International movement and science

A survey of researchers by the Together Science Can campaign

Research report

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Prepared for Together Science Can and Wellcome Trust

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The Together Science Can campaign, led by the Wellcome Trust and international partners, asked RAND Europe to gather evidence on international movement (understood as travel and relocation) in science through an international online survey of researchers. The project was carried out to support the work of Together Science Can, a global campaign to protect and celebrate scientific collaboration. It is run by an international group of high-profile scientific organisations from Africa, Asia, Europe and North America.

This report is intended to present the findings from the survey, including information about the patterns of and reasons for researchers’ international travel and relocation, perceived outcomes and impacts resulting from this movement, and facilitators and barriers to travel. It also provides background context and describes how the survey was conducted and analysed. In addition to being of use for the Together Science Can campaign, the findings may be of interest to other organisations involved in supporting research worldwide and to the wider international research community.

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Executive summary

Introduction and methods

The international movement of researchers, broadly understood as researchers travelling to and from other countries for short-term visits\(^1\) or relocation for work or training, is an important part of research in a global environment. It has been linked to better research quality and scientific outcomes, with benefits for individual researchers, their home countries and their destinations. It is thus valuable to understand the factors that influence researchers’ international movement, the benefits and drawbacks of this movement, and how all of these vary in different contexts. The international movement of researchers is a global concern and important to understand in more detail both as part of the global scientific environment and in light of political developments, such as changes in the US political climate, the UK’s decision to leave the European Union and wider changes in the social and political environment internationally.

This work aims to contribute to the evidence base in this area by gathering data from researchers across the world about their experiences. It was commissioned by Together Science Can, a global campaign led by the Wellcome Trust and international partners, and it supports the campaign’s work to celebrate and protect international collaboration in science.

Through an online survey, researchers were asked about their travel patterns, enablers and obstacles they had experienced, and the perceived outcomes of their international movement. Questions covered both relocation and shorter-term travel. This global approach was possible due to the involvement of the Together Science Can partners, a group of high-profile scientific organisations from Africa, Asia, Europe and North America.

The survey covers 2,465 researchers from 109 countries (based on respondents’ first reported nationality) and provides a broad international picture of researchers’ views on movement between countries. However, the survey sample is not representative of the entire international researcher population; certain countries, namely the UK and India, are overrepresented within the sample, as are certain research areas, namely the biomedical and health sciences. There may also be sampling biases that are not readily apparent from analysis of these data. For example, researchers who have experience of or interest in moving abroad may have been more likely to complete the survey. Finally, the

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\(^1\) Reasons for short-term travel related to research include attending a conference or meeting, visiting collaborators and taking a course or visiting another research group to learn a new technique.
majority of respondents are from academia, so the data provide primarily a picture of the academic research environment.

Findings

1. Three quarters of survey respondents have moved to live in another country for research purposes

Over three quarters of respondents have moved to live in another country for research training or work at some point during their career. Almost half of respondents have lived in another country for a period of more than one year at a time, and one in five respondents have lived in another country but only for a short period, of less than one year. With the majority of respondents moving to live in another country during their research career, the researchers surveyed constitute a mobile workforce.

2. Career progression and international movement are correlated

More-senior researchers travel often to other countries for research purposes. In particular, one in five senior researchers who responded to the survey are high-frequency travellers, visiting other countries five or more times per year. Senior researchers are also more likely to have worked in multiple countries at the same time.

3. Students or those training to be researchers are the least likely to visit other countries for research purposes

Over half of trainee respondents have never or very rarely travelled for research purposes. Trainees are also almost twice as likely to have trained and worked within one country as are early career, mid-career or senior researchers.

4. Europe is a particularly mobile and connected research community

European researchers who responded to the survey were the most likely to report mid- and high-frequency travel for research purposes (59% travelled at least twice per year) and the least likely to report travelling only rarely. In addition to travelling frequently, the majority of European researchers had worked abroad for at least a year at a time. Europe also stands out as being the only region where researchers move to live in other countries within the region more often than they move to live outside of it.

5. Respondents raised concerns about the effects of political developments, including the UK’s decision to leave the EU and changes in the US political climate

In the free-text responses, researchers expressed concern about how the current political climate could affect their own international movement for research and the wider research endeavour. Concerns related to attitudes towards international movement to and from the United States under the current administration, the UK’s decision to leave the EU, and political issues that impact international movement in other countries. A quarter of British respondents are currently working in countries outside of the UK while over a quarter of non-UK European respondents are currently working within the UK.

6. International travel and relocation are costly, and financial support is an important enabler of international movement

A key enabler for movement is funding; conversely, lack of funding is a major obstacle. Four out of five respondents
indicated that financial support had enabled their short-term international travel. Sources of this financial support include funding agencies (cited by 70% of respondents), institutions (63% of respondents) and conference organisers and collaborators (45%). Money is also needed both to move – for example, to support relocation and other practical aspects – and to continue research in the destination country. Linked to this, more than a quarter of respondents reported that living costs in the destination country can be an important obstacle to movement.

7. **African and Asian researchers are more likely to receive support from a funder than from their institution**

Funding is an important enabler for researchers from all regions, but there are significant differences in the sources of those funds. Researchers from Africa and Asia were more likely than those from North America and Europe to report that funds from a research funder had enabled relocation abroad. African researchers also cited invitations from collaborators as an enabler more often than did researchers from other regions. Researchers from North America and Europe more frequently cited support with relocation costs as an enabler.

8. **Visa requirements do not prevent most researchers from travelling, but visa applications can be prohibitively time consuming, complex and costly**

One in five researchers cited visa challenges to research-related international travel. Commonly reported challenges include the length of time to process an application (cited by 70% of respondents), the length and complexity of application forms (cited by 68%), application costs (47%), and a lack of clarity about processes (44%). The problems encountered are broadly similar across career stages, nationalities and short- and long-term movement.

9. **Researchers from Asia and Africa are much more likely to have visa-related challenges, particularly for short-term visits**

Among the survey respondents, Asian researchers were more than four times and African researchers were more than three times more likely than European or North American researchers to report visa-related obstacles to visiting other countries for research. More than one third of researchers from Asia and Africa reported that a visa-related issue had been an obstacle to them visiting another country for a research purpose. A quarter of researchers from these regions had encountered visa issues that affected relocation to another country.

10. **Family-related challenges are the most frequently cited obstacle to international relocation**

Over a quarter of respondents indicated that family-related challenges had prevented them from relocating abroad for research, citing wishes to maintain stable environments for children and difficulties finding and paying for schooling and childcare in the free-text comments. Additionally, one in five respondents stated that family responsibilities had been an obstacle to undertaking shorter-term international visits, again citing childcare difficulties in free-text comments. Mid-career researchers were the most likely group to report family-related challenges as an obstacle, with more than 30% doing so. While the issue appears to broadly affect
researchers, only 4% reported receiving support with childcare or family member travel expenses that enabled a short-term international visit.

11. African researchers and those who have not moved previously are more likely to cite lack of information about jobs abroad as an obstacle to movement

More than 30% of researchers who had only lived in one country reported that a lack of information about job opportunities abroad was an obstacle to international relocation. By contrast, just 13% of researchers who had prior experience of living abroad reported this issue. Exploring the issue by geographical region, researchers with an African nationality cited this obstacle most often, with more than half of those who did not have prior experience living abroad doing so. Trainees and early career researchers were also more likely to cite lack of information about job abroad as an obstacle than their more senior colleagues (among researchers who had not moved).

12. Many internationally mobile researchers have not faced travel obstacles; European researchers reported the fewest obstacles to travel, while African researchers reported the most

While the majority of respondents had encountered obstacles to travel, one in three had not faced obstacles to international relocation and one in five had not faced obstacles when visiting other countries for research purposes. Researchers with a European nationality were the most likely to report that they had not faced obstacles to international movement, with 48% reporting they had not faced any obstacles to relocation for research, compared to 28% of researchers with an African nationality, who were least likely to report this. Of those respondents who had trained and worked within one country, a third had chosen not to move. Respondents commented that, for personal and family reasons, not all researchers are able to or want to travel or move.

13. International movement can have negative outcomes for individuals

Some respondents mentioned that while international movement leads to positive professional outcomes, it can also present challenges on a personal level, for personal relationships and mental health. Some respondents reported experiencing prejudice when they moved.

14. Nearly all researchers – whether they have experienced international movement or not – believe that international movement is important for research

Nearly all researchers surveyed (96%) stated that research benefits from people visiting or moving to other countries. In the free-text responses, many respondents commented on the importance of travel to the development of researchers and to the research endeavour in general, often commenting that international movement is ‘critical’, ‘essential’ or ‘fundamental’ to research. Although many respondents expressed the opinion that travelling for research is beneficial and should be encouraged, some stated that it should not be a requirement of a successful research career.

15. Researchers of all nationalities stated that international movement boosts
research outcomes by forging new collaborations and developing ideas, skills and expertise

Nearly all survey respondents who had spent time in another country believe that doing so has led to positive research outcomes. The most commonly reported outcomes impacted by international movement were forming new collaborations (reported by 80% of respondents), developing new ideas (80% of respondents), and gaining technical skills and expertise (78%). Publishing papers, performing experiments, and changing research questions were also reported by more than half of respondents.

Reflections

The international movement of researchers enables ideas to spread, collaborations to form and new perspectives to be gained. The benefits of international movement are felt by all, but obstacles to movement are currently felt disproportionately by some. The enablers and obstacles identified in the survey indicate that there is a need for

• funding tailored to the needs of researchers in different regions;
• improved circulation of information about research jobs abroad, particularly to African researchers, trainees and early career researchers;
• support obtaining visas, especially for Asian and African researchers, and particularly for short-term travel;
• support with managing the mental health challenges that can arise with a move to a new country; and
• more assistance to reduce family burdens faced by some researchers.

Some respondents also suggested ways in which they could be supported, including

• provision of childcare services at conferences;
• creation of new visas that are more suited to frequent, short-term movement;
• provision of more information on job opportunities; and
• more help with logistics in the new country, such as finding suitable and affordable short-term housing, opening bank accounts, finding childcare and even knowing where to shop for groceries.

Although there are clear benefits to international movement for researchers and research, it is important not to lose sight of the personal and practical challenges that this movement can present, from the hardship of moving to an unfamiliar place far from family and friends to the day-to-day challenges of dealing with bureaucracy in a new country and a foreign language. Care needs to be taken when factoring movement into decisions around funding or promotion, as this factoring in could disadvantage some researchers based on their nationality, caring responsibilities or other factors which may inhibit their ability to move and travel. While international movement should not be required, we must remove the obstacles that affect researchers wanting to travel. Enabling more researchers to access opportunities to move abroad would help research to flourish and would strengthen research systems.
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We would like to thank our QA reviewers, Dr Advait Deshpande and Dr Salil Gunashekar, for their critical reviews and useful advice. We would also like to thank Louise Wren and colleagues at the Wellcome Trust, as well as other organisations involved in the Together Science Can campaign, for their support and assistance with the dissemination of the survey.
1 Introduction

International movement is an important part of research in a global environment, and has been linked to better research quality and scientific outcomes (Scellato et al. 2017). International movement can take many forms, from short-term travel to meet with collaborators and attend conferences, to long-term relocation overseas for work. These different types of mobility are all part of the research system and can offer many and varied advantages. International travel facilitates networking and collaboration, which give researchers access to skills, techniques, equipment, and ideas to advance their work. International collaboration is also linked to better research quality, as research publications authored by international teams are more frequently cited (Adams & Gurney 2016). Many researchers thus seek to spend time training and working abroad to advance their careers. Indeed, the majority of researchers perceive that there is an expectation to be internationally mobile (Guthrie, Lichten, Harte et al. 2017). Governments, institutions and research funding bodies also have a strong interest in encouraging and investing in international movement. Evidence shows that international movement brings benefits for both destination and source countries in the form of enhanced skills and expertise, the development of productive professional ties across countries, and economic benefits (Guthrie, Lichten, Corbett et al. 2017). As a consequence, funders and institutions have introduced a range of mechanisms to foster international movement, including funding for travel to attend conferences or training programmes, fellowships for doctoral and postdoctoral training abroad, funding to create and support international research networks, and research grants open to international teams of collaborators. For example, there are funding awards which require movement as a condition of eligibility for the award (e.g. the Marie Skłodowska-Curie Actions Individual Fellowships in the European Union (EU)), and in other cases national funders from several countries co-fund awards in which collaboration across countries is a condition of eligibility for the award.

Given the importance of international movement to research systems, it is valuable to understand the factors that influence mobility, its benefits, and how these vary across contexts and for different individuals. The need for this understanding has also been emphasised by political developments internationally. For example, the current US administration has implemented new policies regarding international movement, and issues related to international movement in Europe have become more acute in the context of the United Kingdom’s (UK’s) decision to leave the EU. In many other countries, the political agenda can impact the opportunity and challenges for researchers looking to move internationally.

Past research on global mobility focused on high-level flows of knowledge and ‘brains’
(highly skilled migrants, not necessarily researchers), often from lower-income countries to wealthier ones. The concept of the ‘brain drain’ later evolved to a more nuanced picture of ‘brain circulation’, whereby it was noted that researchers who move often retain links with their prior country and may return later, bringing skills and networks – and that there are thus benefits for both source and destination countries (Saxenian 2002). There is a growing body of work on the factors that encourage and impede mobility of researchers, knowledge of which is important for development of policy in this area. Studies, including the large-scale MORE2 and GlobSci surveys and a survey conducted by our team (Guthrie, Lichten, Corbett et al. 2017), have covered drivers of, barriers to and perceived outcomes of mobility, as well as patterns of movement, focusing mainly on the academic context. However, most of the research that has been done to date has focused on specific countries, regions or fields, potentially missing important differences across contexts.

Our previous work has shown that there is a need for more research to reflect the diversity of experiences that researchers have as they move and travel abroad (Guthrie, Lichten, Corbett et al. 2017). Perhaps most important is an awareness of the stories that underlie broad travel and migration statistics, reflecting the human side of this phenomenon. Researchers’ attitudes to and experiences of mobility are shaped by where they come from, where they go, how long they stay, their personal circumstances and a range of other factors (Guthrie, Lichten, Harte et al. 2017).

This work aimed to address this gap by consulting researchers all around the world about their experiences of international movement to train or work in research. An online survey of researchers4 was used to gather evidence about international travel and relocation. It covered patterns, enablers and obstacles of movement, including issues related to obtaining travel visas, and perceived outcomes arising from international movement from Africa, Asia, Europe and North America. The study supports the Together Science Can campaign, which seeks to celebrate and protect collaboration in science5,6 and the data gathered enhance the evidence base on the international movement of researchers.

In the following chapters, we describe our methods (Chapter 2) and results (Chapter 3) and provide a discussion and reflections on ways to better support international movement (Chapter 4). The results presented in Chapter 3 include findings related to patterns of movement (Section 3.1), facilitators and obstacles (Section 3.2), and outcomes and impacts (Section 3.3).

2 The MORE2 survey was conducted between 2011 and 2013 and reached a sample size of more than 14,000, of which more than 10,500 were in the EU, EU-associated countries and EU candidate countries (Weert 2013).
3 The GlobSci Survey was conducted in 2011 and had a sample size of more than 17,000. It covered 16 countries: 11 European countries, Australia, Brazil, Canada, India and the United States. It did not include African countries and focused on researchers working in biology, chemistry, materials science, and earth and environmental sciences (Franzoni, Scellato & Stephan 2012).
4 While the survey was open to all researchers working in any sector (academia, industry, government or others), 72% of respondents were from academia.
5 Together Science Can (homepage), 2018.
6 The partners of the Together Science Can campaign are the Wellcome Trust, the American Association for the Advancement of Science, the African Academy of Sciences, the Alliance for Accelerating Excellence in Science in Africa, the Bill & Melinda Gates Foundation, the Fundación Bancaria Caixa d’Estalvis i Pensions de Barcelona (the ‘la Caixa’ foundation), the Canadian Institute for Advanced Research, the Global Health Technologies Coalition, the Helmholtz Association of German Research Centres, Johnson & Johnson Innovation, the Knut and Alice Wallenbergs Foundation, the Max Planck Foundation for International Peace and the Rule of Law, Novo Nordisk Fonden, the Royal Society, and the Wellcome Trust/DBT India Alliance.
Methods

In this chapter, we describe our approach to collecting and analysing data on international movement of researchers in five sections, covering survey design, piloting the survey, survey in the field, analysis, and limitations of the analysis.

2.1. Survey design

We aimed to create a short, engaging and easy-to-complete online survey that was also quick to complete (less than 10 minutes). To do this, we kept the survey short, included mostly multiple-choice questions, and made sure that respondents only completed the questions that were relevant to them. We included two optional free-text response questions because, while they added to completion time, we felt that it was important to give respondents the opportunity to voice their experiences and thoughts regarding international movement.

The survey consisted of the following sequence of five sections: a section with demographic questions; a section on short-term movement (e.g. for a conference) and the barriers and enablers of this type of international movement; a section on longer-term movement (e.g. relocation overseas for work) and the barriers and enablers; questions on outcomes and impacts of international movement; and a section giving respondents an opportunity to offer any final thoughts in free-text format on their experiences of moving internationally for research.

When developing the demographics questions, we sought to collect only those data that would be used during analysis. Of the seven demographic questions, four were compulsory, as without the answers to these four questions, the other responses would have limited value for analysis. The remaining three questions were optional, as they would add value but not prevent analysis if absent. By design, we did not collect any identifiable personal information.

To generate the response options for the enablers, obstacles and outcomes questions, we drew on the existing literature and our in-house experience of research into international mobility of researchers. In particular, we drew on the literature review and findings of a study on researcher mobility previously conducted by RAND Europe (Guthrie, Lichten, Corbett et al. 2017; Guthrie, Lichten, Harte et al. 2017).
The survey was implemented on the online platform SurveyMonkey. The survey link generated was of the form www.research.net/r/togethersciencecan, as opposed to being SurveyMonkey-branded. We created multiple collection links appended with a single digit counting up from 1, in order to enable analysis of the effectiveness of distribution through different channels. The survey was prefaced with text informing respondents of the Together Science Can campaign, the aims of the study and survey, when the results would be published, and what the results would be used for. The full survey text and questions are available in Annex A.

2.2. Piloting the survey

Given the international scope of this survey, it was anticipated that many respondents would have English as a second or third language. To ensure that the survey was easy to understand and quick to complete for all respondents, we made a particular effort to write the questions in accessible English. To establish if we had achieved a suitable level of accessibility, we piloted the survey with 10 non-native English speakers of eight different nationalities covering eight first languages. The mother tongues of our pilot respondents were Chinese, Danish, Dutch, German, Marathi, Portuguese, Slovak and Spanish. Their insights helped us tailor the language to minimise the chance that questions could be understood differently by respondents from different regions.

2.3. Conducting the survey in the field

The survey was open for just more than four weeks, from 27 June to 27 July 2018. The primary distribution method was through social media engagement from RAND Europe, Together Science Can, and Together Science Can partners. Platforms used for social media dissemination included Twitter, Facebook and LinkedIn. Additionally, all involved parties promoted the survey through emails to their existing networks. Where possible, promotional material was placed in specialist press; for example, Research Fortnight ran a short piece promoting the survey.

The breakdown of responses by researcher nationality was recorded and reviewed on a daily basis. After two weeks of the survey being open, it was apparent that responses from certain regions, such as Africa, Australia and South America, were underrepresented. Therefore, we contacted press offices in the top 40 research institutes in each of these regions directly with a request to promote the survey among research staff and students. In addition, advertisements targeting researchers from these regions were run on Twitter and Facebook.

2.4. Analysis of the survey results

We received 2,769 responses to the survey. Survey responses were analysed using R version 3.5.0 (R Core Team 2018), an open-access programming language and environment for statistical computing and graphics. Initially, the characteristics of respondents were analysed to breakdown the sample by research setting (e.g. academia,

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8 SurveyMonkey Inc., San Mateo, California, USA. www.surveymonkey.com
9 For example, we removed specific descriptions of career stages that might not be applicable in all contexts, and in several places we simplified language to support understanding for non-native speakers.
industry), career stage, research field, nationality and country of work. Comparison with existing datasets covering some of these categories – from the Organisation for Economic Co-operation and Development (OECD) and Eurostat – enabled us to assess the extent to which the survey sample reflected the population of international researchers. As was expected, we did not obtain a representative sample of the entire international researcher population – for example, some countries were underrepresented. Our findings from this stage of the analysis were used to inform the limitations described below. Further details can be found in Annex B.

We produced an overall analysis of the survey responses for respondents who identified as researchers in the initial compulsory question. We then conducted subgroup analyses based on career stage, nationality, country of work, research sector and international mobility. For example, we subset the respondents into trainee, early career, mid-career, or established researchers and explored patterns and relationships between career stage and enablers, obstacles and outcomes. The subsets chosen were largely based on prior work identifying them as key determinants of mobility experience and outcomes (Guthrie, Lichten, Harte et al. 2017; Guthrie, Lichten, Corbett et al. 2017). Statistical analysis was carried out to compare responses between subsets. At all times, when we use the word significant, we mean that a statistically significant relationship was identified.10

In addition to the quantitative analysis, we conducted a qualitative analysis of the free-text responses we received from 1,089 respondents. First, two researchers independently analysed 200 responses. Then they conferred to develop a list of themes which could be used to code the responses. All text responses were then reanalysed and annotated against these themes, covering challenges (six themes), benefits (seven themes), and policy (three themes). Given the structured nature of the survey, this approach enabled us to identify any issues or themes that were novel or not captured by the closed questions.

The outcomes of the quantitative and qualitative analysis were discussed at an internal workshop and developed into an initial set of key findings. Subsequent analysis was then performed as required to strengthen the evidence base for the proposed findings.

2.5. Limitations of the analysis

This survey presents a snapshot of perceptions and experiences of researchers globally related to international movement. There are, however, a number of limitations related to the analysis that are worth noting by readers interpreting the analysis.

The dataset is not representative of the research population internationally. We have compared the demographics of the survey population to the research population internationally and observe three key differences. First, the majority of our respondents are from academic or university settings (72%),11 compared with 43% internationally (OECD 2018). This reflects our finding from previous work that researchers in industry in particular do not typically respond to surveys of this nature (Ioppolo et al. 2017). Second, medical and health sciences respondents are overrepresented in our sample.

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10 P-value of <0.05 for the relevant chi-squared test, after appropriate multiple-testing correction has been carried out.
11 The rest come from other research settings, such as industry or private research, government or public research, or not-for-profit or charity research.
compared with those from other disciplines. Finally the United Kingdom, the United States and India provide a large proportion of our responses. All of these differences are likely partly a reflection of the networks that we were able to access to recruit survey respondents (for more details of these analyses, see Annex B).

Additionally, while the survey received close to 2,800 responses from across the world, it did not receive sufficient responses from all possible subgroups to perform comparative analyses at a statistically significant level. For example, we have sufficient numbers of respondents from Africa, Asia, Europe and North America to make meaningful comparisons between these regions; however, because we cannot say with certainty whether the trends identified for Oceania and South America are likely to be characteristic of the wider researcher population in these regions, analysis for Oceania and South America is descriptive only. We also have a suitable number of respondents across the career stages to disaggregate at this level and make statistically significant comparisons between the groups. For analysis purposes, we classify our respondents into the following groupings:

- Research sector – academic or outside academia
- Career stage – training, early career researcher (ECR), mid-career researcher (MCR), or senior researcher
- Region of nationality or country of residence – Africa, Asia, Europe or North America

Finally, as is common with surveys, it is likely that there is some level of response bias – that is, particular individuals may be more likely to respond to the survey, and we will be unable to detect some biases through analysis of the demographic data provided. In particular, as the survey was explicitly about international movement, it is likely that individuals with particular experiences of international movement, both those being particularly mobile and those having particular problems with international movement, may have been more motivated and hence more likely to participate in the survey. Finally, the survey captures the perceptions of researchers that are likely to be based on their personal experiences (rather than being objective measures), particularly in terms of the outcomes that result from their mobility experiences.

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12 Here, the category ‘training’ refers to doctoral students.

13 These were self-defined by respondents. ‘Senior’ includes both those self-defining as ‘established’ researchers and those self-identifying as ‘emeritus’.

14 We also discuss responses from Oceania and South America; however, these are not included in statistical significance testing since the number of responses is not sufficient for this type of analysis.
This chapter describes the results of the survey analysis in three sections: patterns of international movement, enablers and obstacles of international movement, and perceived outcomes and impacts from international movement.

3.1. Patterns of international movement

Summary
The researchers surveyed constitute a mobile workforce.
- Three quarters of survey respondents have moved to live in another country during their research career.
Patterns of international movement vary significantly between subgroups of researchers, whether considered in terms of career stage or nationality.
- Career progression and international movement are correlated.
- Over half of those training to be researchers have never or very rarely visited other countries for research.
- Europe is a highly mobile and connected research community.
The current political climate is a cause for concern among some researchers.
- Respondents expressed concerns about attitudes to movement under the current US administration.
- Researchers frequently move from Britain to live in Europe and vice versa.
- Brexit is a concern for British and non-British Europeans alike.

This section explores the patterns of international movement reported by researchers from around the world. Respondents were asked how often they visit other countries for a research-related purpose, such as attending a conference or meeting, visiting collaborators, or visiting to learn a new technique. Respondents were also asked about their experience of moving to live in other countries for research, either for training or for work. The full list of survey questions can be found in Appendix A. Here we explore the responses to these questions, both at the aggregate level and in more detail, by using the respondents’ demographic data to disaggregate responses by career stage and region of nationality.
3.1.1. Three quarters of survey respondents have moved to live in another country for research purposes

Over three quarters of respondents (76%, 1,652/2,183) have moved to live in another country for research training or work at some point during their career (Figure 1). With the majority of respondents moving to live in another country during their research career, researchers are a mobile workforce. Almost half of respondents (48%, 1,041/2,183) have lived in another country for a period of more than one year at a time (Figure 2). One in five respondents (21%, 450/2,183) have lived in another country but only for a period of less than one year. Respondents had not commonly trained and/or worked in multiple countries at the same time (7%, 161/2,183).

3.1.2. Career progression and international movement are correlated

In general, senior researchers travel more often to other countries for research purposes when compared with trainee, early career, and mid-career researchers. As Figure 3 shows, this correlation is most apparent when focusing on a high frequency of travel. The proportion of researchers travelling five or
more times per year rises from 2% (8/467) for trainees to 8% (74/871) for early career researchers and 12% (61/492) for mid-career researchers, and it reaches 22% (99/452) for senior researchers. The opposite trend is seen for a low frequency of travel (discussed in more detail in Section 3.1.3). These survey data alone cannot provide insight into the presence or direction of causation, i.e. we cannot say whether senior researchers became senior through travelling a lot, or if they travel a lot because they are more senior.

Moving to other countries has helped my research portfolio tremendously. It has opened new avenues of research for me and made me a better researcher.

Malawian mid-career researcher based in Malawi

The correlation between career stage and experience of moving to live in another country for research is less clear, potentially reflecting the greater complexity and impact of the decision process. While working in multiple countries simultaneously is not a commonly reported experience, there appears to be a correlation between career stage and working in multiple countries at the same time (Figure 4). A contributing factor could be that the opportunity to hold research positions at different institutions is more likely to be available to senior researchers than it is to their more junior colleagues.

3.1.3. Students or those training to be researchers are the least likely to visit other countries for research purposes

While our survey data show that researchers are a highly mobile community, there are significant differences in the extent of movement when the data are segmented by career stage (see Section 3.1.2). Figure 3 shows that trainees are the least likely to visit other countries for research purposes, with 54% (251/467) having travelled very rarely or never, in contrast to the 22–28% of researchers from the latter career stages.

Trainee researchers are also almost twice as likely to have trained and worked within one country (38%, 165/432) than are early career (22%, 187/837), mid-career (18%, 84/473), or senior (21%, 91/433) researchers. However,
this finding is perhaps expected given the generally shorter research careers of trainees.

3.1.4. Europe is a particularly mobile and connected research community

Figure 5 shows the reported frequency of visiting other countries for research purposes, with respondents grouped by the continent of their primary nationality. Researchers with a European nationality were the most likely to report having travelled two to four times per year (43%, 417/964), as well as to report a high frequency of travel (of more than five times per year) (16%, 157/964). Correspondingly, they were the least likely group to have travelled very rarely (17%, 160/964). South American
researchers (not shown\textsuperscript{15}) followed a similar pattern to Asian researchers (44% very rarely, 30% once per year, 20% two to four times per year, 6% five or more times per year; $n = 156$). There was a significant difference between the visiting patterns across the regions represented in Figure 5.

In addition to generally travelling frequently, as Figure 6 shows, researchers with a European nationality were the most likely to have lived in another country for a long period of time – defined as more than one year – while training or working as a researcher (57%, 535/942). When movement experiences other than ‘trained and worked within one country’ are grouped together, we see that Europe (82%) is the region with the highest proportion, followed by Asia (80%), South America (78%), North America (69%) and Africa (57%). This is likely facilitated by freedom of movement for EU citizens to other countries within the EU.

Figure 7 explores the flow of researchers who indicated they had undertaken international movement, showing the nationality on the left and current country of work on the right side. Europe stands out as being the only region where the majority of mobile researchers stay within the region rather than move outside of it. This may be due to the geographical proximity of many strong research systems and the present ease of movement between them.

3.1.5. Respondents raised concerns about the effects of political developments, including the UK’s decision to leave the EU and changes in the US political climate

Concerns were expressed about the impact of political development on opportunities to move between countries. This included concerns about mobility within Europe following the UK’s decision to leave the EU. Respondents also expressed their opinion about attitudes to international movement to and from the United States under the current administration, and the role of political developments in

\textsuperscript{15} South American researchers are not shown because the numbers are insufficient for statistically significant comparisons to be made.
international movement in other countries was also raised in the free-text responses:

“I have been thinking of moving to another country for a job (as our political environment is South Africa is becoming increasingly worrying).”

_**South African researcher working in South Africa**_

“...it’s appalling to see what obstacles researchers from other countries face when they need to travel for research purposes. The US ‘Muslim ban’ is the most prominent example, but my colleagues from South America or other parts of Africa and Asia face similar obstacles with Visa issues and discrimination at borders.”

_**German early career researcher working in the UK**_

“I have seen over the past year that the new US politics and travel restrictions have an enormous impact on turnout at conferences... on one occasion nearly a third of the community was missing!”

_**German established researcher working in the UK**_

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**Figure 7: The flow of researchers from country of nationality (left) to current country of work (right)**

_Note: Only researchers not living in their country of nationality are represented._
After completing my PhD, I was asked to leave the US within 30 days even though I needed to complete my experiments.

*Zimbabwean early career researcher working in China*

I get to work with the best and brightest from all over Africa, many of whom wouldn't have been able to study in the US, had I stayed there.

*American early career researcher working in South Africa*

A quarter of respondents with UK nationality are currently working in countries outside of the UK (25%, 88/347). Additionally, 28% of respondents with a non-UK European nationality are currently working within the UK (189/680). These respondents cover the full range of career stages and a wide range of research fields.

The UK’s decision to leave the EU is of concern for researchers who raised the issue unprompted in the open-ended, free-text question. Both UK researchers working in mainland Europe and continental researchers working in the UK expressed their concerns, exemplified in the quotes below.

The political climate in the US and UK is becoming more and more toxic and less welcoming for foreign people... I made my career and life decisions based on being a European citizen and still cannot believe that the right to stay here is being taken away from me. I work here, my life is here and now everything I worked for is being threatened.

*German early career researcher working in the UK*

One of my favourite elements of studying and doing research in the UK has been the diversity of the research community. As an early career researcher I am worried by the vote for Brexit, because of the hostility of the debate both before and after the vote, I question whether the UK will be a good base for a career that is inherently international.

*Danish early career researcher working in the UK*

Moving has vastly changed my world-view and scientific aspirations. Particularly while Brexit is creating so many problems and uncertainties, this experience is making it clear to me how important international collaboration and goodwill is for the success of scientific research.

*British early career researcher working in Germany*

I have been inspired, encouraged and supported by scientists from all different walks of life with different ways of communicating and thinking. Being British, I despair at Brexit and am incredibly fearful that the UK seeks to isolate itself from the European community and disrupt this wonderful and productive multicultural research environment.

*British early career researcher working in Denmark*
THREE QUARTERS OF RESPONDENTS HAVE MOVED TO ANOTHER COUNTRY FOR A RESEARCH PURPOSE

P.O. 48% trained or worked in another country for at least one year

7% trained or worked in multiple countries at the same time

CAREER PROGRESSION AND INTERNATIONAL MOBILITY ARE CORRELATED

Travelling five or more times per year

2% Junior 8% 12% 22% Senior

Travelling never or very rarely

54% Junior 28% 25% 22% Senior

RESPONDENTS RAISED CONCERNS ABOUT POLITICAL DEVELOPMENTS IN THE UNITED STATES, THE UNITED KINGDOM AND ELSEWHERE

Particularly while Brexit is creating so many problems and uncertainties, this experience is making it clear to me how important international collaboration and goodwill is for the success of scientific research.

British early career researcher working in Germany

After completing my PhD, I was asked to leave the US within 30 days even though I needed to complete my experiments.

Early career researcher from Zimbabwe working in China

I get to work with the best and brightest from all over Africa, many of whom wouldn’t have been able to study in the US, had I stayed there.

Early career researcher from the United States working in South Africa

EUROPE IS A PARTICULARLY MOBILE AND CONNECTED RESEARCH COMMUNITY

Percentage of researchers who travel at least two times per year:

EUROPE 59%

AFRICA 30%

NORTH AMERICA 34%

ASIA 25%
3.2. Enablers and obstacles

Summary

International travel and relocation are costly.
- Lack of funding is a major obstacle, particularly for short-term travel.
- The most frequently cited enabler for both short-term visits and relocation is funding.

Researchers have experienced an array of challenges related to visas, and the specific problems encountered are similar across nationalities, career stages and durations of movement.
- Visa requirements do not prevent most researchers from travelling.
- For some researchers, visas are prohibitively time-consuming, complex and costly.
- Researchers from Asia and Africa are more likely to have visa challenges, particularly for short-term visits.

Family responsibilities are the most commonly cited obstacle to international relocation.
- 27% of respondents indicated that family-related challenges prevented them from relocating abroad.
- 20% of respondents indicated that family responsibilities were an obstacle to international visits.
- Mid-career researchers were the most likely to report family-related challenges as an obstacle.
- European nationals were the most likely to cite family-related challenges as an obstacle.

Researchers from different regions encounter different obstacles and rely on different types of support to enable their international movement.
- African nationals were the most likely to cite a lack of funds as an obstacle to short-term visits abroad.
- European and North American nationals were more likely than others to cite lack of time as an obstacle.
- Lack of information is more often cited as an obstacle by researchers in earlier career stages.
- Lack of information is more often cited as an obstacle by researchers with an African nationality.
- African and Asian nationals more often cited support from a research funder as an enabler of relocation.
- North American and European nationals cited support with relocation costs and practicalities as an enabler of relocation abroad more often than did African and Asian researchers.
- African nationals were less likely than others to cite institutional funds as an enabler of international visits.
- African nationals were more likely than others to cite funds from conference organisers or collaborators as an enabler of international visits.

Many internationally mobile researchers have not faced obstacles preventing travel, and many researchers have chosen to remain in one country.
- Some respondents stated that mobility expectations conflict with personal preferences and constraints.
- A third of internationally mobile researchers have not faced any obstacles to travel.
- A third of non-mobile researchers have chosen to stay within their country.
- Researchers with a European nationality are the most likely to report that they have not faced obstacles.
- Researchers with an African nationality are the least likely to report that they have not faced obstacles.

This section focuses on factors that affect researchers’ decisions to travel abroad. It covers enablers – factors which make international movement more feasible – and obstacles to movement. Respondents were asked to select from a list of possible enablers to indicate which, if any, had helped them travel. One question covered enablers of short-term visits and another covered enablers of relocation for research-related work or training. In another pair of questions, they were asked to indicate which, if any, of a list of possible obstacles had prevented their short- or longer-term international movement. Those who indicated that they had encountered obstacles related to visas were asked to
answer a further question about the nature of those difficulties. We explore the responses to these questions, looking at whether some factors were cited more often by respondents at particular career stages or with a nationality from a particular region. We also highlight some additional details that some respondents provided about enablers and obstacles in an open-text box at the end of the survey.

3.2.1. International travel and relocation are costly, and financial support is an important enabler of international movement

The most frequently cited enabler for both short-term visits and long-term relocation was funding – provided by funding agencies, institutions and conference organisers or collaborators (Figure 8 and Figure 9). Conversely, lack of funding was by far the most frequently encountered obstacle to short-term travel, cited by 62% of respondents (1,397/2,242) (Figure 10). With regard to short-term travel, 81% of respondents (1,825/2,260) indicated that financial support had enabled their international movement; 70% had received funds from a funding body, 63% had received funds from an institution and 45% had received funds from a conference organiser or collaborator (Figure 8).

For research-related relocation, funds from a funding body (54%, 868/1,612) and funds from an institution (47%, 751/1,612) were the top two enablers, followed by job offers (46%, 741/1,612) (Figure 9). Support with ‘relocation costs and practicalities’ was also notable, cited by 24% of respondents (381/1,612). Living costs being too expensive was the second-most frequently cited obstacle to relocation, reported by 27% (547/2,061) of respondents. The
most frequently cited obstacle, family-related challenges, is discussed further in Section 3.2.5. Other frequently cited enablers are invitations from conference organisers or collaborators (44%, 850/1,947 for visits; 25%, 409/1,612 for relocation) and support obtaining visa documents (21%, 404/1,947 for visits; 30%, 484/1,612 for relocation), which is discussed further in Section 3.2.2. Regarding invitations from conference organisers or collaborators, there was a large difference depending on career stage, with more senior respondents much more likely to mention this enabler.

Researchers incur costs when they relocate, and funding is required to continue research in the destination country. High costs of living also deter or prohibit researchers from moving to some countries. Respondents provided further details about the nature of the costs in their comments:

“Moving to the USA from the UK was the biggest and most difficult move and also the most expensive. I was offered no financial assistance for this move which if I had not been so determined to move would have prevented it happening. Being as I estimate the cost of moving to be ~$3000/£2,300.

*British early career researcher working in the United States*
I understood that there is still a big challenge for developing countries students to get opportunities and grants addressing developing countries are not satisfactory.

*Ethiopian mid-career researcher working in Italy*

A substantial barrier to moving abroad is the costs associated with both traveling and moving, which can be prohibitive for some. In particular, my move from Switzerland to the US for my postdoc required over $5k in savings with booking flights, visas, waiting for visa (an unanticipated expense), and temporary housing while I found a suitable living arrangement.

*Irish early career researcher working in the United States*

Doing research in another country is very beneficial, however it would be good if more funders/organisations would help with moving costs, especially when returning and for early-mid career scientists… As a mid-career scientist starting my first independent position it has been a real strain on my finances to come back to the UK without any form of help or compensation.

*German mid-career researcher working in the UK*

Local administration can be a huge obstacle to international mobility. It took 3 months before I was able to receive my first pay check. During this period, I had to be in the country to be able to open a bank account and register with the local authorities.

*Zimbabwean early career researcher working in France*

Access to affordable but decent short-term housing is challenging in almost all markets [in the United States].

*Canadian trainee studying in Canada*
Funding for children to enrol in an international school during research visit is a major obstacle.  
*Belgian mid-career researcher working in South Africa*

Funding for travel is often a limitation, especially early in a research career.  
*British established researcher working in Thailand*

3.2.2. African and Asian researchers are more likely to receive support from a funder than from their institution

Some enabling factors were cited more or less often by researchers from particular regions, which may reflect the availability of and need for different types of support in those regions. Although the general message that funding is a key enabler holds across regions, there were some significant differences across regions in terms of the sources of those funds. The most frequently cited enabler of international relocation is support from a research funder (Figure 11). Overall, 63% (132/209) of
researchers with an African nationality and 58% (166/286) of researchers with an Asian nationality (mainly from India) reported that funds from a research funder had enabled them to relocate abroad, compared with 53% (395/748) of researchers with a European nationality and 46% (91/198) of researchers with a North American nationality. On the other hand, North American and European researchers (29%, 57/198; and 27%, 201/748, respectively) more frequently cited support with relocation costs and practicalities as an enabler for relocation abroad than did African (19%, 40/209) and Asian (14%, 41/286) researchers. The second-most frequently cited enabler of international relocation was funding provided by an institution, and there were no statistically significant differences across regions in the proportion of researchers citing this factor as an enabler.

In terms of funding as an enabler of international movement for visits, funding provided by a research funder was the most frequently cited enabler across all respondents together (Section 3.2.1). It was cited by 66–73% of researchers from each region, and there were no significant differences across regions in the proportion of researchers citing this factor as an enabler (Figure 12). The majority of researchers also reported that funds provided by an institution had been an enabler. However, there was regional disparity,
with 51% (149/291) of researchers with an African nationality reporting this enabler, compared with 77% (195/255) of those with a North American nationality. Furthermore, researchers with an African nationality more frequently reported receiving funds from conference organisers or collaborators, with 54% (157/291) having done so, compared with 43–45% of researchers from other regions.

There were also regional differences in the factors other than funding that researchers cited as being enablers. Researchers with a European nationality were the most likely to indicate that a job offer abroad had enabled their move (56%, 418/748), followed by North American researchers (46%, 90/198), Asian researchers (34%, 98/286) and African researchers (27%, 57/209). European researchers were also significantly less likely to report that support with obtaining a visa had been an enabling factor (22% of European researchers did so, compared with 35% of North American researchers and more than 41% of Asian and African researchers). Researchers with an African nationality were significantly more likely than researchers of other nationalities to report that an invitation from a collaborator had been an enabler for a move abroad (38%, 80/209 of African researchers cited this enabler vs 22–25% of researchers from other regions). However, there were no significant differences by region of nationality in the percentage of respondents citing an invitation from a conference organiser or collaborator as being an enabling factor for a short-term visit.

Researchers from some regions were also more likely to encounter certain obstacles, with significant differences for all obstacles to international travel for visits. Researchers with an African nationality were the most likely to cite a lack of funds for travel expenses or conference fees as being an obstacle; 75% (297/398) did so, compared with 53% (503/946) of European researchers, who were the least likely. European researchers were the most likely to cite family responsibilities as being an obstacle to a research-related visit abroad, 26% (248/946) did so, compared with 12–16% of researchers from the other regions. Researchers with a European or North American nationality were much more likely than their counterparts with an Asian or African nationality to cite lack of time as an obstacle; 41% (384/946) of Europeans and 33% (101/302) of North Americans cited it, compared with 15% (57/380) of Asians and 12% (46/398) of Africans.

Significant differences also emerge across regions of nationality in the obstacles reported to have prohibited a move abroad for research. The data support the idea that researchers with a European nationality encounter fewer obstacles to relocation than their counterparts from other regions, likely reflecting the ease of movement within the EU. Focusing on respondents who had experience of international relocation (Figure 13), we observed that European researchers were less likely than their counterparts to report as obstacles that it is too difficult to get a research job in another country (9%, 64/717), that living costs are too expensive (19%, 134/717), or that they experienced visa challenges (7%, 48/717) or a lack of information about research jobs abroad (9%, 64/717). However, European researchers were more likely to cite family-related challenges (30%, 215/717). The situation is reversed for researchers with an African nationality, who were the most likely to cite the following as obstacles: expensive living costs (39%, 80/207), that it is too difficult to find a research job in another country (9%, 70/207), visa challenges (26%, 53/207) and lack of information about research jobs abroad (20%, 41/207).

Respondents discussed other obstacles they had faced and potential forms of support for
Among researchers with experience of international relocation, those with an African nationality generally encountered more obstacles than did other researchers when moving to live abroad for research.

**Figure 13:**

<table>
<thead>
<tr>
<th>Obstacles to moving to live in another country for research</th>
<th>Percentage of researchers</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have not faced obstacles moving to another country</td>
<td></td>
</tr>
<tr>
<td>Family-related challenges</td>
<td></td>
</tr>
<tr>
<td>Living costs are too expensive</td>
<td></td>
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<tr>
<td>Too difficult to get a research job in another country</td>
<td></td>
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<tr>
<td>Visa challenges</td>
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<tr>
<td>Lack of information about research jobs abroad</td>
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<tr>
<td>Language or cultural barrier</td>
<td></td>
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<tr>
<td>Qualifications are not compatible with research system</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

Nationally:
- **Africa**
- **Asia**
- **Europe**
- **North America**

Researchers who travel or move abroad, which include providing child care at conferences, practical information to help researchers settle in a new place, and offering counselling to those experiencing the stresses of being in a new country.

*“It really helps to get support for small life things like learning where to shop for groceries, so that we can make the most of the research visit.”*

Portuguese mid-career researcher working in the UK

*“Finding housing from another country is challenging and stressful, especially when moving with family (including children). Better support from the receiving institution here would be very helpful, as it can be sometimes practically nigh impossible to organize apartments and things like childcare from another country.”*

Finnish early career researcher working in Germany

*“I very much appreciated that support from psychologists was offered through my new institute.”*
Figure 14: Researchers who experience visa challenges when visiting another country find visa processes lengthy, complex and expensive

help available in navigating these barriers.

German early career researcher working in Portugal

Help with opening a bank account, finding a place to stay and how to move one's belongings is very important.

Polish mid-career researcher working in the UK

While moving abroad for fixed term contracts/short term, language barriers make life very difficult. Most challenging is dealing with bureaucracy in the foreign language. In these cases it is not easy to invest time and money into attending language courses. Sometimes, there is not enough

3.2.3. Visa requirements do not prevent most researchers from travelling, but visa applications can be prohibitively time-consuming, complex and costly

Overall, 22% of respondents (538/2,465) reported that they had experienced visa challenges that had prevented research-related international movement for travel, relocation or both, indicating that obtaining a visa was ‘too difficult or time consuming,’ ‘impossible’ or both. While these results indicate that the majority of respondents (78%) have not encountered visa-related challenges that prevented them from travelling or relocating abroad, visas do pose major challenges for some. There were significant
differences in the percentage of respondents reporting visa challenges, depending on respondents’ nationalities, as discussed in the next subsection. There were no significant differences across career stage in the percentage of respondents reporting visa challenges.

Respondents who indicated that they had encountered visa-related challenges were asked for further detail. The problems they report were broadly similar for both short- and long-term movement. The most frequently cited issue related to visas was the length of time to process visa applications, reportedly preventing international visits and relocation for 70% of respondents who had mentioned encountering visa-related challenges (375/538) (Figure 14). Other noteworthy visa issues were the length and complexity of application forms (68% of respondents who have encountered visa-related challenges, 366/538), costs associated with the application process (47%, 255/538), and a lack of clarity regarding rules and processes (44%, 238/538). Another important visa-related obstacle for researchers seeking to relocate abroad – that employers are unwilling to hire applicants who need a visa or work permit – was reported by 24% of respondents who have been unable to relocate abroad due to visa challenges (130/538) (Figure 15). The inability to travel during visa application and renewal periods was cited as an obstacle by 32% (174/538). There were no significant differences across nationalities in the specific issues reported. The only
significant difference across career stages was that trainees (i.e. PhD students) were less likely and ECRs more likely than more senior colleagues to cite the time required to process applications as an issue for relocation abroad.

In comments, respondents highlighted these challenges, as well as the stress and uncertainty that visa processes can entail:

The negative experiences have been (as usual) with finding funding and visa applications. They are long and exhausting processes that can put anyone off from moving abroad (it delayed me from starting a PhD for about 1.5 years).

Mexican early career researcher working in the UK

Restrictions on salary, degree requirements, inability to stay in country without a work visa, requirement to stay in country for multiple consecutive years (instead of cumulative) prior to gaining indefinite leave to remain, not including study time in country to count towards years in country, have all made working in the UK difficult and massively stressful as academic research jobs are grant/contract based. Fees for work visas are massively high while salaries are low... nothing is secured until the last step when the visa is confirmed – which is not [something] everyone has the means to wait around for. All of this makes job security and career progression extremely difficult. Terrible for mental health as well – knowing that you could have to leave the country that is your home as soon as your contract is up if you don’t secure something else in good time.

American early career researcher working in the UK

I lived (and travelled) in Europe before Schengen and had to get a visa for every country I visited for conferences or even transited. Even today, 25 days to process a conference visa for a one-week trip to Canada is unreasonable.

Indian established researcher working in India

My husband could not work for the first 9 months until his visa was renewed (he is from Colombia) which made survival in an expensive city like London challenging.

Spanish early career researcher working in the UK

The major problem I have faced in conducting research in other countries is visa procedures. Getting a visa requires a unique set of bureaucratic skills and also a lot of time. Most researchers have neither and so we struggle.

British early career researcher working in the UK

Several respondents who were Indian researchers working in India discussed obstacles to transporting scientific materials across borders. Comments included:

Several countries have restrictions to travel with research material, reagents and infectious agents. Every country should follow a common protocol in this regard such that it facilitates the material transfer.

Indian early career researcher working in India

Lack of efficient transfer and equal accessibility of research
material/reagents, infectious agents etc. are [an] impediment to equal participation in research across all the nations.

*Indian mid-career researcher working in India*

3.2.4. Researchers from Asia and Africa are much more likely to have visa-related challenges, particularly for short-term visits

Asian researchers were more than four times and African researchers were more than three times more likely to report visa-related obstacles to visiting other countries for research than European or North American researchers (Figure 16). Overall, 40% of respondents with an Asian nationality (152/380, mostly from India) and 34% of respondents with an African nationality (134/398) reported that a visa-related issue had been an obstacle to them visiting another country for research purposes, compared with 9% (28/302) of North American and 9% (82/946) of European respondents. The variability by region was less pronounced in the context of international relocation. Around one quarter of researchers with an African (24%, 86/352) or Asian (24%, 83/349) nationality encountered visa issues that affected movement to live in another country for research, compared with 13% of North American (36/277) and 7% of European (59/878) researchers.

*Figure 16: Researchers with an African or Asian nationality were more likely to report visa-related challenges related to visiting other countries than were their colleagues with a European or North American nationality*
Figure 17: While many researchers have not faced obstacles when moving to another country, family-related challenges were the most commonly reported obstacle

This issue was highlighted in some respondents’ comments:

“One of the biggest challenges in moving between countries for research is the visa application process. Personally, I visit the UK multiple times a year, yet I still don’t have a long term visa and I have to apply for visas twice a year.

Malawian mid-career researcher working in Malawi

“When applying for conferences, I first assess the visa requirements and how difficult or easy it is to get one then decide whether to apply or not.

Kenyan trainee studying in Germany

3.2.5. Family-related challenges were the most frequently cited obstacle to international relocation

More than one quarter of respondents (27%, 554/2,061) indicated that family-related challenges (‘family responsibilities’ or ‘family member could not move’) had prevented them from relocating abroad for research (Figure 17). Family responsibilities were also cited by 20% of respondents (452/2,242) as an obstacle to undertaking international visits (Figure 10 in Section 3.2.1). There are statistically significant differences by career stage (Figure 18); mid-career researchers were the most likely and trainees the least likely to report family-related challenges as being an obstacle to international movement. European respondents were also significantly more likely than others to cite family-related challenges as an obstacle to either visits or relocation.
While this issue appears to affect a large fraction of respondents, only 4% reported support with childcare or family member travel expenses as an enabler of international visits (Figure 8 in Section 3.2.1). With regard to international relocation, 15% of respondents (241/1,612) reported as an enabler that their family member was also able to get a job in the destination country.

Family responsibilities were also the most commonly cited challenge in the free-text responses, mentioned by more than 10% of those who left comments (118 out of 1,089 respondents). Respondents discussed how family commitments conflict with expectations to be internationally mobile and how women tend to be impacted more by this issue.

I don’t think that it is useful to perpetuate [the] myth that it looks better on your CV to move just for moving’s sake. I feel this negatively impacts women in science disproportionately to men. There are many reasons for this but probably the most important is childcare responsibilities.  
*British early career researcher working in the United States*

Young individuals are expected to make sacrifices for science at an age (25–35) when they should be settling down and starting a family. Travelling to new countries, starting over again (possibly multiple times), and having to break through cultural barriers, is extremely disruptive in this sense. Almost certainly it is a major risk factor for disrupted life courses and mental health problems.  
*Dutch early career researcher working in Germany*

I left my home country to work in Industry. I learnt multiple languages and settled abroad. After 20 years in international research, I have a family but don’t have a stable job. I will probably move country again soon to another fixed-term position. It is not fair on my children to lack stability just because their father is a researcher.  
*Irish mid-career researcher working in Germany*

It is very hard with the responsibility of two kids and a husband with a position in the home country. It is not possible to support the family on only one salary. Childcare costs are expensive in many countries.  
*Irish mid-career researcher working in Germany*
countries [too]. The system is made for young single people [or] men with [wives] on maternity leave that can come along. Not for women with family responsibilities.

Swedish early career researcher working in Denmark

Because of family responsibilities, it is difficult for me to look for a job outside of France. I think ‘mobility’ is not a good criteria for grants distribution, as I feel men and women are not equal in their ‘capacity’ to move because of child responsibility reason (pregnancy, baby care, etc). That’s why, I don’t think that having a research activity in different countries should be compulsory for grant eligibility.

French early career researcher working in France

Since having children however, it’s much more difficult to travel to spend more than ~10 days away from home as it puts too much pressure on the family. My husband also travels a lot for work and it can be difficult to juggle travel and [children’s] school schedules.

South African mid-career researcher working in South Africa

Finding a school & childcare for my daughter was horrible. Took a lot of time & stress.

Dutch early career researcher working in the UK

Childcare is hard to cover both practically and financially – funding can make a big difference here.

Irish mid-career researcher working in the UK

3.2.6. African researchers and those who have not moved previously are more likely to cite lack of information about jobs abroad as an obstacle to movement

The extent to which the availability of information is a barrier to movement is strongly dependent on the respondent’s experience. A small percentage of those who reported prior experience of moving to live abroad reported that lack of information about jobs abroad was an obstacle to moving to live in another country (13%, 200/1,562), compared with nearly one third of those who had not previously moved (31%, 157/499). It is likely that once a researcher has moved to live in another country, they have a wide network through which they can gather information about opportunities and they are more aware of where to look for international job postings.

When we explored this issue by region, two key features became apparent. First, African researchers most commonly reported lack of information as an obstacle, with half of those who have not moved citing this barrier (50%, 73/145) (Figure 19). Second, European researchers least commonly reported lack of information as a barrier, whether they have moved to live in another country or not.

Analysis by career stage revealed that trainees (36%, 55/154) and early career researchers (32%, 56/176) were much more likely to report being hindered by a lack of information if they have not already moved (Figure 19). Senior researcher respondents generally experienced this obstacle less often, especially mobile senior researchers (7% of those who had moved reported it vs 25% of those who had not moved).

It would be easier if opportunities were advertised more widely. I’ve noticed not necessarily a lack but just not widely known/complicated application process so more info on that too.

South African trainee studying in Canada
In South Africa I maybe received an e-mail about a PhD or postdoc position opening once every 6 months, here I receive them on a daily basis.

_South African early career researcher working in France_

The information about research in other countries is very difficult to get. Sometimes institutions, companies or hospitals don't share or respond to e-mails.

_Portuguese trainee studying in Portugal_

I only learnt about how and where to apply thanks to my personal, already international network that reflects my privileged background. These opportunities should be more widely advertised, social media doesn’t
help because regarding this it’s a bit of an echo chamber.

*German trainee studying in the UK*

There is no transparency, nor any systems in place to help people find PhDs in other countries. It seems you are immediately at a disadvantage as a result of being from elsewhere. Lack of support meant I felt working abroad was completely impossible for me.

*British trainee studying in the UK*

Good advertising of the different possibilities is very important for young scientists, information is not always easy to find.

*Brazilian mid-career researcher working in France*

3.2.7. Many internationally mobile researchers have not faced travel obstacles; European researchers reported the fewest obstacles to travel, while African researchers reported the most

The preceding sections have described the obstacles and enablers of travel, and who is affected by them. However, the data show that a large proportion of respondents have not encountered obstacles to travel and relocation and that a large proportion chose to remain in one country rather than relocate. Overall, 22% of respondents (498/2,241) reported that they had ‘not faced any obstacles visiting other countries for research related purposes’, with no significant difference between those who rarely or never travelled and others. Among those who had moved to live abroad for research purposes at least once, 41% (627/1,533) reported that they had ‘not faced obstacles moving to, or staying in, another country for work’. Of the respondents who trained and worked within one country, one third indicated that they chose not to move for work (33%, 166/497). However, the majority of respondents who had not undertaken a move (66%, 331/497) cited at least one obstacle that had prevented them from moving.

There were significant differences across nationalities (by region) and career stage in the proportions of researchers reporting that they had not faced obstacles to international movement. Researchers with a European nationality were the most likely to report that they had not faced obstacles to research visits, as noted previously (Figure 16, 27%, 252/946), or to relocation for research (48%, 343/717), and researchers with an African nationality were the least likely to report this (18%, 70/398 for visits; 28%, 57/207 for relocation). Looking across career stages, senior researchers were more likely (25%, 110/446) than their more junior colleagues to report that they had not faced obstacles to visiting other countries for research purposes; MCRs were the least likely, with 17% (80/481) reporting no obstacles. Trainees (40%, 99/245) and senior researchers (47%, 151/321) were more likely than their colleagues to report that they had not faced obstacles to relocation for research; MCRs were again the least likely, with 36% (132/366) reporting having done so.

At least 11 respondents discussed in the free-text comments how it may not be appropriate for all researchers to travel, often citing personal factors as a reason not to move. Comments included:

*Family oriented people who choose to stay in the same place can also be outstanding scientists, and should not feel forced to move.*

*Portuguese early career researcher working in Germany*

While I appreciate the possibility to travel and I actively support the public campaign for the freedom of movement, I strongly disagree with
the current career system, valuing people who have moved a lot and hence obliging young scientist to sacrifice personal relationships to build their career until they are at least well in their thirties.

*Italian early career researcher working in the UK*

I think it is important to recognise that, while spending time abroad has many positive aspects, it is simply not for everyone and in my eyes mobility shouldn’t be such a major criterion for funding opportunities.

*German early career researcher working in Denmark*

I don’t think it should be mandatory for researchers to move to other countries. In many cases it is possible to be exposed to international environments and do great science without moving.

*Portuguese early career researcher working in France*

I want to make it clear that the current trend of funding bodies to see international mobility as almost essential for ECR funding is absurd and highly damaging.

*British early career researcher working in the UK*

Not everyone has a personality which can adapt to working abroad at the life stage it is necessary. I didn’t want to risk mental health issues abroad. Therefore am blocked from the career.

*British mid-career researcher working in the UK*

Moving to a new country can also be hard emotionally and socially. It takes time to form new networks and figure out cultural differences.

*North American mid-career researcher working in the UK*
INTERNATIONAL TRAVEL AND RELOCATION ARE COSTLY

FOR SHORT-TERM TRAVEL

81% indicated that financial support had enabled international movement

- 70% from a funding body
- 63% from an institution
- 45% from a conference organiser or collaborator

FOR RESEARCH-RELATED RELOCATION

27% indicated that living costs were an obstacle to relocation

VISAS ARE COSTLY, COMPLEX AND TIME CONSUMING BUT NOT WIDELY PROHIBITIVE

22% reported that they had experienced visa challenges preventing research-related international travel

VISA-RELATED OBSTACLES REPORTED INCLUDE:

- 70% Length of time to process application
- 68% Length and complexity of application forms
- 47% Costs associated with the application process
- 44% Lack of clarity regarding rules and processes

RESEARCHERS FROM SOME REGIONS ARE MORE LIKELY TO FACE VISA-RELATED CHALLENGES

Percentage of researchers who reported a visa-related issue preventing travel for research:

- Europe: 27%
- Asia: 20%
- Africa: 9%
- North America: 9%
- Latin America: 9%

FAMILY CHALLENGES WERE THE MOST FREQUENTLY CITED OBSTACLE TO INTERNATIONAL RELOCATION

27% reported that family-related challenges had prevented them from relocating abroad

20% reported that family responsibilities had prevented them from undertaking international visits

RESEARCHERS FROM DIFFERENT REGIONS RELY ON DIFFERENT TYPES OF SUPPORT TO ENABLE THEIR INTERNATIONAL MOVEMENT

Researchers from Africa and Asia were more likely to report that funds from a research funder had enabled relocation abroad

- Africa: 63%
- Asia: 58%
- Europe: 53%
- North America: 46%

African researchers cited invitations from collaborators as an enabler of international relocation more often than researchers from other regions

- Africa: 38%
- Asia: 22%
- Europe: 23%
- North America: 25%
3.3. Outcomes and impacts

Summary

Nearly all researchers – whether they have experienced international movement or not – believe that international movement is important for research.

- 96% of respondents stated that international movement benefits research.
- Respondents who hadn’t moved were slightly less sure of the value of international movement to research.

International movement affects research outcomes for researchers of all nationalities.

- 94% of researchers reported that spending time in another country has led to positive research outcomes.
- The most commonly reported outcomes impacted by international movement were forming new collaborations, developing new ideas, and gaining technical skills and expertise.
- Trainees were the least likely to report almost all of the individual research outcomes.
- African researchers were the least likely to report publishing a paper, changing directions of research or research question, performing experiments or making observations, gaining technical skills or expertise, and making contacts that led to a new job.
- Researchers also experience negative impacts, including strain on individual and personal relationships.
- Some respondents reported experiencing prejudice when they moved.

This section explores the perceived outcomes and impacts related to international movement reported by respondents. Respondents were asked to select from a list of outcomes garnered from the literature and the team’s previous work on international mobility (Guthrie, Lichten, Corbett et al. 2017). There was also a free-text box where respondents could provide greater detail about the effect that travelling internationally – or not – has had on their research. In the second and final free-text question, many respondents also recounted their views on how international travel had impacted their research and the wider research endeavour.

3.3.1. International movement can have negative outcomes for individuals

Many respondents mentioned that while international movement leads to positive professional outcomes, there can also be a variety of negative personal experiences. These can include feelings of loneliness as well as increased strain on individuals and their personal relationships, which perhaps affect mental health. Negative outcomes can be caused by the stress of moving itself, as well as be influenced by the environments individuals move into. For example, some respondents reported experiencing prejudice when they moved.

“I did not cope well with having to move around a lot – it’s nice as an option within a career, but the negative impacts on my mental health far outweighed the positive impacts on my career.”

Retired UK researcher

“It can cause the cut of other relationships in private and work life. And you never feel at home if you move on a regular basis.”

German mid-career researcher working in the Czech Republic
While over the last year other personal and professional difficulties added to this... the wish to move home is the main cause for me likely giving up on an academic career now.

Swiss early career researcher working in Spain

It was not easy to leave everyone I loved behind and move with $600 USD and a suitcase. The loneliness of having no one else in a whole country is very real.

Mexican early career researcher working in the United States

People in [my] home country don’t necessarily appreciate or understand what I am doing in another one. People in the receiving country do not understand my qualifications, and cultural attitudes towards race and gender have been very difficult for me personally.

Singaporean early career researcher working in Thailand

Because of brexit and related uncertainty, and because of some hate crime myself and my wife have experienced in the UK, we are moving to Italy.

Italian established researcher working in the UK

3.3.2. Nearly all researchers – whether they have experienced international movement or not – believe that international movement is important for research

96% (2,074/2,171) of survey respondents stated that research benefits from people moving to or visiting other countries (Figure 20). The percentage was slightly higher for those who have moved (97%, 1,609/1,658) than for those who haven’t moved (91%, 465/513). For those who have not moved, there were more respondents who were uncertain as to whether research benefits from mobility, but only a slightly larger proportion responded that research doesn’t benefit from people moving to or visiting other countries. In the free-text responses, 171 respondents commented on

Figure 20: Overall, 96% of respondents reported that research benefits from people moving to or visiting other countries

Does research benefit from people moving to or visiting other countries?

- Don’t know
- No
- Yes

<table>
<thead>
<tr>
<th>All researchers</th>
<th>Mobile researchers</th>
<th>Non-mobile researchers</th>
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Percentage of researchers
the importance of travel to the development of researchers and to the research endeavour in general, often writing that mobility is ‘critical’, ‘essential’ or ‘fundamental’ to research.

A number of individuals expressed the importance of international mobility to them and to the research endeavour:

- The movement of scientists across the world is what makes the practice of science a global phenomenon. It is a fundamental need for knowledge creation.
  - Chilean established researcher working in the United States

- Every lab I have been in has been an international lab, I cannot fathom a situation where [scientists are] unable to travel. In some countries, research is underfunded, the curious minds that live there should have the opportunity to contribute, even if it means moving country. Travel for academia is the great leveller. It improves the quality of research in our country, and improves the standing of countries from which travelling scientists originate.
  - British researcher working in the UK

- Travelling for research is essential. It may not need not have to be ‘abroad’ but knowledge exchange overall is a significant part without which science cannot survive.
  - German early career researcher working in Thailand

While international mobility was felt to be beneficial and a few respondents stated it should be mandatory, more indicated that international movement should not be required. One respondent stated that placing such a heavy weight on being internationally mobile ‘discourages people from staying in science and makes career advancement even harder than it already is. It favours people with disposable income and from wealthy backgrounds.’ Respondents said that international movement ‘is touted as an essential requirement to obtain academic positions’ or is ‘a major criterion for funding opportunities’, which is viewed as being unhelpful to researchers. Respondents also reported reaping benefits from international movement of researchers without themselves having to move because they hosted visiting researchers from around the world (n = 6). Overall, a strong message from respondents is captured by this comment: ‘Travelling for research should be encouraged but not required.’

3.3.3. Researchers of all nationalities stated that international movement boosts research outcomes by forging new collaborations and developing ideas, skills and expertise

Nearly all researchers who have spent time in another country believe that spending time in another country has led to positive research outcomes; only 6% (103/1,739) said that spending time in another country had not changed the outcomes of their research (Figure 21). As noted below, there is no difference across career stages or nationalities related to the reporting of no change in outcomes.

The most commonly reported outcomes impacted by international movement were forming new collaborations (80%, 1,399/1,739), developing new ideas (80%, 1,392/1,739), and gaining technical skills and expertise (78%, 1,356/1,739). Publishing a paper, performing experiments or making observations, and changing direction of research questions were also all reported as outcomes by more than 50% of respondents. It should, of course, be noted that these outcomes are self-reported and that researchers who do not move also
Overall, 94% of respondents reported that they had experienced outcomes and impacts of spending time in another country (Figure 21). The free-text responses echoed the survey question finding, with broadening research horizons through new ways of thinking or new ways of approaching problems, as well as building networks and collaborations, being the main reported outcomes of international movement (304 and 273 free-text mentions respectively). A large number of respondents also commented on improving their research skills, experiencing personal growth and improving employability (185, 175 and 133 free-text mentions respectively).

Trainees were the least likely to report almost all of the individual research outcomes, other than the gaining of technical skills and expertise (Figure 22). This is perhaps not surprising, as they are likely to have had shorter careers, and therefore may not have had the opportunity to have these outcomes. There is a statistically significant difference between career stages for all outcomes reported except spending time in another country, and performing experiments or making observations.

We observed significant differences between respondents from different countries for five of the reported outcomes: publishing a paper, changing directions of research or research question, performing experiments or making observations, gaining technical skills or expertise, and making contacts that led to
a new job. In all cases African researchers were the least likely to report these outcomes (Figure 23).

In the free-text responses, researchers described the varied ways international movement has had a positive impact on them:

“As a scientist born in a small country with a more limited science base, doing a PhD in the United Kingdom gave me access to ideas, equipment and skills that would have been simply impossible at home. As a junior researcher, moving to the United States allowed me to explore completely new areas of science and make collaborations that would have been impossible in the United Kingdom. As a senior researcher, my work is underpinned by collaborations with colleagues in Africa and the Americas, and those collaborations require movement of me but also other scientists in both directions. Technology has made it easier to communicate remotely, but it can not replace face to face communication – people from my lab going to others to learn new skills, collaborators coming to my lab for the same reasons, attending conferences to
share ideas and discuss new directions. Communication and free movement are the absolute life blood of science.

New Zealand established researcher working in the UK

The opportunity to work in two labs in different countries is an overwhelming positive of the training. It has given me a much wider perspective, exposure to a great variety of techniques, work practices and people, and the opportunity to draw on different resources during difficult parts of my PhD.

UK trainee studying in France

Moving to another country helped me to bring and share important [information] about my area. Also helped me to improve my language skills, make new contacts with different researchers and new [techniques] and improve health in my country.

Brazilian trainee studying in Brazil

Since human progress depends on the growth of knowledge and this is a global endeavor, scientists need to travel and work in other countries to share and advance their research. It is an essential part of their work.

Venezuelan established researcher working in Venezuela

[S]cience is international, anything that inhibits the movement of scientists is inhibiting the progress of science.

North American early career researcher working in the UK
The movement of scientists across the world is what makes the practice of science a global phenomenon. It is a fundamental need for knowledge creation.

Established Chilean researcher working in the United States

Moving to other countries has helped my research portfolio tremendously. It has open new avenues of research for me and made me a better researcher.

Mid-career researcher from Malawi working in Malawi

As a scientist born in a small country with a more limited science base, doing a PhD in the United Kingdom gave me access to ideas, equipment and skills that would have been simply impossible at home.

Established researcher from New Zealand working in the United Kingdom

It was not easy to leave everyone I loved behind and move with $600 USD and a suitcase. The loneliness of having no one else in a whole country is very real.

Mexican researcher working in the United States

Discrimination is a reality despite the promise of a better life.

Kenyan mid-career researcher working in Australia
The findings from this online survey of 2,465 researchers from 109 countries provide evidence about the importance of international movement for research, along with insights into the enablers and obstacles that researchers face. The findings build on previous research conducted by our team and others, backing up previous findings while exploring the experiences of a more geographically diverse group of researchers than has been covered by most prior studies.

Some clear messages emerged from the data gathered, although it is important to keep in mind that they are subject to the caveats that the dataset is not representative of the entire international research population based on sectors, fields and countries covered; there were insufficient responses to enable meaningful comparisons with some regions (Oceania and South America); and there is likely some level of response bias.

Examining the differences across career stages and regions of nationality revealed important variations across contexts as well as many similarities. The vast majority of researchers stated that international movement is important, regardless of their career stage or nationality. Researchers across the world reported that international movement had enhanced the outcomes of their research, although it is clear that researchers from some regions faced more obstacles to international movement. Given this, care needs to be taken when factoring movement into decisions around funding or promotion, since such factoring in might disadvantage some researchers based on their nationality or their family care responsibilities.

With an eye to making international movement accessible to researchers from all over the world, the findings suggest some areas where institutions, funders or other organisations may tailor support to researchers from particular regions. Improved circulation of information about research jobs abroad could be helpful, particularly for researchers of African nationality and early career researchers. Support for obtaining visas would likely be helpful for African or Asian researchers, particularly in the context of short-term travel. Although Europe is a particularly mobile and connected research community, there is potential for more assistance to reduce family-related burdens faced by some researchers.

Survey comments about the personal strain brought by international movement also point to another opportunity for greater support. As stress and burnout disproportionately affect academic researchers (Guthrie, Lichten, van Belle et al. 2017), ensuring that assistance is made available at a time when individuals are at greater risk may prove worthwhile. One respondent indicated that such intervention had been helpful: ‘I very much appreciated...’
that support from psychologists was offered through my new institute after moving as they are aware of the emotional stress moving to a new country and a new job can entail.’

Respondents also offered ideas for how international movement could be better supported, some of which have been mentioned elsewhere in this report. Requests ranged from childcare services at conferences to creating new visas that are more suited to frequent, short-term movement. There was a desire for more information on job opportunities to be made available, and for more help with logistics, such as finding suitable and affordable short-term housing, opening bank accounts, finding childcare and even knowing where to shop for groceries.

The international movement of researchers enables ideas to spread, collaborations to form and new perspectives to be gained, and a large proportion of researchers do not face obstacles to travel or relocation abroad. The benefits of international movement are felt by all, but obstacles to movement are currently felt disproportionately by some. Widening the accessibility of international movement would help research to flourish and strengthen research systems.
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Thank you for participating in our survey. Together Science Can is a campaign to celebrate and protect scientific collaboration. As part of its season focusing on the importance of international movement, they would like to collect the views and experiences of researchers from across the world.

The survey asks about your experiences of travelling or moving for research training or work—things that supported you, challenges you faced, and the results of that time in a different country. Responses are confidential and you do not have to give your name or any personal details. The survey is being conducted by RAND Europe, a not for profit research institute that helps to improve policy and decision making through research and analysis.

The results will be published in September 2018 and will give us a better understanding of people’s experiences of moving for research and how that varies internationally. Together Science Can will use these results to highlight the barriers, as well as the opportunities and benefits, so researchers can work together better in the future.

A.1. Demographics

1. *Are you a researcher? (Choose Yes or No)
   - Yes
   - No

2. In which sector do you currently train or work?
   - Academia or university
   - Industry or private research
   - Government or public research
   - Not-for-profit or charity
   - Other (please specify)

3. What is your current position?
   - Student or training to be a researcher
   - Early career researcher
   - Mid-career research
   - Established researcher
   - Retired or Emeritus researcher

4. *In which fields do you mainly train or work? (Please select up to two)
   - Natural sciences
   - Engineering and technology
   - Medical and health sciences
   - Agricultural and veterinary sciences
   - Social sciences
   - Humanities and the arts
   - Other (please specify)
5. *What is your nationality? 
   Drop-down selection of countries

6. If you have a second nationality, please select it here. 
   Drop-down selection of countries

7. *In which country do you currently work? 
   Drop-down selection of countries

A.2. Short-term mobility experience

In this section we are interested in your experience of visiting other countries for research related purposes. You might have visited another country to:

- attend a conference or meeting
- visit collaborators
- learn a new technique

8. How often do you visit other countries for a research related purpose?
   - Never
   - Very rarely
   - Once per year
   - 2-4 times per year
   - 5-11 times per year
   - 12 times per year or more

9. Which of the following have helped you visit other countries for a research related purpose? (Please select all that apply to you)
   - I have not travelled for a research related purpose
   - Funds provided by research funder for travel
   - Funds provided by conference organiser or collaborators
   - Invitation from conference organiser or collaborators
   - Support taking time away from work
   - Support obtaining visa or other travel documents
   - Childcare or family member travel expenses provided
   - Other (please specify)

10. Have any of the following obstacles prevented you from visiting other countries for a research related purpose? (Please select all that apply to you)
   - I have not faced any obstacles visiting other countries for research related purposes
   - Too difficult or time-consuming to obtain a visa
   - Impossible to obtain a visa
   - Too difficult or impossible to leave country of residence
   - Family responsibilities (e.g. childcare)
   - Lack of funds for travel and expenses
   - Lack of funds for conference or meetings fees
   - Lack of time
   - Other (please specify)

A.2.1. Challenges with visa or immigration processes

You indicated that challenges with visa or immigration processes prevented you from visiting another country for a research related purpose. In this section we would like to find out what aspect of the process was challenging for you.
11. Which of the following challenges have you experienced with visa or immigration processes when visiting another country? (Please select all that apply to you)
   • Length of time to process application
   • Long or complex application forms
   • Lack of clarity regarding rules and processes
   • Inability to travel during application or renewal periods
   • Costs associated with application process
   • Mistakes in materials received or processing of application
   • Difficulty for my partner or dependents to obtain the necessary visas for work/study
   • Other (please specify)

A.3. Long-term mobility experience

In this section we are interested in if you have moved to live in another country for training or a job in research. You might have moved to another country to:
   • start a research job in a company
   • start a research job in a university or institute
   • receive training (e.g. a PhD)
   • start a research job for a government

12. Which of the following best describes your experience of moving to live in other countries for research training or work?
   • I have trained and worked within one country
   • I have trained or worked in another country, but only for a short period (less than one year at a time)
   • I have trained or worked in another country for a long period (more than one year at a time)
   • I have trained or worked in multiple countries at the same time

13. How many countries have you lived in while training or working as a researcher?
   • 1
   • 2
   • 3
   • 4
   • 5+

14. Which of the following helped you move to another country for research training or work? (Please select all that apply to you)
   • Funds from a research funder
   • Funds from an institution
   • Invitation from collaborators
   • Offered job in the new country
   • Support from funder or institution to obtain visa or other travel documents
   • Family member (e.g. spouse) was able to get a job in the new country as well
   • Support with relocation costs and practicalities
   • Support taking time away from an existing role (e.g. a sabbatical)
   • None of the above
   • Other (please specify)

15. Have any of the following obstacles prevented you from moving or staying abroad for research training or work? (Please select all that apply to you)
   • I have not faced obstacles moving to, or staying in, another country for work
   • Lack of information about research jobs abroad
16. In your opinion, does research benefit from people moving to or visiting other countries?
   • Yes
   • No
   • Don’t know

17. Have any of the following obstacles prevented you from moving or staying abroad for research training or work?
   • I have chosen to work in one country
   • Lack of information about research jobs abroad
   • Too difficult to get a research job in another country
   • Qualifications are not compatible with research system
   • Too difficult or time-consuming to obtain visa
   • Impossible to obtain visa

18. In your opinion, does research benefit from people moving to or visiting other countries?
   • Yes
   • No
   • Don’t know

A.3.1. Challenges with visa or immigration processes

You indicated that challenges with visa or immigration processes prevented you from moving to live in another country for a research related job or training.

In this section we would like to find out what aspects of the process were challenging for you.

19. Which of the following challenges have you experienced with visa or immigration processes when moving to another country for research training or work? (Please select all that apply to you)
   • Length of time to process application
   • Long or complex application forms
   • Lack of clarity regarding rules and processes
   • Inability to travel during application or renewal periods
• Costs associated with application process
• Mistakes in materials received or processing of application
• Employers unwilling to hire applicants who need a visa or work permit
• Difficulty moving between roles within the same institution
• Difficulty moving between institutions
• Difficulty for my partner or dependents to obtain the necessary visas for work/study
• Other (please specify)

A.4. Outcomes and impacts of mobility

In this section we are interested in how your international experiences have impacted your research or career.

We are interested in impacts arising from both short-term and long-term periods abroad.

20. Have any of the following things happened because you could spend time as a researcher in another country? (Please select all that apply to you)

• I have not spent time abroad as a researcher
• Spending time in another country has not changed the outcomes of my research
• Formed new collaborations
• Published a paper
• Filed a patent
• Formed a company
• Developed new ideas
• Changed direction of research or research question
• Performed experiments or made observations
• Gained technical skills or expertise
• Made contacts that led to a new job
• Other (please specify)

21. Would you like to tell us more about how moving (or not moving) to another country has impacted your research or career?

Free text response

A.5. Final thoughts

22. Please provide any additional comments or reflections on spending time in another country for a research purpose, training or work. You may wish to tell us about:

• any particularly positive or negative experiences trying to move between countries for research
• why travelling for research does or does not matter
• what effect spending time in another country has had on your research

Free text response

Thank you for participating in this survey. Please share the survey with your colleagues around the world and help spread the word using #togethersciencecan.

The survey is being run on behalf of Together Science Can, a global campaign to unite researchers and institutes around the world to celebrate and protect international scientific collaboration.

If you would like to find out more or keep in touch, please visit us at togethersciencecan.org
Annex B. Comparison of survey demographics with population-level data

In this annex we describe the characteristics of survey respondents and, where possible, compare them with population-level data. The characteristics investigated are research setting, career stage, research field, nationality and country of residence. In this section we also describe how we grouped survey respondents for the analysis.

B.1. The majority of respondents conduct research in an academic setting

Of the 2,769 respondents, 89% identified as researchers. Of those who did not, we were able to conclude, based on a review of the text responses provided, that many had some past experience of research, either directly or indirectly, or had an interest in moving into research in the future. However, we excluded from any further analysis any respondents who did not identify as researchers.

Figure 24 shows that the majority of our respondents are from academia or university settings (72%), which compares with 43% internationally (OECD 2018). This proportion matches our finding from previous work that researchers in the private sector in particular do not typically respond to surveys of this nature (Ioppolo et al. 2017). This proportion may also partly reflect our networks and the networks of Together Science Can partners that we were able to access to recruit survey respondents.

Because our respondents are dominated by academic researchers, it is likely that the majority of the conclusions we are able to draw reflect the experiences and perceptions of this sector primarily.

B.2. All career stages are represented, but no population-level data are available for comparison

The career stage of survey respondents is shown in Figure 25. The largest group is early career researchers, who account for 37% of respondents. A further 21% are comprised of trainees (i.e. PhD students). We would anticipate that there would be a larger number of respondents within these two earlier career stages, as observed. However, we do not have comparable international statistics for the expected breakdown of researchers by career stage, so it is not possible to state whether this represents the international researcher population adequately. For the purposes of subsequent analysis, we group together responses from retired or emeritus researchers with established researchers (using the term ‘senior’ collectively), since it is likely that they will be reflecting on experiences from a similar perspective.
B.3. Medical and health sciences researchers are overrepresented in the dataset

Respondents were allowed to specify up to two major research fields based on the OECD classification of field of research. We note that almost half of respondents report one of their two major research fields being the medical and health sciences. Natural sciences is reported by around one third of respondents (Figure 26). The numbers of respondents
within the humanities and the arts and within agricultural and veterinary science were much lower, with both major fields representing less than 6% of respondents.

International population-level comparators for these data are limited in terms of their comprehensiveness. The overall percentages within broad categories for OECD (OECD 2018) and Eurostat data (Eurostat 2016) are compared with the survey respondents in Table 1. There are some important caveats to note in this comparison. First, survey respondents were allowed to select up to two fields, and 20% of respondents did so. This means that, unlike is the case for the two comparator datasets, the total proportions sum to more than 100%. Second, the OECD data only include breakdown by subject area for 11 (primarily, though not exclusively, European) countries. Third, the Eurostat data are limited to European countries and use a different categorisation system. Finally, the latest available OECD data are for 2015 and the latest available Eurostat data are for 2016.

Even taking into account these caveats, it seems likely that we have an overrepresentation of medical and health sciences respondents, which is plausible given the networks we were able to access through Together Science Can generally and through the Wellcome Trust in particular. Across other broad fields, the proportion of respondents does not seem substantially different to...
population-level statistics, taking into account the limitations of the datasets available.

### B.4. Researchers of UK nationality are overrepresented within the European grouping, as are researchers of Indian nationality within the Asian grouping

We asked respondents to provide information on their current country of residence and their nationality. The aim was to be able to make comparisons between regions. The segmentation of respondents by nationality and current country of work is shown in Figure 27. We note that in both cases, the UK has the largest number of respondents, with the United States and India also featuring significantly.

Those three countries together provide more than one third of the responses by current country of residence. For the purposes of comparisons in further analysis, we have grouped respondents by regions (continents). In each case, we have sufficient numbers of respondents to conduct analysis comparing Africa, Asia, Europe and North America. The numbers for Oceania and South America are lower, and in these cases the analysis provided will be more descriptive.

It should also be noted that respondents were given the opportunity to provide a second nationality, and 11% of respondents did so. However, the proportion of respondents listing any specific nationality was 15% or less for all countries except the UK and United States. Therefore, we conduct this analysis based on the first nationality provided.

*Note: Respondents were given the opportunity to provide a second nationality, and 11% of respondents did so. However, the proportion of respondents listing any specific nationality was 15% or less for all countries except the UK and United States. Therefore, we conducted the analysis based on the first nationality provided.*

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**Table 1: Comparison of research field of survey respondents with OECD and Eurostat data**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Field</td>
<td>[245x171]</td>
<td>[245x171]</td>
<td>[245x171]</td>
</tr>
<tr>
<td>Science &amp; technology16</td>
<td>[245x301]</td>
<td>[245x301]</td>
<td>[245x301]</td>
</tr>
<tr>
<td>Natural sciences</td>
<td>20.1</td>
<td>32.9</td>
<td></td>
</tr>
<tr>
<td>Engineering and technology</td>
<td>49.6</td>
<td>12.5</td>
<td></td>
</tr>
<tr>
<td>Health &amp; welfare; services</td>
<td>14.0</td>
<td>48.4</td>
<td></td>
</tr>
<tr>
<td>Medical and health sciences</td>
<td>10.8</td>
<td>16.6</td>
<td></td>
</tr>
<tr>
<td>Social science, business &amp; law</td>
<td>20.6</td>
<td>16.6</td>
<td></td>
</tr>
<tr>
<td>Social science</td>
<td>9.5</td>
<td>16.6</td>
<td></td>
</tr>
<tr>
<td>Education; arts &amp; humanities</td>
<td>19.5</td>
<td>5.8</td>
<td></td>
</tr>
<tr>
<td>Humanities and the arts</td>
<td>5.6</td>
<td>5.8</td>
<td></td>
</tr>
<tr>
<td>Agriculture &amp; veterinary</td>
<td>2.6</td>
<td>3.8</td>
<td></td>
</tr>
<tr>
<td>Agricultural and veterinary sciences</td>
<td>4.5</td>
<td>3.8</td>
<td></td>
</tr>
</tbody>
</table>
We do not have comparators for the nationality of researchers. However, there are data on the number of researchers based in each country, produced by UNESCO. Comparisons by region are shown in Table 2. We note an overrepresentation in our respondents from Europe (primarily driven by the large number of UK respondents). In addition, Asia is underrepresented in the analysis – and in particular countries other than India, given that the majority of the respondents based in Asia are from India.
Table 2: Comparison of region in which respondents are currently resident with population-level data

<table>
<thead>
<tr>
<th>Region</th>
<th>Survey respondents (n)</th>
<th>Survey respondents (%)</th>
<th>UNESCO data (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>458</td>
<td>18.6</td>
<td>2.7</td>
</tr>
<tr>
<td>Asia</td>
<td>284</td>
<td>11.6</td>
<td>45.0</td>
</tr>
<tr>
<td>Europe</td>
<td>1,189</td>
<td>48.2</td>
<td>28.8</td>
</tr>
<tr>
<td>North America</td>
<td>350</td>
<td>14.2</td>
<td>18.1</td>
</tr>
<tr>
<td>Oceania</td>
<td>56</td>
<td>2.3</td>
<td>1.6</td>
</tr>
<tr>
<td>South America</td>
<td>128</td>
<td>5.2</td>
<td>3.8</td>
</tr>
</tbody>
</table>

B.5. Researchers with experience of international movement may have been more likely to complete the survey

It is likely that there is some response bias, in that people who engaged with the survey may be more likely to have experience of international mobility. If this is the case, the patterns of international movement will be skewed towards more travel, and the enablers and obstacles reported may also be skewed. We try to overcome this limitation by performing analyses by experience of movement – for example moved vs not moved – where appropriate.