers).

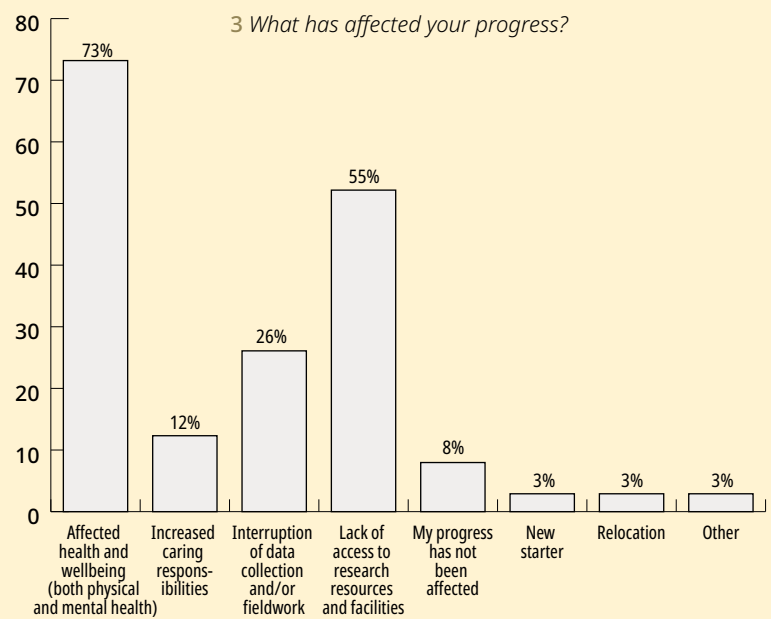
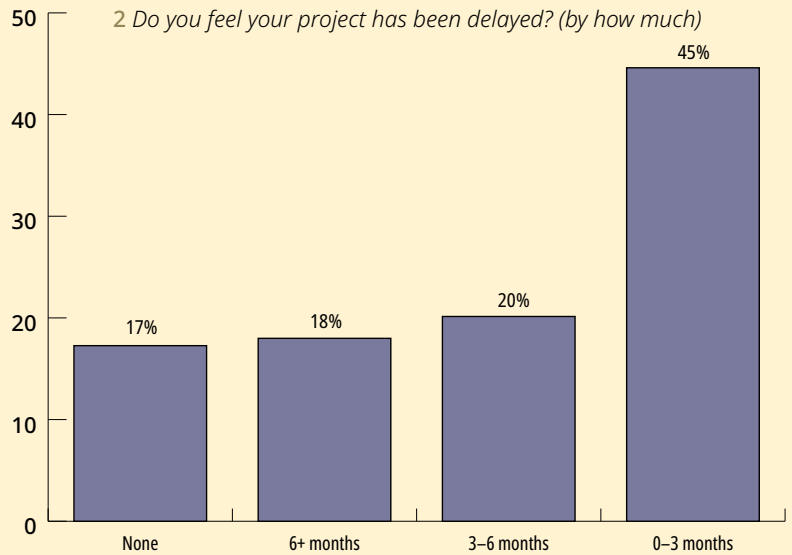
We have collated the responses of the 50 respondents in post-PhD roles into one group: post-doctoral researchers (PDRs). Of these 50, 80% hold a temporary contract (academic), 8% a temporary contract (non-academic), 6% a permanent contract (academic), 2% a permanent contract (non-academic), 2% a temporary contract (non-academic), and 2% concurrent temporary (academic) and temporary (non-academic) contracts.

Among the 40 respondents working on temporary academic contracts, most (72%) reported that these contracts had not changed, but 6% saw contracts extended, 6% had extensions delayed, and 2% had their contract extensions reduced. By number of respondents, UKRI was the largest funder of research (43%), followed by individual universities (23%), other government institutions (15%), multiple funders and the European Research Council (ERC) (13% each), Royal/other academic societies (8%), and the European Space Agency (ESA; 5%). Of the 74 PGR respondents, 96% are engaged in full-time study, with UKRI again the largest funder of PhD students.

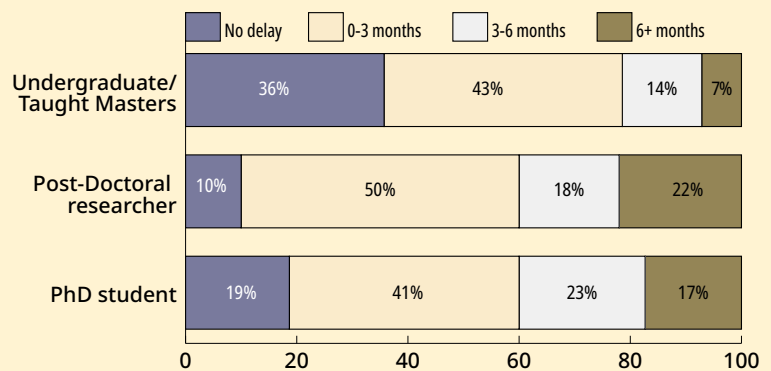
Project delays

Delays are a key consequence of the impact of the pandemic. Often ECRs are working to fixed-term contracts and external deadlines, with little scope for flexibility. Many PGRs are still seeking extensions to their funded period in order to complete their theses. This also affects those in post-doctoral positions, who are often on short, fixed-term contracts, again with little flexibility. At the time of this survey, UKRI had not announced plans for extensions other than for those in their final year of a PhD. When asked 'Do you feel your project has been delayed?', 83% responded 'Yes'. Most (30%) noted a delay of 1–3 months, but 20% replied 3–6 months, 15% 0–1 months, 12% 6–9 months, and 6% more than a year. Only 17% reported no delays and 51% of respondents anticipate no further delays to their project. More men anticipated further delays than women (56% compared with 44%).

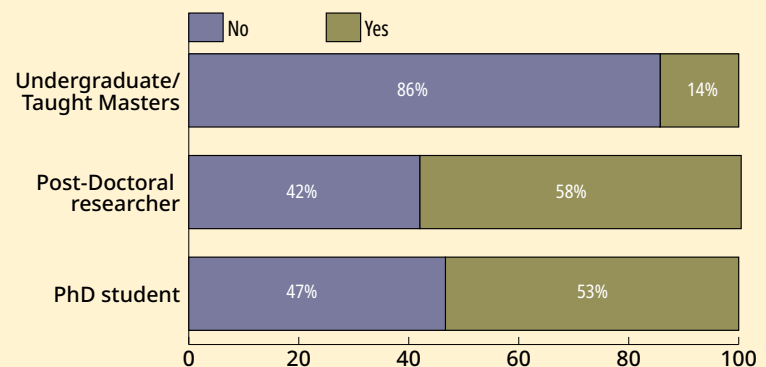
Breaking this down by career stage, only 19% of PGRs and 11% of PDRs reported no delays. For PDRs, 53% reported delays of 0–3 months, 17% reported delays of 3–6 months and 19% reported delays of more than six months. For PGRs, 41% reported delays of 0–3 months, 23% reported



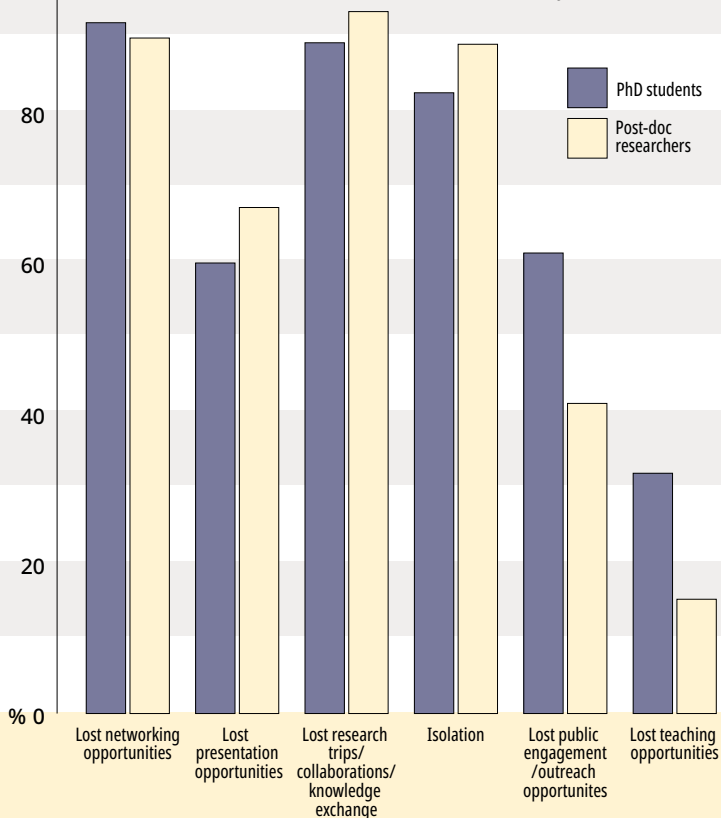
4 Do you feel your project has been delayed? (by career stage)



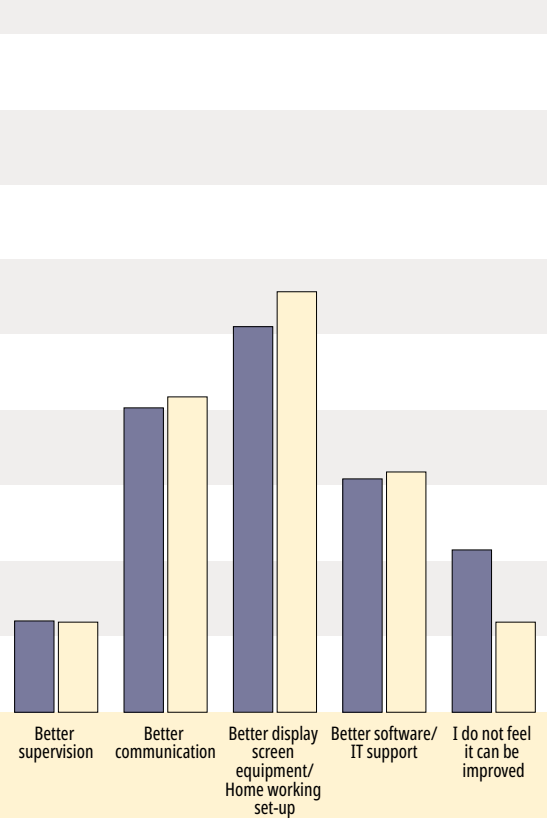
5 Do you anticipate further delays?



6 What wider academic issues concern you?



7 How could you be better supported in your work?



delays of 3–6 months and 17% reported delays of more than six months. 53% of PGRs and 55% of PDRs reported they are anticipating further delays. Respondents reported that the delays arose from:

- effects on health and well-being (both physical and mental) (73%);
- lack of access to research resources and facilities (52%);
- interruption of data collection and/or fieldwork (26.1%);
- increased caring responsibilities (12%);
- relocation and issues to do with starting a new position (4%).

Only 8% felt that their progress had been unaffected. Overall, 83% of respondents indicate their project has been delayed and 73% of respondents that their progress has been significantly affected by their health and well-being. Stepanek *et al.* (2019) reported that mental and physical health, job characteristics and support from their organization are the most important determinants of employees' productivity, with 93% of the indirect influences mediated through mental and/or physical health.

Broader comments

Several respondents took the opportunity to comment on their productivity and motivation, including one who noted: "I have seen a lot of people around me, including myself, suffer from believing that our output, motivation and progress is not up to the standard that it would be without the pandemic or compared to our peers. This has been talked about, which has helped, but the feelings remain."

Other comments indicated that lost networking opportunities were a worry for 92% of PhD students and 80% of post-doctoral researchers; 91% of PhD students and 86% of post-doctoral researchers feared lost chances for knowledge exchange, including research trips and collaborations. Similarly, 62% of PDRs and 60% of PGRs reported lost presentation opportunities as a concern, and 61% of PGRs and 38% of PDRs were

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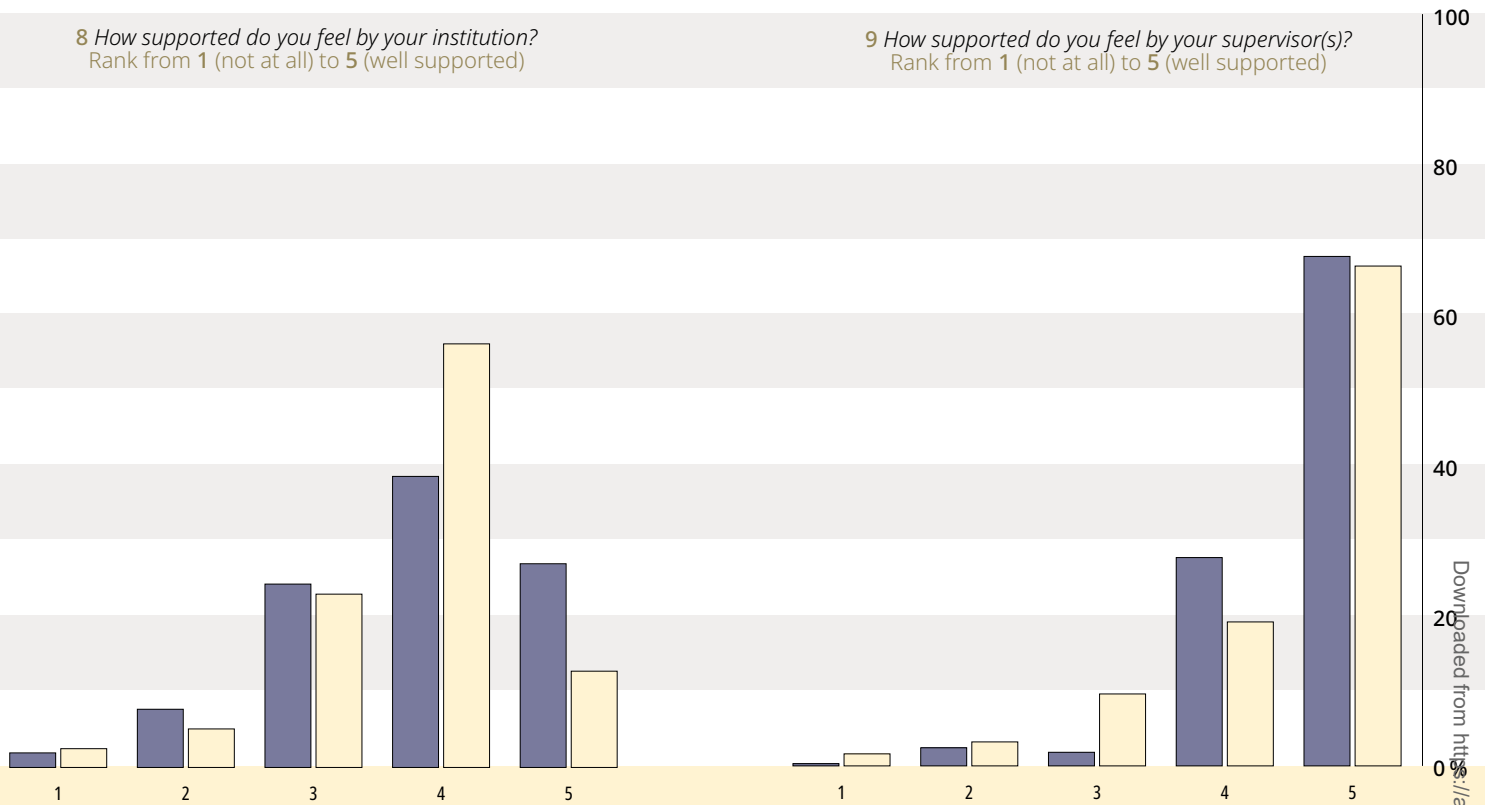
concerned about lost outreach opportunities.

Teaching is one of the areas most changed by the pandemic; 32% of PGRs and 14% of PDRs were concerned about lost teaching opportunities. But some PDRs felt that their career prospects may have been damaged by taking on extra teaching work. "I'm concerned about the lack of further opportunities. Our department has been trying to use the pandemic as an excuse to force postdoctoral researchers to take on teaching duties, even if this does not help advance their career or fall within their career plans. Fighting this has taken up a lot of energy."

This survey was conducted early in the pandemic, while many institutions were still exploring the challenges of a rapid change to remote working. Virtual conferencing emerged as a ready substitute for lecture theatres filled with colleagues presenting their findings, and offered many researchers the opportunity to 'attend' many different events, with fewer restrictions from funding and time. While novel ways to exchange ideas were quickly adopted out of necessity, it remains to be seen what future balance between online and in-person opportunities will emerge. Hybrid conferences bring the benefits of each approach and have been successful early on; they are a popular option for the future (Stefanoudis *et al.* 2021), in no small part because of the environmental benefits (Tao *et al.* 2021).

Isolation and complex living situations

Given the precarious nature of early career research contracts, it is common for ECRs to relocate in order to take up posts and to be separated from friends, family and support networks. Isolation was a large concern, reported by 85% of PGRs and 82% of PDRs. Additionally, many survey respondents added further comments: "Having to shield has isolated me further from my colleagues"; "[I am experiencing] social and professional isolation"; "I am very lonely – I never leave my house and casual coffee chats have dropped off. These were not possible with my new



institution when I started and now it feels too late to meet my colleagues artificially”; “[It is] impossible to go back to my home country and see my family.”

Many ECRs reported precarious living situations relating to temporary contracts, relocation and income, which in turn affected their working environment when forced to work from home. 52% of PhD students responded that a better set-up would support them in working from home: “On a PhD stipend, [I] can only afford to rent a home that is too small to effectively work from home”; “I have no access to a quiet work/study space or good internet, there is limited support for figuring out remote access for computing needs.”

5.3% of our respondents had childcare responsibilities and around 4.5% reported caring for the elderly. We also received several reports of issues surrounding relocation and visas. 4% reported that their progress was affected by relocation and issues to do with starting a new position. Further comments included: “[When my] contract runs out, [I’m] unable to relocate due to visa issues, [my] university refused to help”; “My supervisor been very supportive and understanding given the long visa delay.”

More generally across the higher-education sector, recent statistics show improvements, as restrictions have eased and the effects of the pandemic have begun to be mitigated. According to the Office for National Statistics (2021) the proportion of all higher education (foundation to postgraduate) students feeling lonely often or always was 14% in November 2021, significantly higher than the adult population in Great Britain (6%), but not significantly different from the 16–29-year-old age group (10%) overall. Less than a third (28%) of students reported that their mental health and well-being had worsened since the start of the Autumn 2021 term, similar to early November (30%). Among students who were enrolled in an educational institution during the 2020/21 academic year, 43% indicated that their academic performance has been better since the start of the Autumn 2021 term, compared with the previous academic year.

“On a PhD stipend, I can only afford to rent a home that is too small to effectively work from home”

“Deadlines in a fast-paced and competitive field mean that if I’m unable to complete work, other people are glad to take my place”

Lack of structured support

We asked ECRs, on a scale of 1–5 (1 meaning ‘not at all’ and 5 ‘well supported’), ‘Do you feel supported by your institution?’. PDRs gave an average of 3.42, and PGRs 3.44. When asked ‘Do you feel supported by your supervisor?’, PDRs gave an average of 4.08, and PGRs 4.42. Positively, among PDRs, most (58%) felt supported by their institution, with 8% of choosing 5 on a scale out of 5, and 50% choosing 4. While 26% of respondents were neutral, only 8% felt they were unsupported and 8% not supported at all by their institution. Even more respondents felt supported by their supervisors (74%), 52% choosing 5 on a scale out of 5, and 22% choosing 4. Only 14% felt neutral, 6% felt unsupported, and 6% not supported at all. Postgraduate students rated their supervisors and universities similarly highly. Most (61%) felt supported by their institution, 19% choosing 5 on a scale out of 5, and 34% choosing 4; 27% were neutral, 14% felt unsupported, and 7% felt they were not supported at all. PGRs indicated that they were better supported by their supervisors than by their institutions: 61% felt well supported, 30% felt supported, 3% were neutral, 5% felt unsupported, and 1% felt they were not supported at all by their supervisors.

These responses suggest that the general issues with support are largely structural and systemic, relating to the wider research environment including funding bodies, rather than a problem with the support offered by individual supervisors, with whom they had greatest contact. This also serves to highlight the gap between pastoral support and funded resources to support adapting their research.

When asked ‘How do you feel you could be better supported in your professional development?’, 52% of PDRs wanted better help with their career planning, 40% stronger mentoring, 36% assistance seeking employment, 32% support with skills development, 32% support finding alternate career paths, 20% help with CV writing, and 16% training on social media and networking. Only 12% felt support for their professional development sufficient and that it

could not be improved. Additional comments include a need for more tailored pathways to promotion and into permanent roles, as well as bridging support for those having to move frequently. One postdoc commented that “All the stops have been pulled out to ensure work can progress remotely.”

For PGRs, 53% sought help with career planning, 45% support with skills development, 35% help to find alternate carer paths, 32% help seeking employment, 26% improved mentoring, and 22% assistance with CV writing. Only 18% felt that their current level of support could not be improved. Additionally, PGR respondents indicated they saw a need for further support for networking and personal development. These are not new concerns; during the pandemic, many respondents shared the same concerns about support for future career progression as beforehand. “I feel as though there are a lot of considerations being made for staff and undergraduate students. And although we can utilize the resources available for the undergraduates, we still feel like (PGRs) are overlooked again.”

Asked ‘How do you feel you could be better supported in your work?’, 56% of PDRs felt that better display screen equipment or an improved home working set-up could help; 42% indicated they needed better communication from institutions; and 32% needed improved software and IT support. In line with the positive evaluation of supervisors, only one in eight (12%) raised a need for better supervision. Only 12% felt their current level of support could not be improved. Further comments included the pre-Covid desires for less bureaucracy, greater stability, and further support for their research. Additional comments indicated that support varies greatly between institutions.

Similar issues were raised by students, who also felt support lacking in the hardware and software for remote working that the pandemic abruptly made necessary. A majority (51%) of PGRs favoured better display screen equipment, 41% improved communication from their institution and senior academics, 31% improved software and IT support, and 12% better supervision. Nearly one-quarter (22%) were content and felt their current level of support could not be improved. Several students felt that they would be best supported by extensions and related concessions, but were not eligible for these at the time.

Career planning

We asked respondents about their career plans, on the same scale of 1–5 (0 meaning ‘not at all’ and 5 ‘very much so’) how their values had changed since the pandemic. Overall, most PDRs reported that the pandemic had not changed their career plans. We asked ‘Have your career plans changed?’, ‘Are you put off from a career in academia?’, ‘Are you actively seeking work outside your field?’, and ‘Are you actively seeking work outside academia?’, which yielded averages of 1.9, 2.0, 1.2, and 1.4, respectively. PGRs were as resolved in their intentions, returning respective averages of 1.7, 1.9, 1.2, and 1.4. Putting this into the context of support, help with career planning was the most popular response for both PDRs (52%) and PGRs (53%).

Development

We asked all our respondents to evaluate their current abilities according to the Vitae Researcher Development Framework (Vitae 2010), in order to give a clear picture of self-assessment among ECRs, and to provide a simple metric against which gaps in skills and provision could be compared in future surveys. The mean score for each of the behaviours and attributes in the Vitae Researcher Development Framework is shown in the radial diagram in figure 10. We found that respondents felt most accomplished in their Cognitive abilities (A2) and Professional conduct (C1) both with scores of 3.4 ± 0.1 . We found that survey respondents felt least accomplished in Professional and career development (B3), and Finance, funding and resources (C3) both with an average score of 2.4 ± 0.1 . (In both cases, the error is the standard error, SE, calculated using: $SE = \sigma / \sqrt{N}$, where σ is the standard deviation of the mean and N is the number of respondents.)

These lowest scoring areas are consistent with the earlier survey we (the ECN committee) carried out when we were first established; we had asked ECRs what they felt they needed help with the most. The overwhelming response was access to funding, career advice, and opportunities to share their work with others. This new data cements the role the ECN plays in running such events and providing opportunities including the online poster exhibition. Although we do not have access to our own funding sources, our research-focused careers events include advice in applying for funding.

Knowledge and intellectual abilities (A)

As a reassuring indication of strengthening abilities and maturing confidence with progression in a career, early-career staff express more security in their knowledge, cognition and creativity. Notably, men rate their own knowledge and intellectual abilities more highly than do women, although women align themselves more clearly with creativity. As a whole, however, the community shows a robust confidence in its aptitude.

Personal Effectiveness (B)

Notwithstanding the major challenges associated

Key quotes from the survey

“[I am] living in a small apartment with young children, [with] no dedicated space for me or my partner to work from home. Intermittent/repeated nursery closures makes getting any work done impossible. Most collaborators sympathetic though deadlines in a fast-paced and competitive field mean that if I’m unable to complete work (due to caregiving responsibilities, ill health, etc.), other people are glad to take my place. No extension to my ECR contract; little time to seek out next job (if any) in academia. It appears that the working situation has stabilized or normalized for many colleagues, whereas I am still trying to juggle the responsibilities and stresses of raising two small children who are not independent learners, and who require considerable supervision. The impacts of the pandemic will be hard to quantify as they will impact on [my] career for many years in the future, for example, if I lose out on publications, or future job opportunities etc.”

“[My] supervisor has been hit hard by increasing teaching and caring responsibilities due to the pandemic. This has put more responsibility on

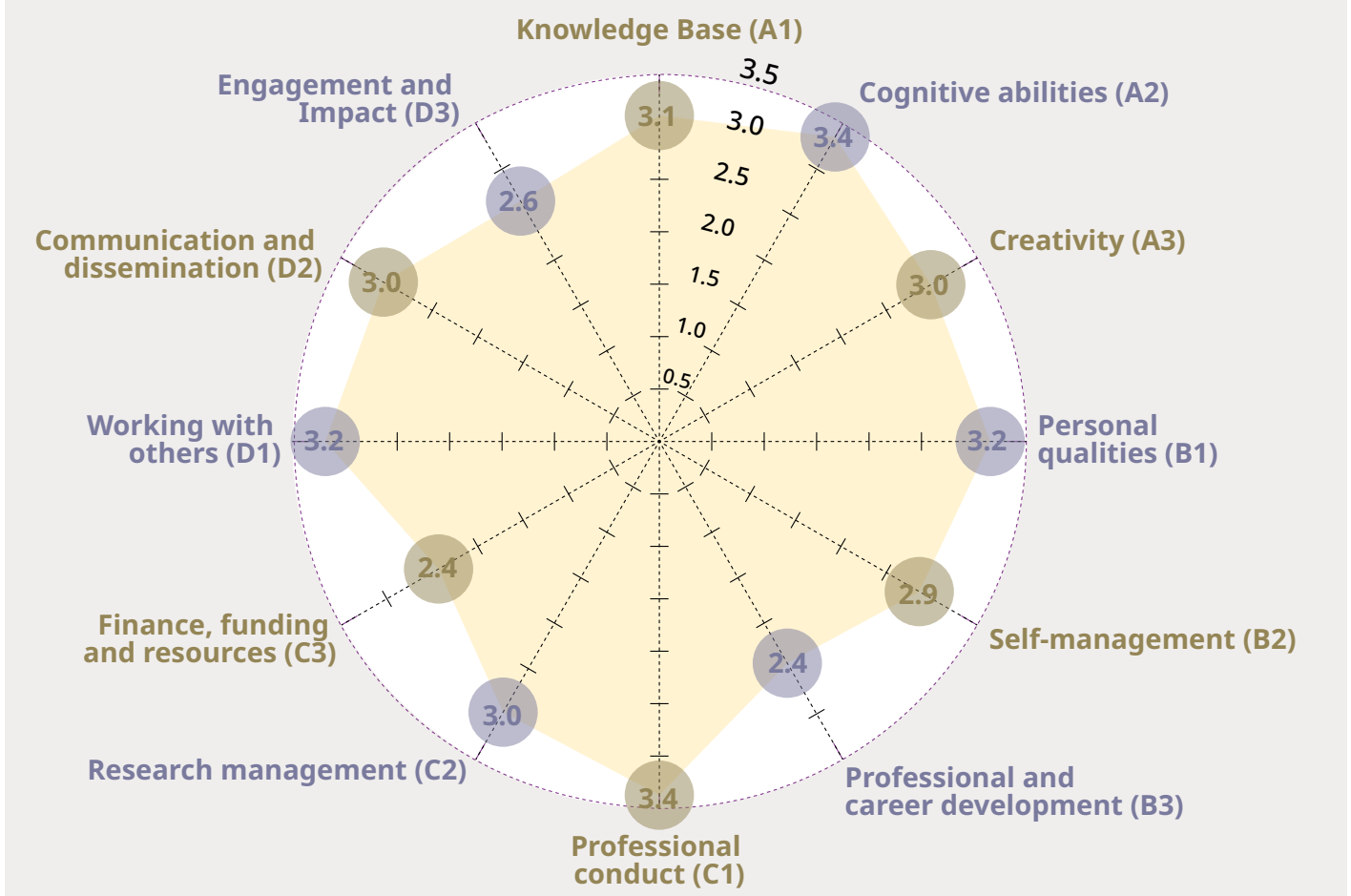
postdocs (including me) to help the students in the group, while receiving minimal support ourselves.”

“My main supervisor has been understanding and has helped take pressure off me.”

“While the academics and support staff are very encouraging and understanding, and have supported a lot of us with getting paid sick leave or temporary withdrawals and making those options known, my university has not yet said whether they’ll offer financial extensions to those finishing their PhDs after 2021. I feel abandoned by the UKRI on that front, and I feel like I’m going to be abandoned by my university too.”

“My supervisors have been working hard to make things easier for me, for example by getting in contact with colleagues who can do at least some preliminary lab work while I cannot access labs at my home institute. Furthermore, they have supported my application for extended funding, and have provided good mental health support when needed.”

Self assessment using the Vitae Researcher Development Framework



with the pandemic, students are as confident as staff about these 'soft skills'. For Professional & Career Development, they are more assured, which may reflect the increased attention given to these skills at the early stages of a career in recent years.

Research, Governance, and Organization (C)

As research becomes increasingly institutionalized and professionalized, PGRs are as positive as PDRs about their abilities and their capacity to operate in this environment. Indeed, research management is a skill established among students, who rate themselves more highly than PDRs in this respect.

Engagement, Influence, and Impact (D)

Public engagement is becoming an increasingly important part of academic careers, and so it is heartening that members of the community positively evaluated their abilities in this sphere. Engagement is particularly well-ingrained among students and younger early career researchers.

Summary

To conclude, this survey has highlighted many of the struggles felt by ECRs early in the pandemic. Many issues were common concerns of PDRs and PGRs, but each group also had particular challenges. These challenges lay in the support they felt would allow them to continue with their research successfully. We have identified three common challenges that ECRs felt affected their well-being during the pandemic:

- Isolation and a lack of structured support
- Lost opportunities
- Complex living situations & work from home set-ups

These insights into the challenges that faced ECRs allow institutions to highlight these concerns internally and assess how they are supporting their

10 Radial diagram of the mean score for each of the behaviours and attributes in the Vitae Researcher Development Framework

early-career colleagues. This also informs the RAS and the ECN in how we can support our ECR fellows.

Although our sample size is good (138 participants) we cannot say that our data is representative of the population of ECRs, but it is indicative of their experiences. According to RAS 2016 demographic survey there were 1278 PhD students in astronomy and geophysics; assuming similar numbers today our PhD student dataset represents approximately 5% of the population. However, given discernible differences between PGR and PDR responses in many cases, the overall trends we identify are likely valid, even if the true proportions in the population may differ from our dataset.

The RAS Early Career Network Committee hope that this survey provides some much needed evidence and insight into the challenges ECRs are facing and that the results can help guide conversations about how best to support ECRs going forward. ●

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