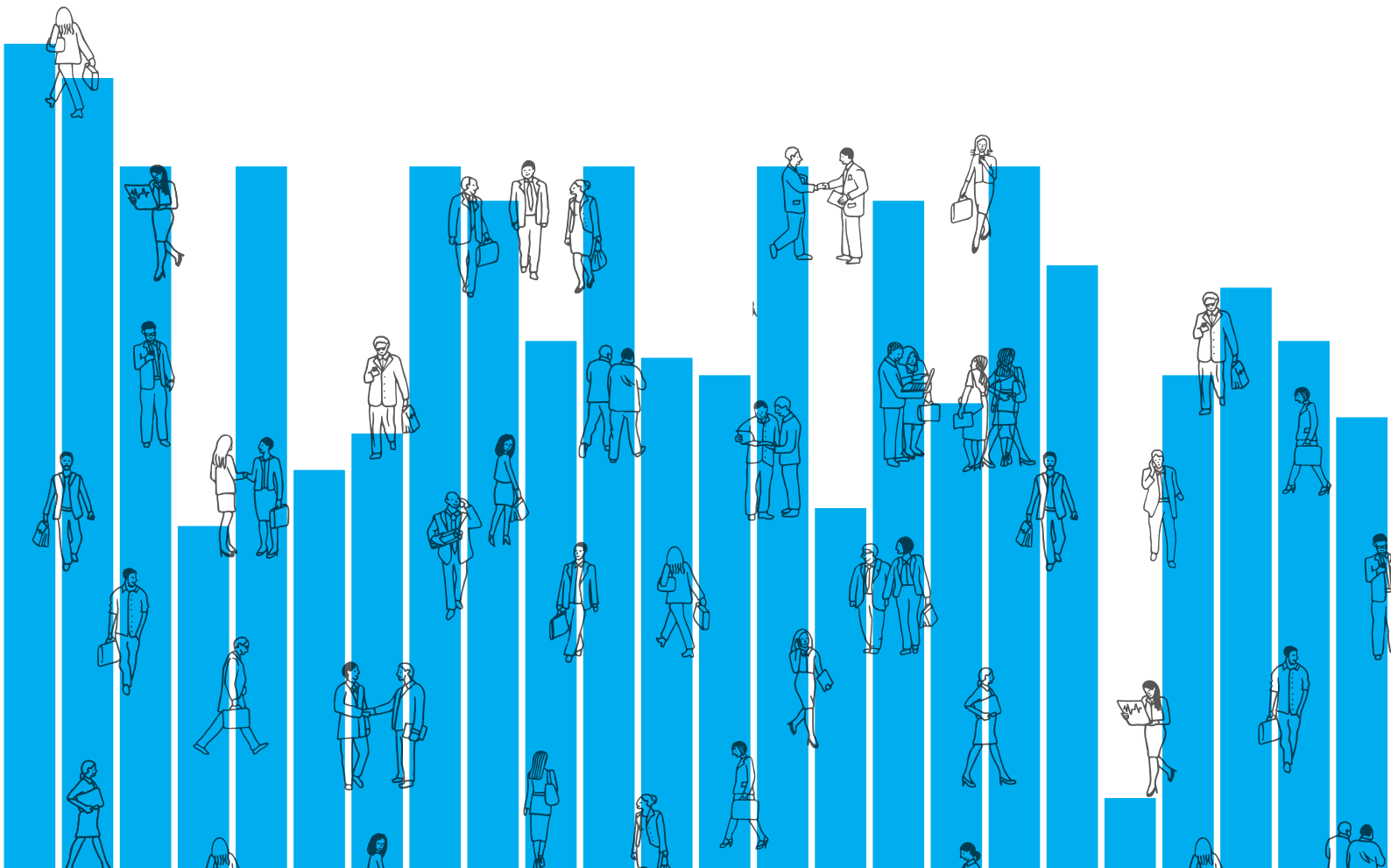
eurodoc

The European Council of Doctoral Candidates and Junior Researchers

Report

EURODOC POSTDOC SURVEY



The European Council of Doctoral Candidates and Junior Researchers

EURODOC Postdoc Survey

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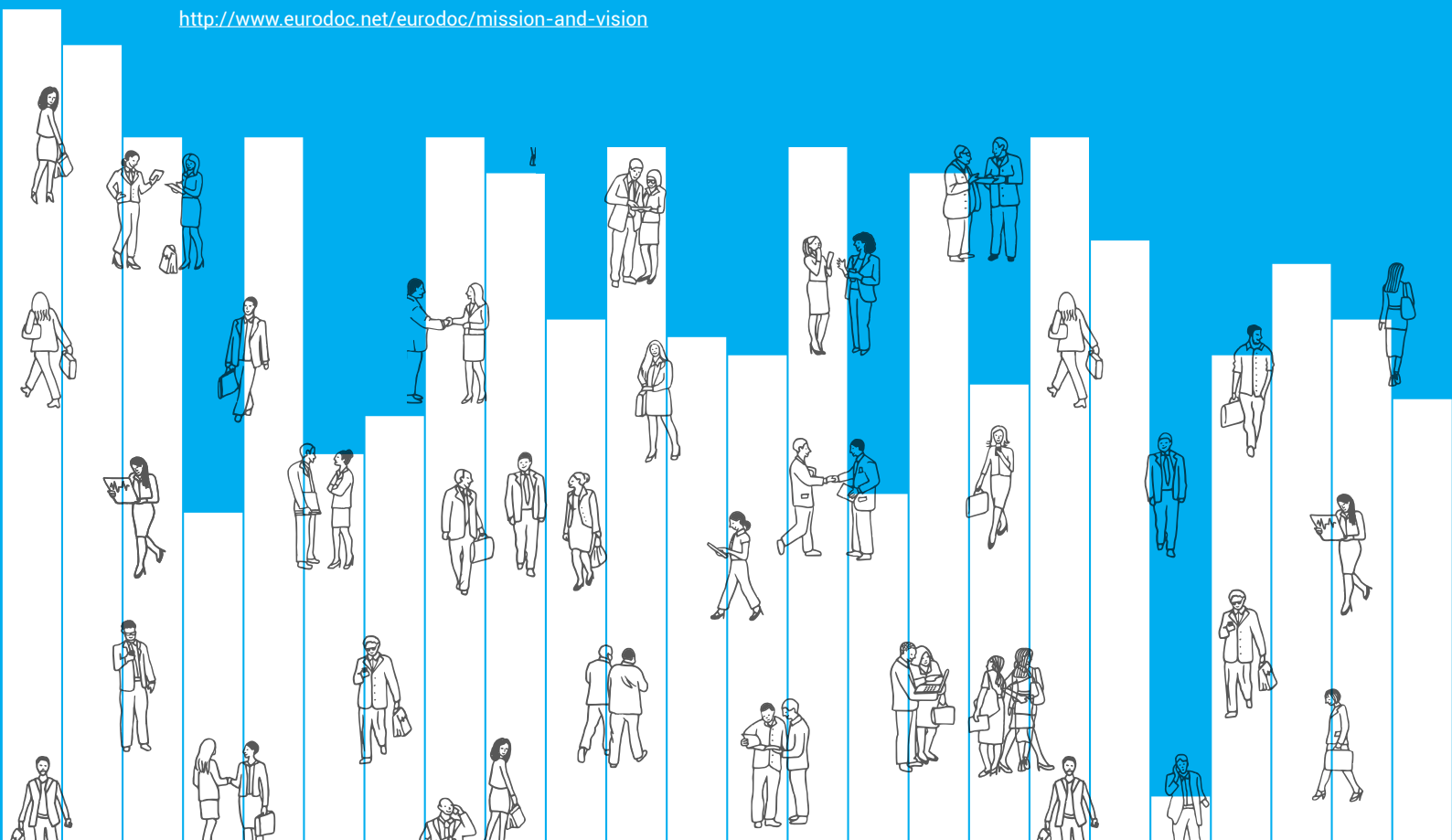
Who we are and what we advocate

Eurodoc[1], The European Council of Doctoral Candidates and Junior Researchers, is an umbrella organisation of 26 national associations (NAs) representing doctoral candidates (DCs) and junior researchers (JRs) in 24 countries of the European Union (EU) and of the Council of Europe[2]. Eurodoc was established in 2002, in Girona (Spain), and is based in Brussels. It is Eurodoc's **mission and vision** to advocate for a fair and sustainable research culture where early career researchers (ECRs) are treated with respect and have access to long-term and stable career pathways. For more information, see Eurodoc Mission and Vision[3] statement.

[1] Eurodoc (2024, December). *About*. Eurodoc, The European Council of Doctoral Candidates and Junior Researchers. https://www.eurodoc.net/eurodoc

[2] Eurodoc (2024, December). *Eurodoc members*. Eurodoc, The European Council of Doctoral Candidates and Junior Researchers. http://www.eurodoc.net/eurodoc-members

[3] Eurodoc (2024, December). *Mission and Vision*. Eurodoc, The European Council of Doctoral Candidates and Junior Researchers. http://www.eurodoc.net/eurodoc/mission-and-vision



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1The recognition of authorship uses the CReDiT, contributor roles taxonomy. See https://credit.niso.org/

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List of Acronyms

Charter & Code European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers

CoARA Coalition for Advancing Research Assessment

DC Doctoral Candidate

DGRTD Directorate-General for Research and Innovation

DORA San Francisco Declaration on Research Assessment

EC European Commission

EC-DGRTD European Commission, Directorate-General for Research and Innovation

ECDWG Employment and Career Development Working Group (Eurodoc)

ECR Early Career Researcher

EHEA European Higher Education Area

ERA European Research Area

EU European Union

EUPL European Union Public Licence

Eurodoc The European Council of Doctoral Candidates and Junior Researchers

GDP Gross Domestic Product

GDPR General Data Protection Regulation

GEP Gender Equality Plan

HE Higher Education

HEI Higher Education Institution

HE&R Higher Education and Research

HRS4R Human Resources Strategy for the Recruitment of Researchers

ISE Initiative for Science in Europe

JR Junior Researcher

MA Master Student

MCAA Marie Curie Alumni Association

MO Member Organsation (Eurodoc)

NA National Association (Eurodoc)

OECD Organisation for Economic Cooperation and Development

OS Open Science

PI Principal Investigator

R&I Research and Innovation

R1 First-Stage researchers

R2 Recognised Researcher

R3 Established researchers

ReICO Research & Innovation Careers Observatory

ReMO Researcher Mental Health Observatory

RPO Research Performing Organisation

STIP Science, Technology and Innovation Policy

UN United Nations

UNESCO United Nations Educational, Scientific abd Cultural Organisation

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Forward

Since its founding in 2002, Eurodoc has been advocating for the stability of employment and the sustainability of the careers of early career researchers. With the establishment of the European Research Area in 2000, the European Commission has had the goal of making research careers attractive on its agenda with achievements including, for example, the development of a competence framework for research careers. However, the conditions in the sector offered to early and mid-career researchers remain less competitive than what is offered in other public and private sectors, to the detriment of both individuals and society.

It is well known that many doctoral candidates are not employed nor fully recognised as professionals. What is often overlooked, however, is that these conditions remain a reality, or indeed are even further exacerbated, for many postdocs: fragmented employment contracts, work under free-lance conditions, and financing through stipends and scholarships are wide-spread. Due to the so-called atypical nature of their employment, data remain sparse and incomplete.

Often, it is assumed that precarity for postdocs refers solely to the widespread use of (short) time-limited contracts. Yet, precarity is not only a question about the length of a contract, it is equally a question about the general employment and working conditions as well as social security and the pressure to be internationally mobile. Does the salary level match those in other sectors with similar levels of experience? Does the contract bring rights and access to social security, such as parental and sick leave, that match other sectors? Can researchers retain their social security, keep their private networks stable enough, and have stable living conditions when they move from institution to institution, from country to country, from system to system? As Eurodoc identifies, postdoctoral researchers' circumstances are best described by the 'postdoc paradox'[1]. Precarious employment often renders postdocs invisible to their hosting organisations, even as they are required to perform the core work of research, teaching, and outreach for their institutions while being put under extreme pressure to still singularly focus on the numbers for career advancement (number of publications, impact factors, etc).

Eurodoc collected the data presented in the following through the Eurodoc Postdoc Survey disseminated during 2018-2019 among our member organisations. The aim was and is to better understand the working conditions, the challenges and realities of the work-life balance of researchers at the postdoctoral stage working in Europe.

1 Parada, F. (2019, October 7). Working precariously as a postdoc: "Big issues" and "daily hassles". International Workshop on Reducing the precarity of researchers' careers. OECD: Paris. https://community.oecd.org/docs/DOC-160715.

The report was initially delayed by the COVID-19 pandemic as well as by the reality of Eurodoc volunteers working on this project, with many being precariously employed and internationally mobile, which accounts for the high turnover rates in their volunteering for the Eurodoc Survey project. The project has had the support of last year's and this year's boards, for which the writing of the report was a priority. It is sobering to realise that the report as well as the underlying data remain as relevant today as when it was collected over five years ago. Data on and awareness of the conditions of postdocs in Europe remain sorely lacking.

In recent years, and perhaps particularly during the spring of 2025, the future of the European Research Area has become a focal point of discussion. Retaining and attracting the best researchers requires a sustainable research work environment, mitigating the current precariousness of the research career. There is no research nor higher education without the people, without the researchers, lecturers, academics. Research conditions thus always means working conditions. Public spending on research and higher education is crucial to set the standards for the working conditions of researchers. The European funding schemes should no longer be used to finance early career researchers on stipends or freelance-type contracts; it should be ensured that the funds go to competitive employment contracts (on par with other sectors), even when these are time-limited, and adequate social security provisions.

As this report highlights, the problems are multidimensional, and only concerted action will ensure the much-needed change in today's hypercompetitive and performance (rather than quality)-based research culture and environment. Thus, six key points for action are proposed that include, amongst others, the call for moving towards stable and more predictable career paths and the reduction of disparities between working conditions with a common framework for attractive, sustainable researcher careers in Europe based on transparency, flexible career pathways, and an open labour market that protects social security.

We would like to remind every stakeholder that research, innovation, higher education and the principle of academic freedom are intimately connected and play key roles in our democracies. Governments and public institutions must protect and promote higher education, research and academic freedom, which means ensuring that the legal framework for employment conditions extends to early career researchers and that all monitoring mechanisms for the conditions in the sector include a particular focus on early career researchers.

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Figure 1: Authorship credit comic from "Piled Higher and Deeper" by Jorge Cham www.phdcomics.com, reprinted with permission of the author. All rights reserved.

Executive Summary

The **Eurodoc Postdoc Survey** examined the working conditions, career prospects, and work-life balance of postdoctoral researchers working in Europe to make an in-depth characterisation of this population. The survey was developed by Eurodoc and the data were collected between October 2018 and February 2019. Over 1700 postdoctoral researchers based in more than 30 European countries participated in the study.

'Postdocs' is how researchers with a doctoral degree working in universities with a fixed-term contract or a stipend are commonly designated. Despite the generalised use of the term, there is no consensual definition of 'postdoc', and this population of researchers remains relatively unknown. Gaps in data persist, which hinders knowledge about the phenomenon of precarity in the research and higher education (HE) sectors. Postdocs are among the researchers that are the most affected by precarity, with postdocs' precarious working conditions recently emerging as a political concern globally. Precarity and a highly competitive research culture impact not only individual researchers – their well-being and work-life balance, their employment and career prospects – but also research and society, specifically the ability to produce real innovation and impact, including the ability to contribute to economic growth. In the report, the expression **'postdoc'** is used to designate **all researchers with a doctoral degree who are not yet fully independent and who are in non-standard employment**, that is, employment with no prospects of continuity or of becoming permanent.

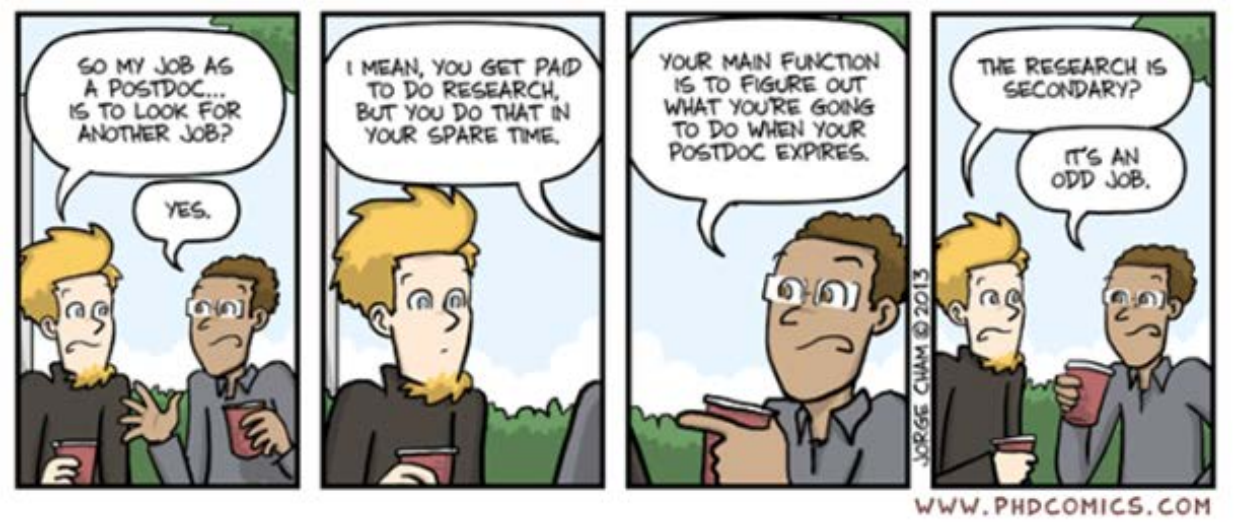


Figure 2: Authorship credit comic from "Piled Higher and Deeper" by Jorge Cham www.phdcomics.com, reprinted with permission of the author. All rights reserved.

Structure of the report

The report is structured into **six main sections**: Key Points for Action, Introduction, Method, Results, Reflecting on the Key Points for Action, and Conclusion. Appendix 1 contains the survey questions and Appendix 2 additional figures.

Introduction

The section on Introduction provides the background for the survey. The expression 'postdoc' is defined and the main issues impacting these researchers and affecting today's research and higher education landscape are discussed, specifically, factors leading to the unprecedented growth of the research workforce, the precarisation of postdocs' working conditions, and its implications for their careers and wellbeing, as well as for research and society.

Method

In the section on Method, is reported information on the survey participants, instruments, data collection, and data analysis strategy. The focus is on the answers researchers self-describing as postdoctoral researchers gave to the questionnaire, which addressed the following six topics:

1. **Institutional and international mobility**
2. **Stability of employment and funding**
3. **Access to social welfare**
4. **Role definition, clarity of rights and responsabilities, including teaching and supervision responsabilities, and applying to funding and access to ancillary costs**
5. **Career support and plans, including access to career guidance and support, barriers to career development, and plans for career development.**
6. **Wellbeing and work-life balance**

Analysis of the data was carried out in two phases. First, a descriptive analysis of all items in the questionnaire was performed to arrive at a Europe-wide perspective on the different topics explored with the survey. Second, a chi-squared analysis of the data was conducted to arrive at a more nuanced understanding of differences in postdocs' employment, career prospects, and well-being, which used the following dimensions as grouping variables: gender, European region where postdocs were based, field of research, and academic age.

Results

The section on the Results evidences the extent to which precarity affects postdoctoral researchers working in Europe, the seriousness of its impact on their expectations and career progress, as well as on their work-life balance and wellbeing. The following are among the Eurodoc Postdoc Survey key results:

Precarity and uncertain career prospects are widely disseminated across all countries and regions of Europe. Postdocs' contracts were short- to very short-term and typically did not grant these researchers full access to social welfare provisions (e.g., unemployment benefits, sickness, or parental leave). These results were irrespective of the type or source of funding and of the region of Europe where these researchers worked. Many of the postdocs surveyed did not have clear specifications for the number of weekly hours they were contracted to work, with many reporting working over 40 hours a week. Temporary work contracts and uncertain job opportunities were the factors that impacted the most postdocs' lives. Followed by the lack of stable income, lack of free time, high workloads, and the need to be mobile.

The postdocs answering the survey were aware of and concerned with the implications the limited prospects of overcoming precarity and securing a permanent position have for their lives and careers, with many reporting not having clear plans for what they would like to do in the future. Many – especially among those acquiring a doctorate in the last 3-4 years – stated preferring or being open to pursuing alternative careers in or outside academia. Regardless, many survey respondents declared wanting to continue working in academia either as a professor or in an alternative researcher position.

Overall, postdoctoral researchers had either unclear or partially defined roles, rights and responsibilities, with many also not having their work or skill set duly recognised, namely concerning supervision. Many postdocs could not cover ancillary costs of their work (e.g., travel costs, language proofreading, publication costs), and many also were not entitled to representational rights in institutions' relevant governing bodies. Furthermore, many survey respondents believed they did not receive enough guidance or advice about career options, with many also being unaware of, or not having access to, an office in their host institution offering guidance or advice about careers, which they perceived as a serious barrier to career development. Postdocs mostly affected by institutional neglect or invisibility were those acquiring a doctorate for the shortest or the longest time (i.e., up to 2 years or for 5 or more years).

Most survey participating researchers considered their careers to have a considerable negative impact on well-being. Most of the respondents felt there was an imbalance between their work and non-work life, with many rating their work-life balance as bad or very bad. Several survey participants reported either not living permanently in the same country as their partner or commuting between countries.

Female researchers are more pessimistic about their career prospects and tend to perceive chances of progressing in their careers more negatively. Female researchers also found it harder to balance work and family and reported more often feeling that certain dimensions of their working lives very much affected their private lives (e.g., the need to be mobile, the lack of stable income, or high workloads).

The grouping variables that most consistently differentiated survey respondents across the topics addressed with the questionnaire were the field of research and, especially, the region of Europe where postdocs worked. The answers postdoctoral researchers gave to the questionnaire evidenced the different expectations, employment opportunities, and paths for career development of researchers from different disciplines or fields of research. The results also revealed a divide based on geographic location, especially between researchers based in the north and the south of Europe. Postdocs working in the south were more likely to report doing worse in many of the issues surveyed (e.g., a higher number of temporary contracts, lower access to social welfare, less clear roles, rights and duties) and being the least optimistic about their career prospects. These postdocs also reported less frequently than their peers being mobile, both institutionally and internationally.

Postdocs of higher academic age were the least satisfied with their jobs and the least open to pursuing alternative careers to a career in academia. These researchers also were the most pessimistic about their career prospects, the ones to be the least satisfied with how their work and non-work lives were balanced, and those who considered their careers had a considerable negative impact on their wellbeing. They also declared more often than other postdocs that their private life was very much affected by their careers. In turn, postdoctoral researchers with the lowest academic age (i.e., with up to 2 years since receipt of the doctorate) reported more often than their peers not having a clear understanding of their roles, rights, and duties, including the welfare provisions covered by their contracts.

Key Points for Action and Reflecting on the Key Points for Action

Following the Executive Summary, Eurodoc proposes **six key points for action**. These key points for action will be resumed and additional considerations underlying their framing will be presented in the section on **Reflecting on the Key Points for Action**.

The **six key points for action** are:

1. **Improve postdoctoral researchers' working conditions by offering them stable and more predictable career prospects based on standard employment.**

2. **Provide postdoctoral researchers with nurturing and fair working environments, access to career guidance and representational rights, as well as ample opportunities for wide-ranging professional development.**

3. **Implement a clear, common framework for attractive, sustainable research careers in Europe based on transparency, flexible career pathways, and an open labour market.**

4. **Ensure common basic working rights and adequate employment conditions to researchers across Europe.**

5. **Promote gender equity while fostering diversity and inclusion in research careers.**

6. **Promote postdoctoral researchers' mental health and wellbeing and ensure their adequate work-life balance.**

The six Key Points for Action are forward-looking and consist of broad orientations resulting from the careful analysis of the survey results and a meticulous reflection on their meaning and policy implications. To be effective, they must be embraced by all stakeholders involved in R&I, including ECRs, which must act in coordination to implement reforms. Structural systemic change can only be achieved through a shared vision and concerted, multidimensional action from all relevant actors.

The six Key Points for Action also are unique as they allow moving beyond a fragmented analysis and understanding of the challenges postdoctoral researchers face in their careers. By determining how specific dimensions – such as gender, region of Europe where the researcher is based, field of research, and academic age – affect postdocs' employment, career advancement, and wellbeing, the analysis performed on the data provided a wide-ranging understanding of the difficulties these researchers experience during the early stages of their careers. These difficulties will be discussed in the section on **Reflecting on the Key Points for Action**, where additional evidence and an integrative analysis supporting Eurodoc proposals for policy reform will be presented.

Key Points for Action

The **six key points for action** which Eurodoc proposes are broad orientations, supporting a wide-ranging reform agenda addressing the many challenges postdoctoral researchers face in accessing and maintaining stable employment, progressing in their careers, balancing their work and personal lives, and in their mental health and wellbeing. They result from a thorough analysis and careful reflection of the data collected with the survey and reflect Eurodoc's positions and contributions to R&I policy discussion and reforms as well as the priorities currently shaping action at the EU level. To be effective, all stakeholders involved in R&I, including ECRs, must be involved in the reforms proposed, which require a multidimensional approach to the many problems researchers at the early stages of their career – especially, postdocs – face.

1 Improve postdoctoral researchers' working conditions by offering them stable and more predictable career prospects based on standard employment.

The precarious nature of the research careers, – especially in academia – is a problem that concerns not only the individual researcher but also society as a whole. It creates an instability that erodes the higher education and research sector from within, leading to pervasive and high costs.

A stronger commitment to reforms in the higher education and research sector is needed from the research and higher education institutions, the European Commission (EC), national and regional governments, and private investors. More robust investments are also needed to ensure that researchers and research-performing organisations have access to adequate, stable funding. This funding should support postdoctoral researcher positions based on standard employment contracts, guaranteeing the same level of social protection as others working within the university - , public - , or private sector. Additionally, these positions should have a reasonable minimum length, such as two years or longer, to provide stability and career development opportunities.

Additional actions include the creation of Sustainable Career Plans (SCPs). Similar to the European Commission's Gender Equality Plans (GEPs), SCPs should be mandatory, systematic policy reform instruments designed to foster community engagement and action, ensuring stable and predictable career opportunities for postdoctoral researchers across Europe and in all fields of research. SCPs should start from common basic principles and clear objectives that support cultural and organisational change. They should also be flexible enough to adapt to the specific national, regional, and institutional contexts of research-performing organisations.

2 Provide postdoctoral researchers with nurturing and fair working environments, access to career guidance and representational rights, as well as ample opportunities for wide-ranging professional development.

A distinctive feature of today's academia is its hypercompetitive environment and culture, which often leads to aggressive and harmful working environments. Postdoctoral researchers, in particular, are under immense pressure to continually compete and perform at extreme levels. These harmful workplace dynamics often result in power imbalances between postdoctoral researchers and principal investigators (PIs) or supervisors. This exploitation is linked to deficiencies in management and leadership, including the failure to recognise postdoctoral researchers as a separate staff category.

Only by reforming existing policies and practices, including institutional human resources management, and developing appropriate, transparent regulations, can the institutional invisibility or neglect that postdoctoral researchers face be overcome

This entails ensuring at the institutional level, that (1) postdocs have clear roles, rights and responsibilities, from the start of their contracts, including work-related specifications, such as the number of weekly hours they are contracted for, and access to basic resources like sufficient office space, computer facilities, and suitable opportunities for training and professional development, (2) their skillset is recognised, particularly their skills as educators and supervisors duties, (3) they are provided with adequate supervision and while still supporting their autonomy over their research, (4) they have access to career guidance and support, which are essential for a positive postdoctoral experience and performance, and (5) their representational rights are guaranteed, allowing them to become more engaged in academic governance, since the participation of all staff in the governance of academia is one of the fundamental values of the European Higher Education Area (EHEA; Tirana Ministerial Communiqué, 2024).

3 Implement a clear, common framework for attractive, sustainable research careers in Europe based on transparency, flexible career pathways, and an open labour market.

Among the fundamental obstacles academia faces in attracting and retaining talent are the poor working conditions, and a lack of appealing and sustainable career paths. Enhancing the attractiveness and sustainability of research careers in the EU requires implementing a research career framework at the European level that offers postdoctoral researchers diverse and flexible pathways for employment and career advancement, both within and outside academia. The years spent as a doctoral candidate and, subsequently, as a postdoctoral researcher must be recognised as professional experience, and this entails that doctoral candidates and postdoctoral researchers are recognised as professionals.

Implementing a common, comparable framework for research careers and competencies aligns with the objectives of the European Research Area (ERA) and furthers the establishment of an open pan-European labour market for researchers. This framework should not hinder the uniform implementation of career frameworks, which should be aligned and coherently applied across the ERA.

The framework would add transparency to existing career paths, taking into account discipline-specific factors, the national and local labour market characteristics, and the specific circumstances attached to postdocs' high degree of specialisation and personal responsibilities that tend to increase with absolute age. It would also consider the rights, interests, and needs of non-EU citizens wishing to work in Europe, including the access to social security, long-term residence, and the right to citizenship.

Additionally, the fairness, effectiveness and transparency of recruitment and reward practices in academia must be improved to enhance postdoctoral researchers' open recruitment, employment, professional development, and promotion.

4 Ensure common basic working rights and adequate employment conditions to researchers across Europe.

Across Europe, asymmetries in frameworks and investments in R&I persist, with the EU progressing at different speeds. While some countries or regions lead, others lag. The recent crises in Europe and globally have likely accentuated these discrepancies, making it imperative for national governments to be held accountable for their strategies, reform efforts, and investments in the R&I sector, especially regarding the employment and working conditions offered to researchers. These conditions can vary immensely across Europe. EU-level funding and strategies are insufficient to overcome existing gaps in the capacity and performance of European R&I systems and institutions.

Disparities in R&I investments and capacities among EU member states are slowing down the ERA and creating imbalances in the circulation of researchers within Europe. The attractiveness of national research and HE systems or institutions is a key driver of the intra-European academic brain drain. Researchers are drawn to countries and institutions offering them better working conditions (e.g., salaries, benefits, job security). Especially at the postdoctoral level, many researchers are compelled to be internationally mobile as a means of progressing financially and improving what they perceive to be the professional development opportunities at their disposal in the near future.

To address these issues, Cohesion Policy and the EU's sectoral funding programme – Horizon Europe – must work together, and the mechanisms through which researchers access funding schemes must be adapted and simplified. More funding, especially long-term and strategic funding, needs to be allocated to R&I both nationally and at the EU level.

5 Promote gender equity while fostering diversity and inclusion in research careers.

Gender inequalities and other policies promoting diversity, equity and inclusion in R&I have been an EU priority for decades. Nonetheless, progress has been slow, and during the past decade, women's presence, participation, and advancement in the R&I market have largely stagnated. Women continue to drop out of research careers more often than men, especially at the postdoctoral stage, with female researchers, especially those with children, reporting to feel more pessimistic about their career prospects,

lower satisfaction with their work-life balance, and experiencing more precarious conditions than their male counterparts.

Additionally, access to parental leave must be guaranteed on equal terms for both parents, ensuring that it does not interfere with the duration of the postdoc's contract. The length of the contracts should be extended accordingly for either parent taking parental leave.

Finally, to ensure meaningful change, it is essential to assess which of the measures the EU, national governments and institutions have implemented over the years, such as the Gender Equality Plans (GEPs), have been effective and have contributed to long-term improvements. Understanding how and why these improvements were achieved is equally important. The Research and Innovation Careers Observatory (ReICO) or similar could take on this task.

6 Promote postdoctoral researchers' mental health and wellbeing and ensure their adequate work-life balance.

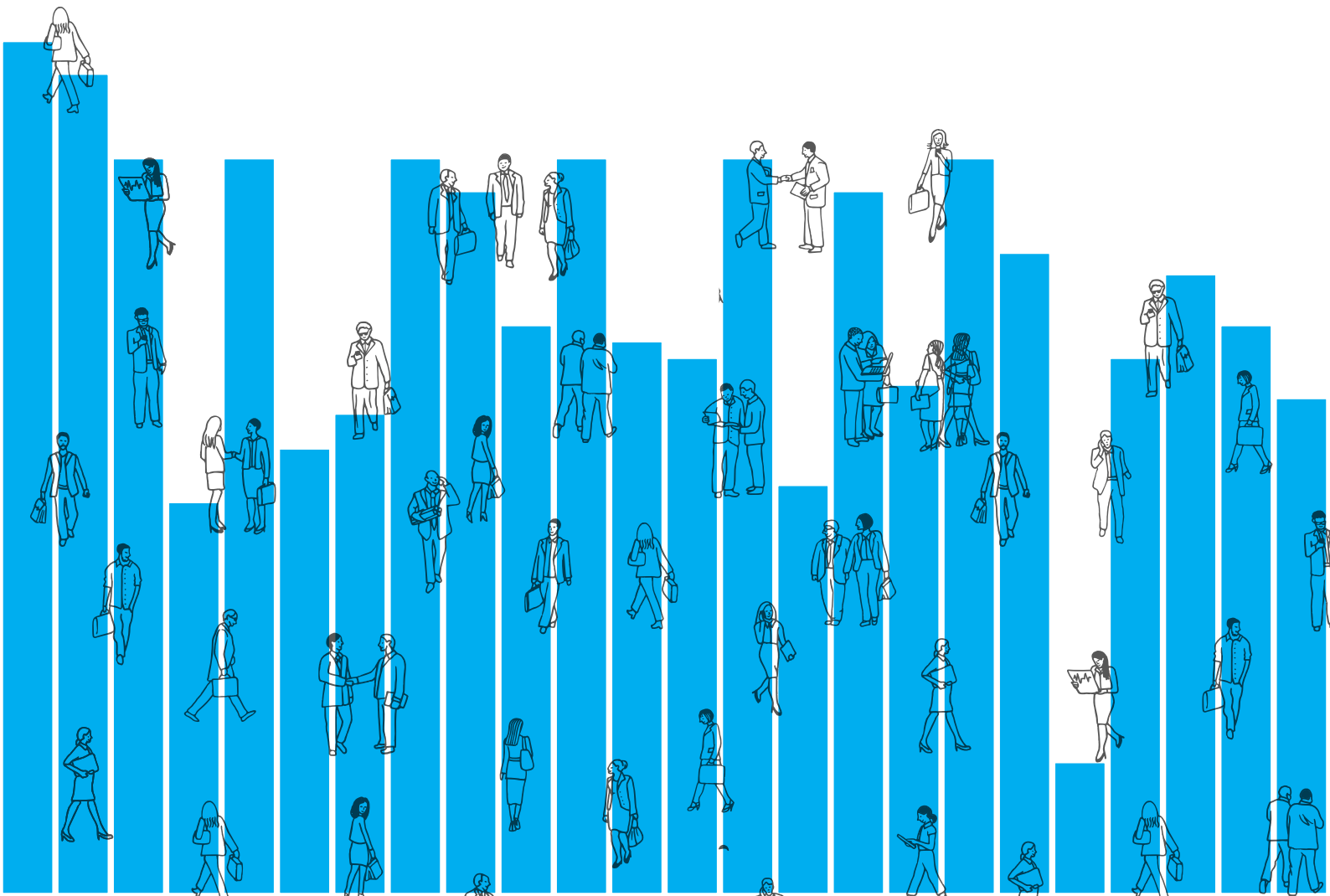
There is growing evidence that postdoctoral researchers' mental health and wellbeing are suffering. Precarious employment, long working hours, high performance expectations, and frequent rejection contribute significantly to decreased mental health and wellbeing among professionals.

The vicious cycle of burnout, anxiety, and depression that many researchers face must be reversed, and the unhealthy working environment that contributes to these issues must be openly addressed by stakeholders at all levels of the system, including the academic community, research funders, and policymakers. It is crucial to raise awareness of the problem, but even more so is implementing policies that change the culture and practices of higher education and research institutions, along with the current rewards and incentives system. Access to specialised structures providing researchers with mental health support as well as assistance in other areas of their lives (e.g., support for dual-career couples who are mobile) also is fundamental as it would alleviate some of the pressure postdoctoral researchers experience and help improve their work-life balance and overall well-being.

Report

EURODOC
POSTDOC
SURVEY

1 INTRODUCTION



1 Introduction

The **Eurodoc Postdoc Survey** was planned by the Eurodoc board and the previous Employment & Career Development Working Group (ECDWG)[1] in 2018, aiming to investigate the working conditions and work-life balance of **postdoctoral researchers** in Europe. The survey was conducted between October 2018 and February 2019 and collected answers from 1784 postdoctoral researchers based in more than 30 European countries.

The survey allowed Eurodoc to make an in-depth characterisation of the population of postdoctoral researchers working in Europe. Gaps in available data made it hard to arrive at a clear picture of the working conditions these researchers face, especially the extent to which precarity is widespread and the impact it has on postdocs' expectations toward their careers, as well as their career prospects and wellbeing (Organisation for Economic Co-Operation and Development [OECD], 2021b). With that in mind, the **Eurodoc Postdoc Survey** collected information on postdoctoral researchers' demographics, their working conditions and wellbeing, and analysed the associations between these dimensions to provide additional insights into their career paths. The data collected focuses on aspects such as postdocs' knowledge of their roles, rights and responsibilities, expectations toward their careers, the main barriers in accessing their envisioned career path, and their perceptions of work-life balance.

Defining postdoctoral researchers

According to Eurodoc, Junior Researchers **(JRs)** are broadly defined as all researchers "who have been awarded a doctoral degree and are engaged in a temporary and defined period of advanced, not yet fully independent research, either in academia, in the public or in the private sector" (Eurodoc, 2017a). The JR status ends when researchers are appointed a permanent position granting them the status of a fully independent researcher, or when they drop out of a research career entirely (Eurodoc, 2017a). Eurodoc's definition of JRs resembles the European Framework for Research Careers' **R2 – Recognised Researcher** – research profile, which was initially proposed by the European Commission (EC) in 2011 (European Commission, Directorate-General for Research and Innovation [EC-DGRTD], 2011). Often, the expressions **'postdocs'** or **'postdoctoral researchers'** are used to refer to JRs or R2 researchers.

Throughout the report, the terms JRs and postdocs (or postdoctoral researchers) will be used interchangeably to refer to all researchers who are in the early post-doctorate stages of their careers and who are not yet fully independent. Not all survey respondents are employed or generally referred to as 'postdocs'. However, they all fit the description of a JR, which is inclusive of these other roles allocated to ECRs with a doctorate who are not yet fully independent and who are in non-standard employment.

1 The ECDWG was renamed Employment Conditions and Welfare Working Group in 2022.

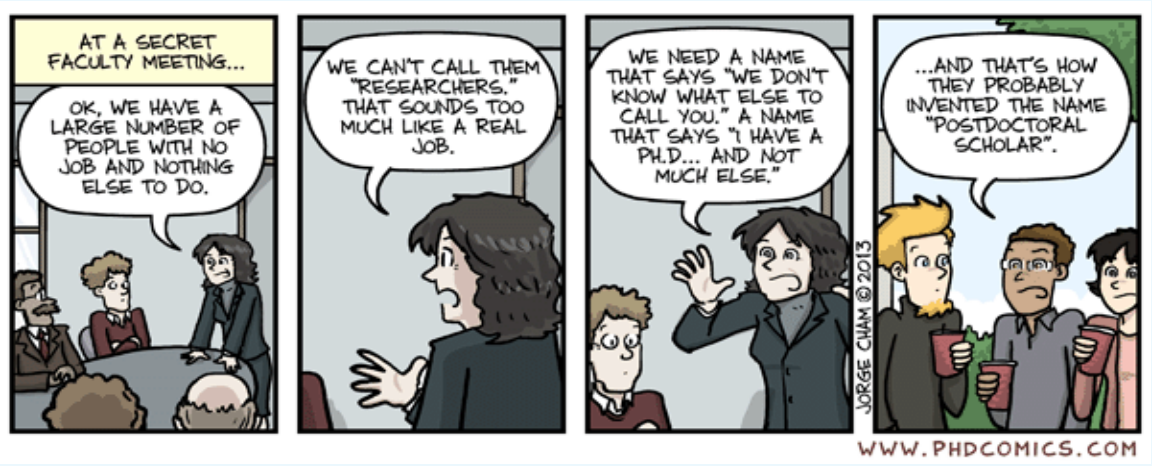


Figure 3: Authorship credit comic from " Piled Higher and Deeper " by Jorge Cham [www.phdcomics.com,](http://www.phdcomics.com) reprinted with permission of the author. All rights reserved

Over the years, 'postdoc' became a popular term to nominate researchers with a doctoral degree working in universities with a fixed-term contract or a stipend. Despite the generalised use of the term, there is no consensual definition of 'postdoc' and this population of researchers remains relatively unknown (Van der Weijden et al., 2016). Postdoctoral researchers typically perform diverse roles at universities often without recognition as an autonomous staff category or without benefiting from suitable institutional integration (Herschberg et al., 2018). They are undercounted and, in some countries (e.g., Czech Republic, France, Ukraine), the term is mostly used informally, as these researchers are formally referred to by alternative titles like an assistant, associate teacher, or researcher (Gaughan & Bozeman, 2019).

Typically, the following criteria are used to designate **researchers at the postdoctoral stage** of their careers (Åkerlind, 2009): They have (1) a doctoral degree; (2) a primary focus on advanced research training that includes publications, grants, professional networking, and often also teaching and supervision of Bachelor (BA) and Master (MA) students or doctoral candidates (DC), management-related tasks; and (3) a fixed-term appointment, either as a non-standard employment contract or as a stipend. Recently, researchers working under these conditions were named the "research precariat" in acknowledgment of the precariousness of their employment (OECD, 2021b). The research precariat results from the unprecedented growth of non-standard employment in the research-performing organisations (RPOs) and HEIs , that is employment with no prospects of continuity or of becoming permanent (OECD, 2015).

The growing postdoctoral workforce

The number of doctorate holders entering or trying to enter the labour market in recent decades has increased immensely, with universities worldwide doubling the total of doctoral degrees awarded during the past two decades (Lysinger et al., 2020). The growing emphasis placed on knowledge-based or knowledge-driven societies as a means of fostering economic growth, prosperity, and competitiveness led to an increase in R&I investments and supported the notion that a larger doctoral degree holder workforce was needed (Pedersen, 2014). This resulted in a demand for universities to produce more doctorate holders, which favoured the growth of the research workforce.

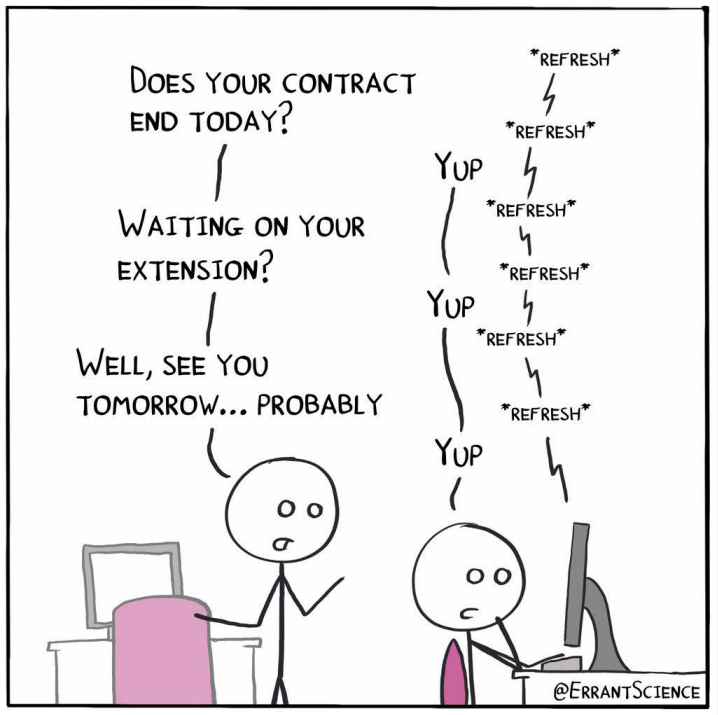


Figure 4: Comic from ErrantScience.com, by Matthew Partridge.

However, the growth in the number of doctoral degree holders was not accompanied by an equivalent increase in permanent positions RPOs and HEIs had on offer (Aarnikoivu et al., 2019). Also, this vast increase in the number of doctorate holders was not based on a thorough analysis quantifying the current and future demand for this type of qualifications, including the sectors of activity in which such demand existed, or the type of research skills that were needed (Pedersen, 2014). As a result, the outgrowth of the number of doctorate holders in relation to the number of available positions in the labour market, particularly in the HE and academic research sector, pushed researchers at the early stages of their post-doctorate careers toward precarious forms of employment that offer uncertain career prospects and have been associated to job and career dissatisfaction (Aarnikoivu et al., 2019). Currently, the precarity of the working conditions offered to postdoctoral researchers and their dim career prospects are global political issues (O'Connor et al., 2023).

Precarity is not a phenomenon specific to academia; however, it is a large problem in the research and HE sectors, in comparison to other areas of activity (Sarrico, 2022). Post-doctoral researchers often find themselves in a "career limbo" that may persist for decades (Nature, 2020). This period is characterised by a long-term holding pattern of short, fixed-term contracts offering little job security and sparse benefits, poor compensation, high workloads, poor resources and support, as well as limited opportunities for professional development (EC-DGRTD, 2017). The anxiety and uncertainty attached to job insecurity and unclear career paths are further heightened by the experience of involuntary – at times unpaid – career breaks, involuntary part-time jobs, unpaid overtime work, and cloudy prospects regarding future employment (Fotta et al., 2020; Woolston, 2020d).

During the COVID-19 pandemic this situation was aggravated as ECRs' employment or opportunities for career progression were limited or even frozen worldwide (Initiative for Science in Europe [ISE], 2020; Woolston, 2020a). In addition to requests for the extension or the suspension of projects, which lead to amendments and the rescheduling of project reviews and payments, there was also a substantial decrease in the number of new research projects – specifically non-COVID-19 research-related projects – being pursued by the scientific community (European Research Executive Agency, 2022; Gao et al., 2021). Due to lockdowns and other constraints imposed by the pandemic, many ECRs saw their work delayed – sometimes up to twelve months – which made it very difficult or even impossible for them to complete their research within the allocated time frames (Eurodoc, 2020; ISE, 2020). These delays compromised ECRs' payment for the work being conducted, with many funders not providing sufficient funding to cover the salaries and other research expenses associated with the extensions being granted (Eurodoc, 2020; ISE, 2020). They also compromised ECRs' ability to produce the outputs (e.g., publications) required for securing the next position or grant (Gao et al., 2021; Woolston, 2020a).

The changing landscape of research and higher education

By itself, the continued increase of doctoral degree holders does not fully explain the rise of postdocs as a "peripheral workforce" inside academia (Herschberg et al., 2018). In parallel to the proliferation of doctoral graduates occurred an important reshaping of the financial relation the research and HE sectors held with the state, which required institutions to increasingly search for other sources of funding besides government funding and made them more dependent on performance indicators such as metrics (Teelken & Van der Weidjen, 2018). This reshaping deeply transformed the tasks, structure, and culture of RPOs and HEIs, leading them to operate similarly to profit-making organisations (Van der Weijden et al., 2016). Nowadays, RPOs and HEIs are more market-driven and focused on performance, competition, entrepreneurialism, and on the reduction of costs, which includes the minimisation of the costs attached to labour (Teelken & Van der Weijden, 2018).

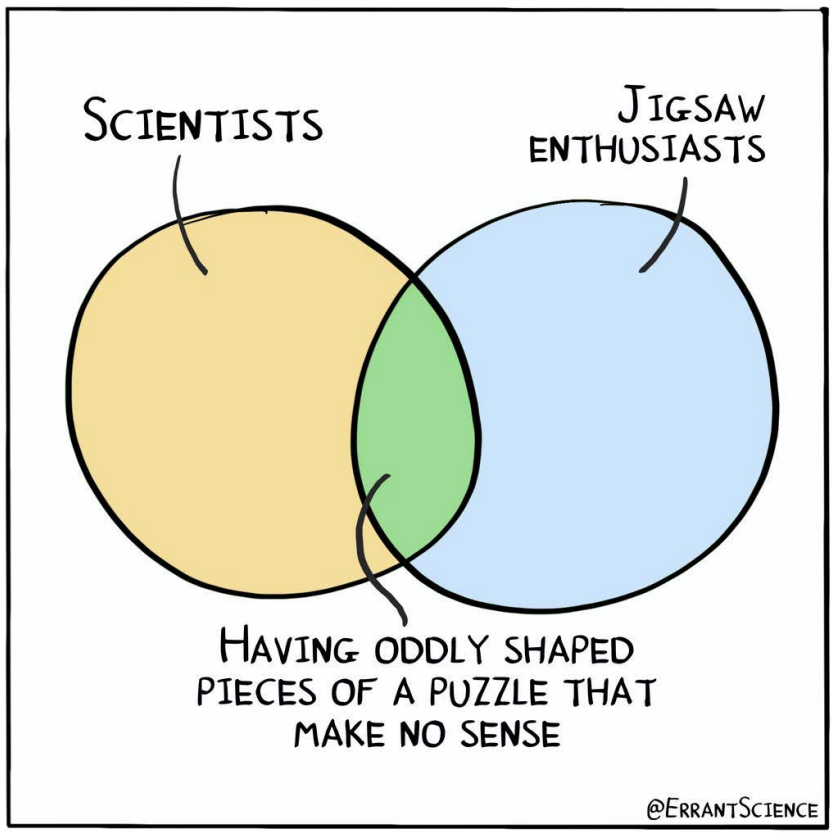


Figure 5: Comic from ErrantScience.com, by Matthew Partridge.

Public funding of R&I activities commonly relies on two mechanisms: institutional and project funding (Reale, 2017). Particularly since the start of the 2000s, the reliance of RPOs and HEIs on project (or external) funding increased substantially (Waaijer et al., 2018). This growth was accompanied by a decline in the success rate of applications and, in particular after the financial crisis of 2008, by financial cutbacks in the institutional funding allocated to RPOs and HEIs (Teelken & Van der Weijen, 2018). In tandem, many countries embarked on reforms over the past 50 years, which increased the weight of performance-based criteria in how funding for R&I activities was allocated (Lepori, 2007). The assumption was that funding handed out according to a competitive model would contribute to better the performance of researchers, RPOs and HEIs, while making the use of resources more effective and transparent. Specifically, it was believed that funding based on competition or performance-based criteria would help identify top researchers (individuals and groups), strategically promote specific research fields or themes, support structural changes in the production and application of knowledge, and highlight models for cooperation and competition between researchers (Reale, 2017).

Impacts for researchers

The strengthening of performance-based criteria in funding allocation for R&I, in combination with the reduced availability of funds and jobs, transformed academia into a "hypercompetitive environment", which led many to start questioning if the negative outcomes resulting from such an environment do not outweigh the positive (Fang & Casadevall, 2015). As a recent report from the Wellcome Trust pointed out, RPOs and HEIs "poor" and often "aggressive and harmful" culture not only impacts researchers but also has consequences for research and society (Wellcome, 2020). For individual (postdoctoral) researchers, key adverse effects of the current research culture concern their quality of life, particularly their wellbeing and ability to achieve work-life balance (Nording, 2023; Woolston, 2020c). As studies have consistently shown, in comparison to similar cohorts of workers, researchers in academia suffer more from work-related stress and clinical depression (Schroijen & Malaguarnera, 2021; Van der Weijden & Telkeen, 2023). Specifically for postdocs, the factors most associated with stress, anxiety and mental health problems are their bleak career prospects, the pervasiveness of job insecurity, and the heavy productivity expectations they face, which are further heightened by scarce workplace wellbeing support (Wellcome, 2020; Woolston, 2020b).

Poor working conditions and the negative impact they have on researchers' wellbeing and mental health, as well as an unsatisfactory work-life balance, are the reasons most cited by postdoctoral researchers for opting out of an academic career (Aarnikoivu et al., 2019; Dorenkamp & Weiß, 2018). Additionally, heavy workloads and the pressure for high productivity which is required for career advancement, frequently lead to feelings of isolation and loneliness (Wellcome, 2020). Besides often requiring researchers to prioritise work over other areas of their lives, research also tends to be an "inherently solitary" endeavour. As the Wellcome Trust report highlighted, this sense of solitude is heightened by research's current competition-oriented culture. It not only hampers the establishment of a sense of community and camaraderie among researchers but for some also translates into an inability to seek out support when help is needed (Hatch & Curry, 2020).

Precarity also severely hinders efforts to foster diversity, equity, and inclusion (Wellcome, 2020). Despite the progress recently made toward a more diverse and gender-balanced distribution of academic staff, inequalities persist and change is still occurring at an "unacceptably slow" pace (Hatch & Curry, 2020). As the EC recently acknowledged, the 'glass ceiling' and the 'leaky pipeline' continue to exist, and progress made by the member states to ensure the sustained growth of women's enrolment and retention in research has been uneven and slow (EC, 2019). Further discrepancies exist in how doctoral degree holders are distributed across disciplines, both by gender and according to the country or region where they did their training or work (Fotta et al., 2020). These imbalances are usually related to national agendas and strategic policies that partly also account for differences in the labour market outcomes of doctorate holders with different backgrounds regarding their field of training (Andres et al., 2015).

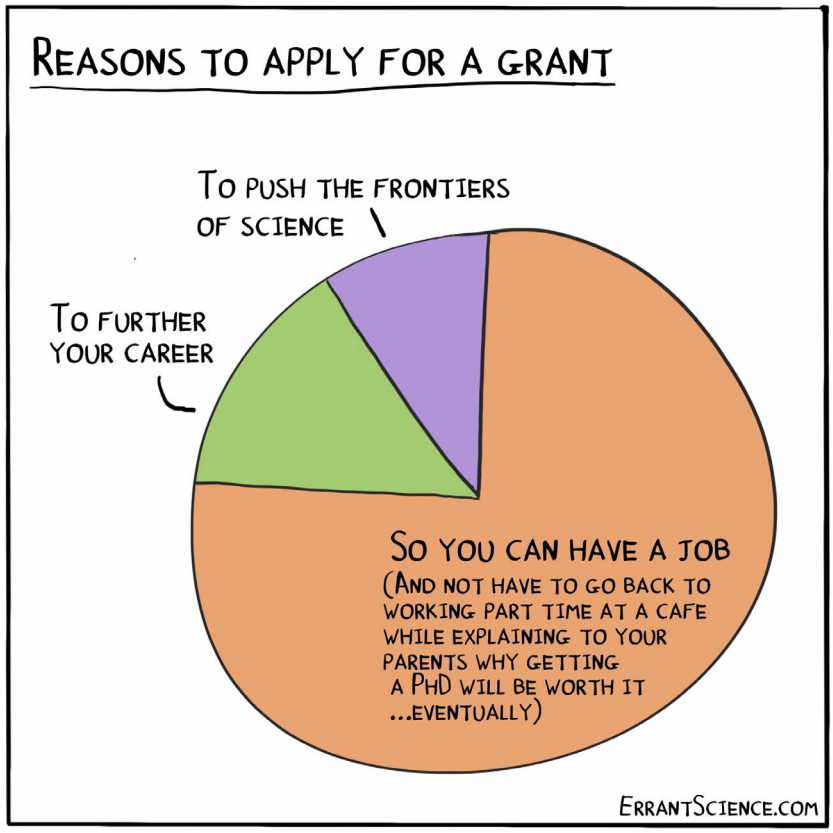


Figure 6: Reasons to apply for a grant. Comic from ErrantScience.com, by Matthew Partridge.

Additionally, marked regional differences continue to exist across Europe concerning the framework conditions of HEIs and RPOs, research funding, the career pathways offered to researchers, and the talent creation and retention strategies they have in place, including the salaries paid to researchers (AURORA et al., 2023). As noted in the MORE studies' reports, ECRs from Eastern and especially Southern European countries tend to be highly dissatisfied with their working conditions (e.g., salaries, social security protection), providing greater motivation for them to continue their career internationally in the form of brain drain (EC-DGRTD, 2017, 2021a). These disparities were further exacerbated by the COVID-19 pandemic since its impact was most severe on individuals with less institutional support, individuals with disabilities, and women (Cardel et al., 2020).

Impacts on research and society

The current hypercompetitive research culture also impacts widely on society and is closely connected to the potential loss of talent in the research and HE sectors (e.g., EC, 2020; Van der Waijden et al., 2016). Prioritising a culture based on (fierce) competition has the potential to hinder the sharing of resources, the integrity of researchers, and the creativity of the research being produced (Fang & Casadevall, 2015). At the level of society, the focus and incentivisation that governments, funders, RPOs, and HEIs place

on poor quality indicators, such as quantity outputs, hint at a narrow set of priorities and will probably lead to a reduction in the ability to produce real innovation and impact (Waaijer, 2017). Research is and always has been a competitive activity, and researchers accept competition as an integral component of their work (Wellcome, 2020). Nevertheless, the current pressure for productivity, which proves to be a considerable distraction, and the emphasis on competition and the allocation of performance-based funding around a (typically three-year) project life cycle, are detrimental to research (Fang & Casadevall, 2015). As the history of science has shown, seminal discoveries often do not occur because of but in the absence of competition, with the development of complex concepts usually requiring researchers to have long periods where they can focus on and thoroughly develop their ideas without being distracted or burdened with excessive bureaucracy or the need to continuously secure external funding (Fang & Casadevall, 2015).

Moreover, the channelling of research toward specific, predefined paths fitting into a short-term vision of the outputs to be produced, together with high pressure and a highly aggressive work environment, may have the unintended effect of constraining researchers' intrinsic motivation (Kallio & Kallio, 2014; Wellcome, 2020). Researchers tend to value performing an activity because of the intrinsic rewards it entails (e.g., being intellectually challenging, experiencing a certain degree of independence) rather than because of its pecuniary or other extrinsic rewards, like opportunities for promotion (e.g., Boman, 2017; EC-DGRTD, 2017; Hayter & Parker, 2019). The conflict that exists between researchers' intrinsic orientation and the extrinsic rewards inherent to a system based on the assessment of performance and competition may, therefore, lead to an increment of productivity at the expense of the quality of research (Kallio & Kallio, 2014).

This system favours the use of performance indicators, such as publication metrics, that often lead researchers and their hosting institutions, funders, and governments to focus more on the production of quantity than on the quality of what is being produced (EC-DGRTD, 2021d). It also encourages the growth in the number of people composing the research teams led by senior or principal investigators (PIs; Milojević et al., 2018). Such growth appears to have been accompanied by an increasing division and standardisation of the tasks performed by researchers, typically postdocs, in these supporting roles. It also appears to point to an increased control on the part of PIs over the content of the research being produced by their supporting staff, and a selection of human resources based on a short-term focus and narrow utility criteria, rather than recruiting the most talented researchers or the ones with the most potential for academic excellence (Herschberg et al., 2018). As a result, the research and HE sector may not retain and constrain the opportunities given to many of the most capable researchers (OECD, 2021b). The current system probably also discriminates against doctorate holders "with an affinity for impacting society", especially against postdocs with the highest potential for innovation and contribution to economic growth, as rewards do not yet prioritise quality over quantity outcomes (Waaijer, 2017). These circumstances will most likely have consequences for the sustainability and competitiveness of the research and HE sectors, particularly when considering the essential role played by postdoctoral researchers, both for the present and for the future of research (Teelken & Van der Weidjen, 2018).

Recently, and as a potential solution to overcome these issues, Open Science (OS) became a priority for the EC and similar efforts designed to promote a fair, open and transparent research environment and culture have spawned all over the world (DGRTD, 2016; United Nations Educational, Scientific and Cultural Organisation [UNESCO], 2021). The underlying idea is that openness and transparency should govern the research process, and practices based on collaboration and the sharing of resources should be fostered. The unprecedented research collaboration triggered by the COVID-19 pandemic is a good example of the added value of such practices (OECD, 2020). Another example of an EU-level initiative designed to change the current situation is the Agreement on Reforming Research Assessment (Coalition for Advancing Research Assessment [CoARA], 2022). The focus is on fostering a (much-needed) cultural and systemic change by shifting policies, practices, and power structures based on a narrow understanding of research, researchers', and RPOs' excellence that privileges the use of quantity indicators – metrics – as proxy measures of quality and impact (CoARA, 2022).

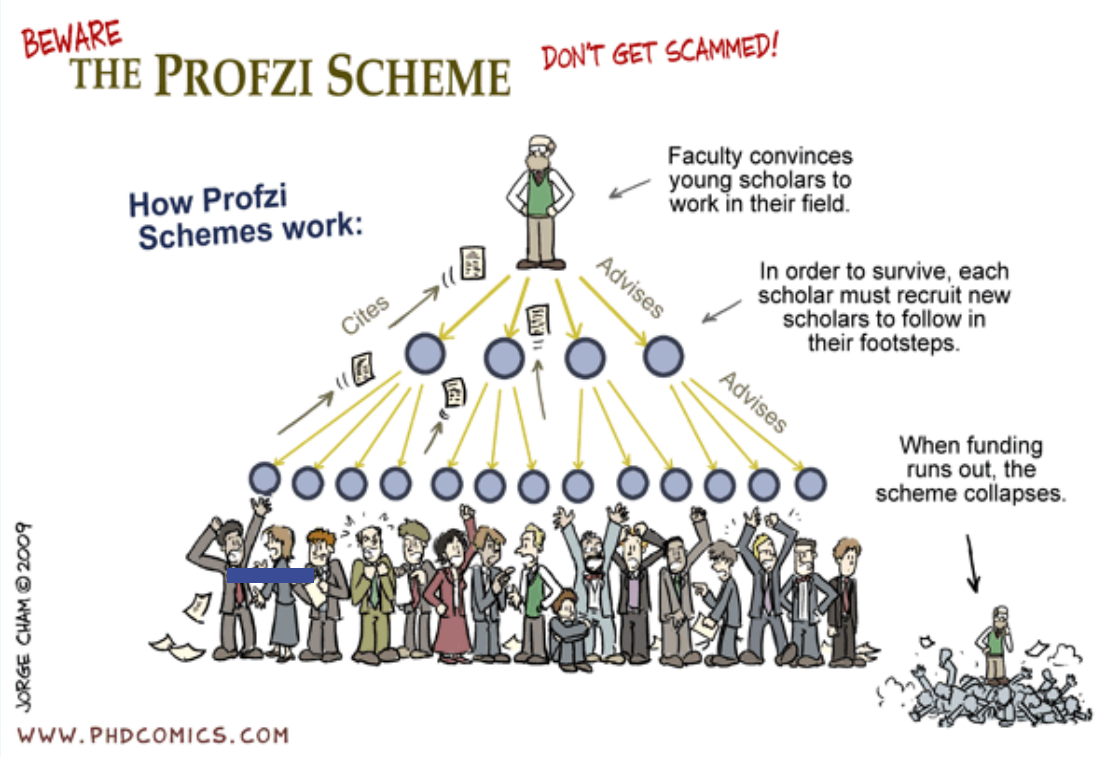


Figure 7: Beware the Profzi Scheme. Authorship credit comic from " Piled Higher and Deeper " by Jorge Cham www.phdcomics.com, reprinted with permission of the author. All rights reserved

It is nowadays acknowledged that alternative (best) practices must become the rule in how research, researchers, and RPOs are assessed, with signs of systematic bias being recognised and overturned when making decisions about hiring, promotion, or tenure (Conroy, 2021). Consistent with what is proposed in the Agreement on Reforming Research Assessment, priority should be given to the assessment of the quality and impact of the research (e.g., the originality of ideas and their potential to advance knowledge and have an impact; the professional research conduct; results beyond the state-of-the-art), with diverse roles, outputs, practices and activities being valued besides the use of metrics (e.g., number of citations, impact factors). The present over-reliance on quantity indicators no longer meets the challenges and expectations contemporary research faces (EC-DGRTD, 2021d; OECD, 2023). This change in emphasis from quantity to quality indicators and judgement also has the potential to alleviate some of the (overwhelming) pressure ECRs currently experience that often threatens their mental health and wellbeing, besides facilitating certain behaviours undermining the integrity of the research (OECD, 2021a; Wellcome, 2020). However, for these initiatives to be successful, deep systemic and cultural change must occur in academia, which is not easy to achieve (Hatch & Curry, 2020). If successful, the reforms inherent to these initiatives will be an important step in reversing the drivers of postdoctoral researchers' employment precarity and deteriorating wellbeing, and in achieving Eurodoc vision for a "fair and sustainable research culture where early career researchers are treated with respect and have access to long-term and stable careers"[2].

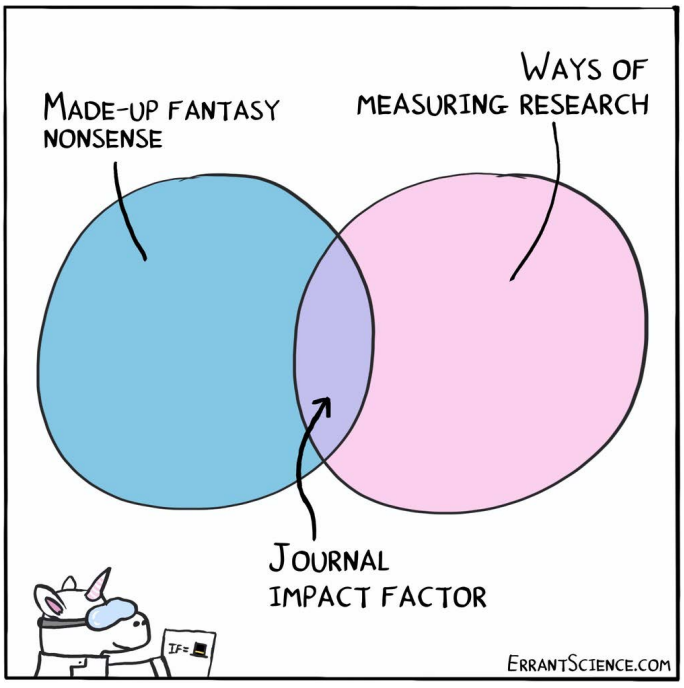
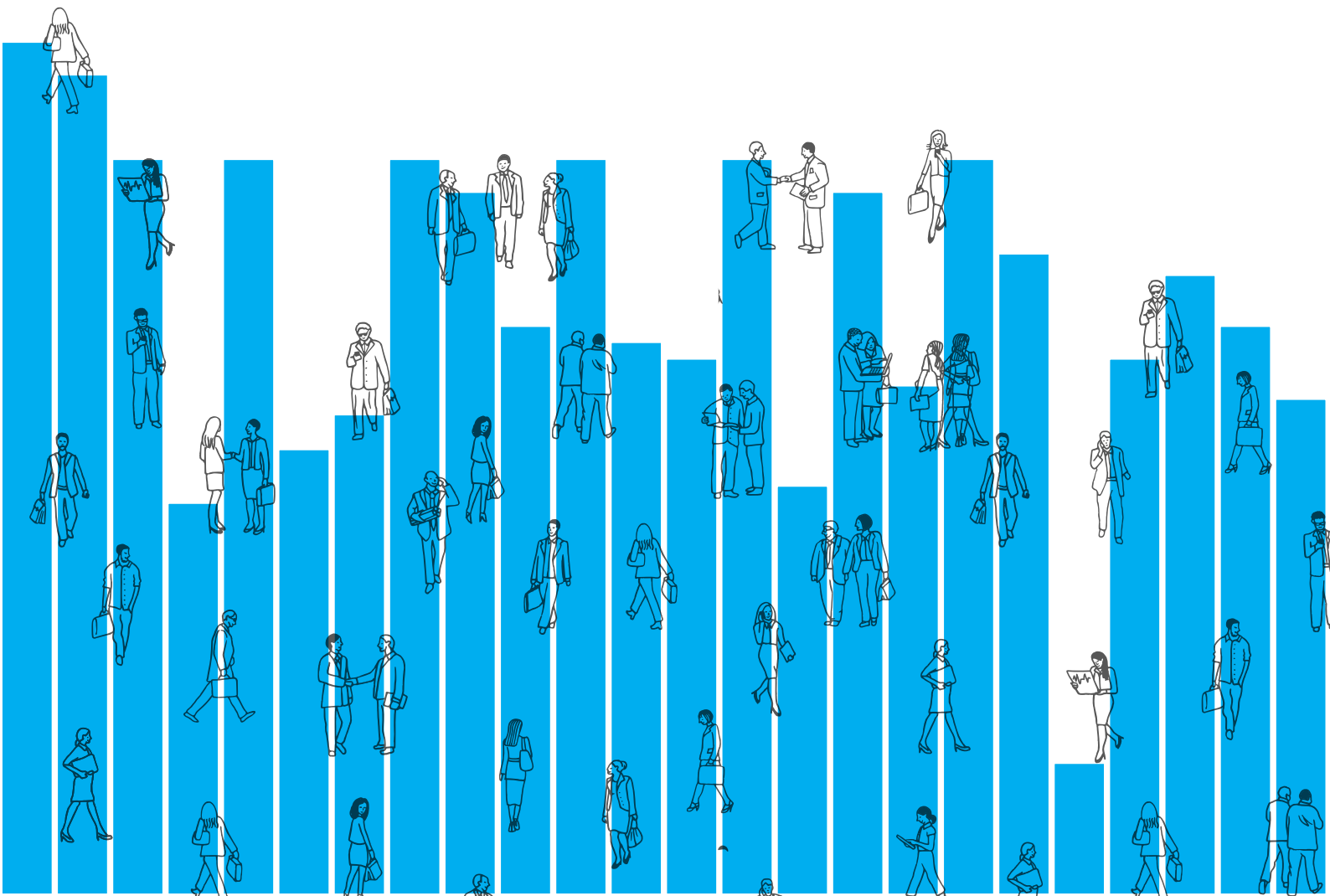


Figure 8: Impact factor. Comic from ErrantScience.com, by Matthew Partridge.

2 Eurodoc (2024, September). Mission and Vision. Eurodoc, The European Council of Doctoral Candidates and Junior Researchers. http://www.eurodoc.net/eurodoc/mission-and-vision

2 METHOD



Method

Participants

A total of 2390 responses were collected with the survey. Respondents included 1784 ECRs who self-described as R2 researchers or postdocs (74.6%), with 22 (1.2%) declaring holding a permanent contract. The other 606 researchers answering the survey stated being at other stages of their careers, specifically doctoral candidates or R1 – First-Stage researchers, and researchers in more advanced stages of their careers, namely R3 – Established researchers (EC, 2023a). Considering the scope and aims of the current report, only the responses from researchers self-describing as R2 researchers were considered for the analyses presented herein.

The majority of postdoc respondents were 31-35 years of age (50.5%) (Figure 9a, Q2). Their average academic ages was 4.02 years, their median academic age was 3 years, and the range went from 0 to 27 years from being awarded the doctorate.

The gender distribution of the responses was balanced – 51.7% female, and 47.3% male. A small number of respondents (1%) declared an alternative gender identity or preferred not to disclose their gender (Figure 9b, Q1). About marital and family status, 70.6% of respondents were in a relationship and 22.9% had children.

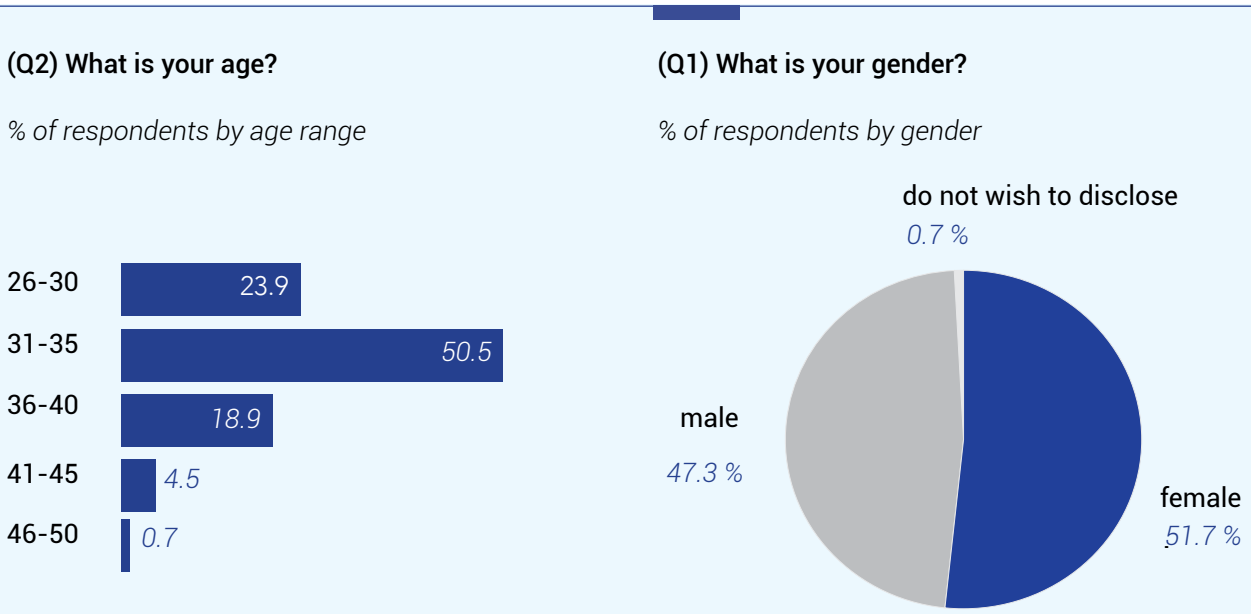


Figure 9: Respondents answers to the questions about a) age and b) gender

Reporting country of origin, respondents were nationals from over 34 countries and worked in 30 European countries.

For further analysis, the European countries were divided according to the United Nations (UN) geoscheme for Europe into four main geographic regions: Southern, Northern, Eastern, and Western Europe (UN Statistics Division, 2023). The largest percentage of the researchers responding to the survey were in Southern Europe, which accounted for 39.8% of the responses. Researchers based in Northern Europe accounted for 29.6% of the responses, in Western Europe 23.9%, in Eastern Europe 5.1%, and elsewhere for 1.6% (Figure 10, Q4).

Despite the imbalance observed in the distribution of the survey respondents working in Southern Europe, here most of the postdoctoral researchers surveyed were based in Italy, the decision was to include respondents working in this region into one cluster as similar issues have been identified in Southern European countries' R&I systems regarding postdocs' patterns of employment, mobility, career advancement, and (dis)satisfaction with their working conditions (EC-DGRTD, 2017, 2021a).

(Q4) Where do you primarily work?

% of respondents by European region

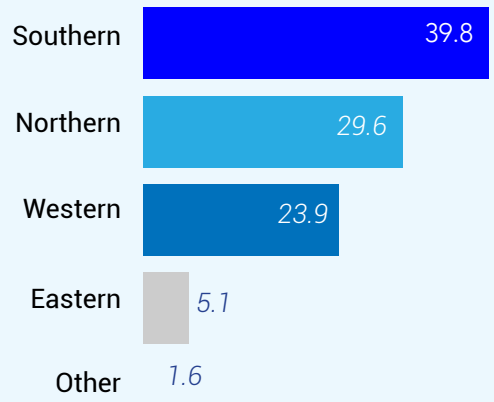
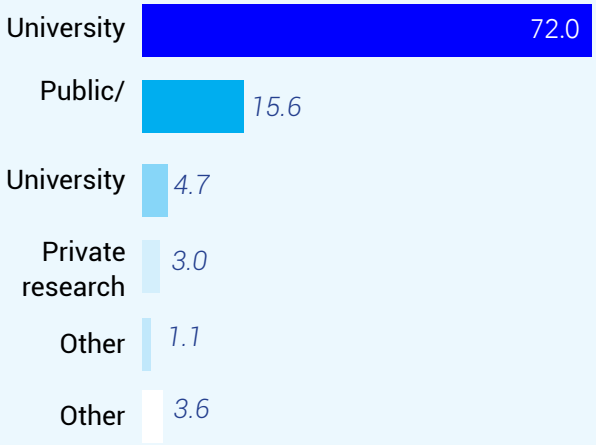


Figure 10: Respondents answers sorted by region of Europe to the question 4: Where do you primarily work?

Most respondents were based at universities (72.0%), but also those working at public or governmental research institutes made up a large group (15.6%) (Figure 11a, Q12).

Project-based or institution-core funding was the most typical source of funding for postdoctoral positions (49.6% and 26.2% respectively). Only 11.5% had secured their own funding (Figure 11b, Q13).

(Q12) For which type of institution do you conduct research? *% of respondents by type of institution*



(Q13) Who is funding your current position? *% of respondents by funding source*

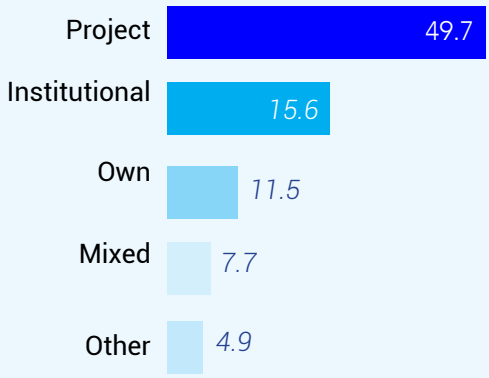


Figure 11: Distribution of Researchers by a) Institution Type and b) Funding Source.

Concerning the field of research, the division of the respondents was based on the OECD's classification of research fields (OECD, 2007). Most respondents answered that they worked in natural sciences (40.5%), followed by engineering and technical sciences (19.2%), social sciences (15.9%), medical and health sciences (14.7%), humanities (6.9%), and with fewest working in agricultural sciences (2.9%) (See Figure 12, Q5).

(Q5) In which research field do you work?
% of respondents by research field

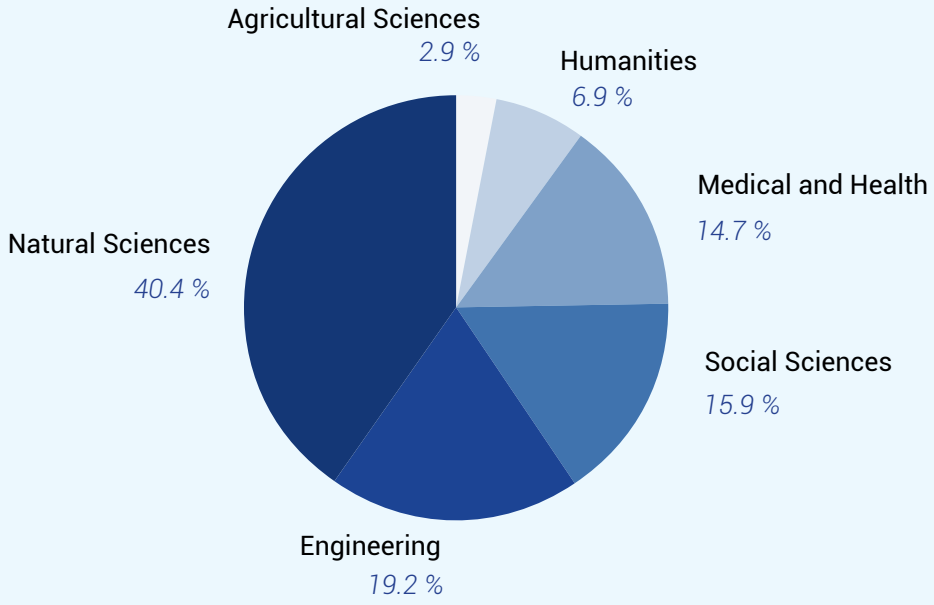


Figure 12: Distribution of researchers by research field.

Instrument

The questionnaire was designed using ECDWG members' knowledge of the literature and activism on ECRs' working conditions, including their knowledge of the main problems faced by postdoctoral researchers. This knowledge led to the identification of the following six topics that underlie the questions included in the questionnaire: (1) institutional and international mobility, (2) stability of employment and funding, (3) access to social welfare, (4) role definition and clarity of rights and responsibilities, including teaching and supervision responsibilities, applying to funding, and access to ancillary costs, (5) career support and plans, including access to career guidance and support, barriers to career development, and plans for career development, (6) wellbeing and work-life balance.

The questionnaire used for data collection included 42 questions and was structured in 5 sections (see Appendix 1):

1. Sociodemographic information
2. Employment status
3. Career development
4. Career evaluation
5. Work-life balance.

Most of the items in the questionnaire were formulated as multiple-response questions asking participants to choose one of the options given, for example:

- In how many countries have you lived (for 3 months or more) since your master's graduation? (response options: 1 – stayed in the same country, 2, 3, 4 or more, prefer not to answer).
- How many temporary research contracts have you already had? (response options: 0, 1, 2, 3, 4, or more than 4).
- Are you allowed to apply for funding as a lead investigator of a research project? (response options: yes, no, I don't know, prefer not to answer).
- Are you currently searching for jobs? (response options: yes, in academia; yes, outside academia; yes, either inside or outside academia; no).
- How difficult do you think it will be for you to achieve your career goal(s)? (response options ranged from 1 = very easy to 5 = very difficult).

Other multiple response items allowed respondents to choose all the options that applied to their situation, for example, participants were able to indicate which of the following social provisions were included in their contract or fellowship: parental leave, access to healthcare, unemployment benefits, sick leave, and pension savings. Additional response options were “I don´t know" and “Not applicable". Questions formulated as multiple responses usually included the options “Prefer not to answer" and

"other", which was followed by "Please specify" (open-ended response).

The questionnaire also included open-ended questions. Examples are: "In which year did you complete your PhD?", "In which year did you start your current research position?", or "What do you think could be done in your institution to improve your career development?" Two multiple-response questions asked participants to use a 5-point Likert scale when positioning themselves in relation to each of the options listed. These two questions concerned:

- The main barriers/obstacles for opportunities for career development the respondents perceived to exist at their institution, in particularly, lack of employment, structure of research careers, absence of research careers, lack of career development support, or others.
- The extent to which participants felt their private life was affected by holding a temporary contract, the need to be mobile, unsure job opportunities, lack of stable income, lack of free time, and high workload.

Data collection

The survey was published on EUSurvey on 12th October 2018 and remained accessible until 7th February 2019. The EUSurvey is the EC's official management system for creating and publishing forms[1]. The platform is fully open source, published under the European Union Public License (EUPL), and is available free of charge to all EU citizens.

The survey was compliant with the General Data Protection Regulation (GDPR; EU Regulation, 2016/679 that is applicable as of 25th May 2018 in all member states) and included the following statement: "By filling in this survey you consent to your answers being processed and used to develop policy for junior researchers in Europe by Eurodoc. No private data will be shared publicly."

To collect the data, Eurodoc used multiple channels to reach out to the postdoc community in Europe, with the major means for dissemination being Eurodoc MOs. MOs used their communication channels (e.g., social media, newsletters, direct mailing) to advertise the survey among their members and within the national community of JRs. Additionally, Eurodoc encouraged survey dissemination by promoting the survey website in a way that could be organically shared by social media and email. In some countries where Eurodoc is represented, MOs went further in their dissemination efforts and used publicly available contact information for university leadership, international postdoctoral associations, and other national and international stakeholder organisations representing ECRs, and asked these individuals to disseminate the survey to all postdocs at their institutions. In addition to direct contact with the institutions, social media platforms were used to disseminate the survey.

1 https://ec.europa.eu/eusurvey/

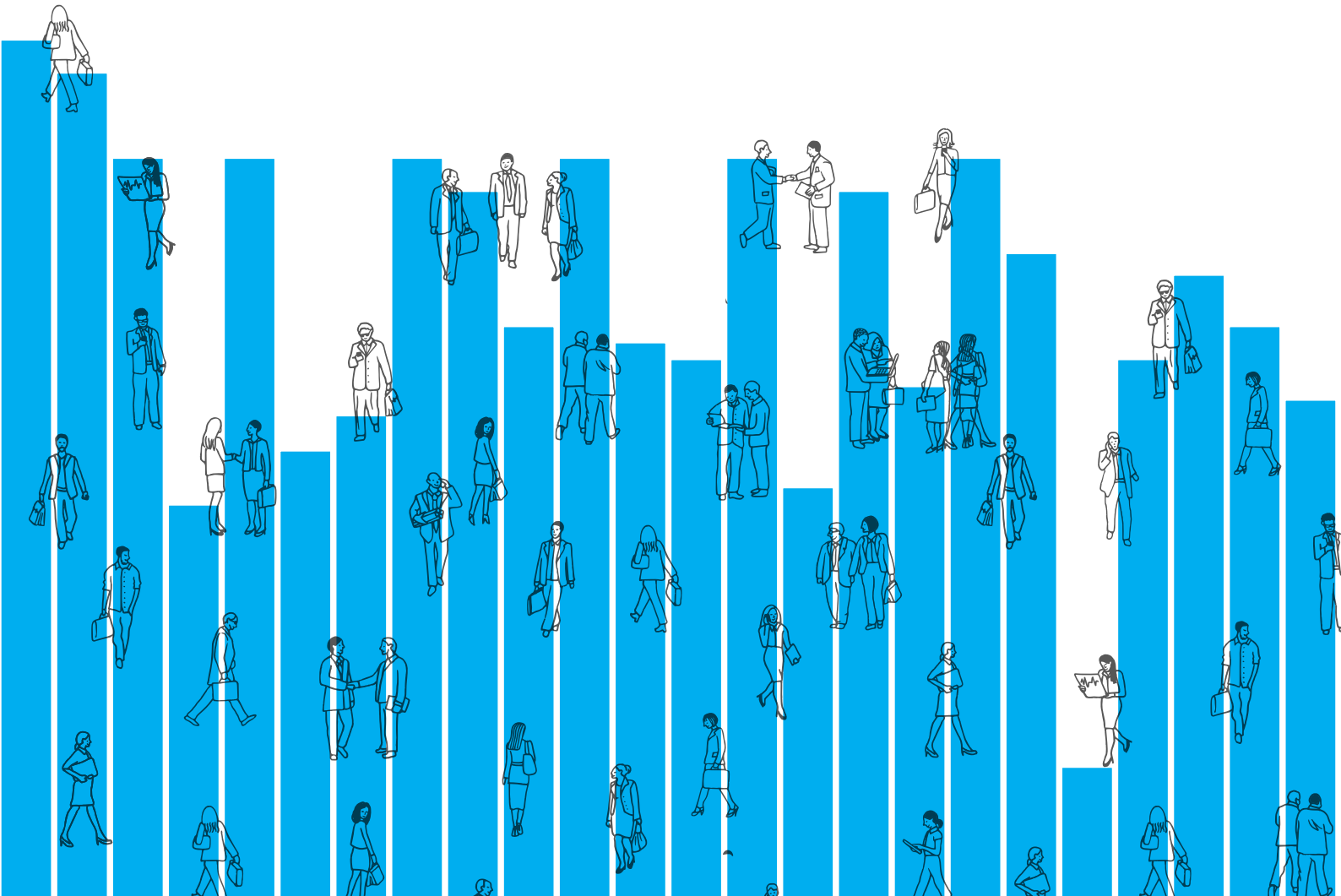
Data analysis

Analysis of the data was conducted in two phases. First, a descriptive analysis of all items in the questionnaire was conducted to arrive at a Europe-wide perspective on the different topics explored in the survey. The general trends identified in participants' responses led to further questions to be investigated, which were addressed in phase two of the data analysis. A multivariate chi-square analysis of the data was conducted to arrive at a more nuanced understanding of differences in postdocs' employment and career prospects, assessed along the following dimensions:

- **Gender:** Comparison of two groups, male and female. A small number of respondents (1%) reported an alternative gender identity or preferred not to disclose their gender. Due to privacy concerns, a choice was made to omit them from further analysis.
- **Region of Europe:** Comparison of four groups: north, south, west, and east of Europe. Respondents working outside Europe were omitted from further analysis.
- **Field of research:** Comparison of six groups, specifically, natural sciences, engineering and technology, medical and health sciences, agricultural sciences, social sciences, and humanities.
- **Academic age:** To compare how academic age influenced the respondents, the JRs were divided into three groups structured such that the number of participants belonging to each group was similar in size. This led to an academic age division, consisting of the following three groups: Group 1, where the doctoral degree was awarded within the last 2 years, Group 2 where the doctoral degree was awarded 3-4 years, and Group 3 where the doctoral degrees were awarded 5 or more years before the data collection.

Significant differences in responses were computed using the statistical software R. The differences were found performing a chi-square test using the function chisq.test. The criteria for including a correlation in this report has been that it belongs to the 99% confidence interval.

3
RESULTS



3 Results

Analysis of the survey data was conducted according to a two-phase strategy. First, a descriptive analysis of the data was performed, which gave a comprehensive picture of the conditions of the postdoctoral researchers on the following six topics; (1) institutional and international mobility; (2) stability of employment and funding; (3) access to social welfare; (4) role definition and clarity of rights and responsibilities, including teaching and supervision, and applying to funding and access to ancillary costs; (5) career support and plans, including access to career guidance and support, experienced barriers, and career development plans; and (6) wellbeing and work-life balance. The general analysis, allowed for the identification of four variables of particular interest - in this section labeled by (A) for gender, (B) for the region of Europe where the postdocs were based, (C) for field of research, and (D) for academic age.

In the second stage of data analysis the independence of these four variables was tested with a Chi-square analysis carried out with a 99% confidence level. Female postdocs were overrepresented among those working in the medical and health sciences and social sciences, and underrepresented among those in the field of engineering and technology. Male postdocs were over-represented among those in engineering and technology, and underrepresented among those in medical and health sciences, and social sciences. Furthermore, it was found that postdocs in Northern Europe were overrepresented among those working in natural sciences, and underrepresented in the fields of social sciences and humanities. Postdocs in Southern Europe were overrepresented in the fields of engineering and technology and medical and health sciences, and underrepresented in the field of natural sciences. Postdocs in Western Europe were overrepresented in the fields of social sciences and humanities, and postdocs in Eastern Europe were overrepresented in agricultural sciences.

The results for the data analysis are presented for each of the six topics mentioned above. First, the general results are presented, and then the results for those of the four variables that when a Chi-square analysis was performed, with a 99% confidence, showed over or underrepresentation of one or more groups with regards to the general responses.

3.1 Institutional and international mobility

Around a third of the respondents (36.4%) received their doctorate from the same institution at which they still worked, 24.1% had remained in the same country, but moved to another institution, 33.7% had moved abroad to another European institution, and 5.8% have done their PhD outside of Europe (Q7 - see appendix). Also reporting on international mobility, 74.4% of the respondents had lived in two or more countries for at least three months after receiving their MA (Q35 - see appendix).

Significant differences were found in the responses with regards to the region of Europe where they worked, their field of research, and their academic age.

3.1.1 Work region of Europe

Both institutional and international mobility differed across Europe. Those working in Northern and Western Europe were most likely to have changed institutions and country after obtaining the PhD, whereas those working in Southern and Eastern Europe were the least mobile. Of postdocs in Southern Europe 55.8% remained where they did their PhD and 86.6% remained in the country. (Q7b, Q35b - see appendix).

3.1.2 Field of research

Postdocs in social sciences were those most likely to remain in the same institution or country where they obtained the doctorate. Postdocs in engineering and technology were those most likely to remain at the same institution, but the least likely to have moved to another institution in the country. Postdocs in natural sciences were those most likely to move abroad and less likely to remain at the same institution (Q7c, Q35c - see appendix).

3.1.3 Academic age

Postdocs with an academic age of <2 years were the most likely to be at the institution where they had done their PhD, and those with an academic age of +5 the ones most likely to have lived in three or more countries (Q7d, Q35d - see appendix).

3.2 Stability of employment and funding

Whilst contracts for postdoc positions were mostly full-time (88.4%) (Q14 - see appendix), precarious employment conditions impacted postdocs across all Europe. Many postdocs had held several temporary positions, with 41.5% having held three or more (Fig. 13a, Q9). This precarity is compounded by most having less than two years left of their current position (78.7%) (Fig. 13b, Q11).

Figure 13: Distribution of respondents per a) number of temporary research contracts already performed, and b) number of years left in their current research.

Region of Europe

Postdocs in Northern and Eastern Europe were overrepresented among those with full-time contracts without an exclusivity clause whereas postdocs in Western Europe were underrepresented. Postdocs in Western Europe were the most likely to be part-time employed. Postdocs in Southern Europe were the most likely to have had more than four contracts (Q14b, Q9B - see appendix).

Field of research

Postdocs in engineering and technology were underrepresented among those who worked for a public/governmental research institute, while postdocs in medicine and health sciences were overrepresented among those working at a private research organisation (Q5c - see appendix).

Postdocs in humanities and social sciences were those least likely to have a full-time contract, and those in social sciences were also those least likely to have a full-time contract with an exclusivity clause (Q9c, Q14c - see appendix).

3.3 Access to social security.

In Question 16 of the survey, the respondents were asked about their access to 5 different social security provisions:

1) Healthcare
2) Parental leave
3) Pension
4) Sick leave
5) Unemployment benefits.

In order to be considered as having access to full social security provisions, the respondents should have report having access to all five of these.

The question was presented as a checker box question, meaning that the respondents could choose one or several of the answers above, and beside this they could also answer 6) I don't know, and 7) Not applicable. The checker box nature of the question and in combination with the 7 possibilities allowed for multiple combination possibilities.

1727 answers were included in this detailed analysis

13.1% of the postdocs indicated not having access to any of the previously mentioned social security provisions by selecting "Not applicable" as their answer. 11.9% stated not knowing to which provisions they were entitled, and those who only ticked both those boxes accounted for 0.02%. In total, these three combinations account for 25.2% of all responses (Figure 14, Q16)

The survey showed that **only** 20.0% of the postdocs were granted full coverage of social security provisions (Fig. 14, Q16). 16.3% of the respondents had access to 4 out of five of the provisions, 14.4% had access to 3 out of five, 12.1% had access to 2 out of 5, and another 12.0% had access to only one of the five mentioned social security provisions.

Of the respondents 56.8% reported having access to pension savings, 52.1% to have access to sick leave, 49.9% to have access to parental leave, 43.8% to healthcare, and 41.7% unemployment benefits (Fig 14a, Q16a, green bars).

That 13.1% of the respondents answered that they do not have access to any of the previously mentioned social security provisions and that only 20% answered that they have access to all of them is extremely worrisome (Figure 14b, Q16).

3.3.1 Access for different groups

Gender

In general, male and female postdocs reported similar access to social security provisions, except in the case of parental leave, where female postdocs were more likely to have access (Fig. 14, Q16a).

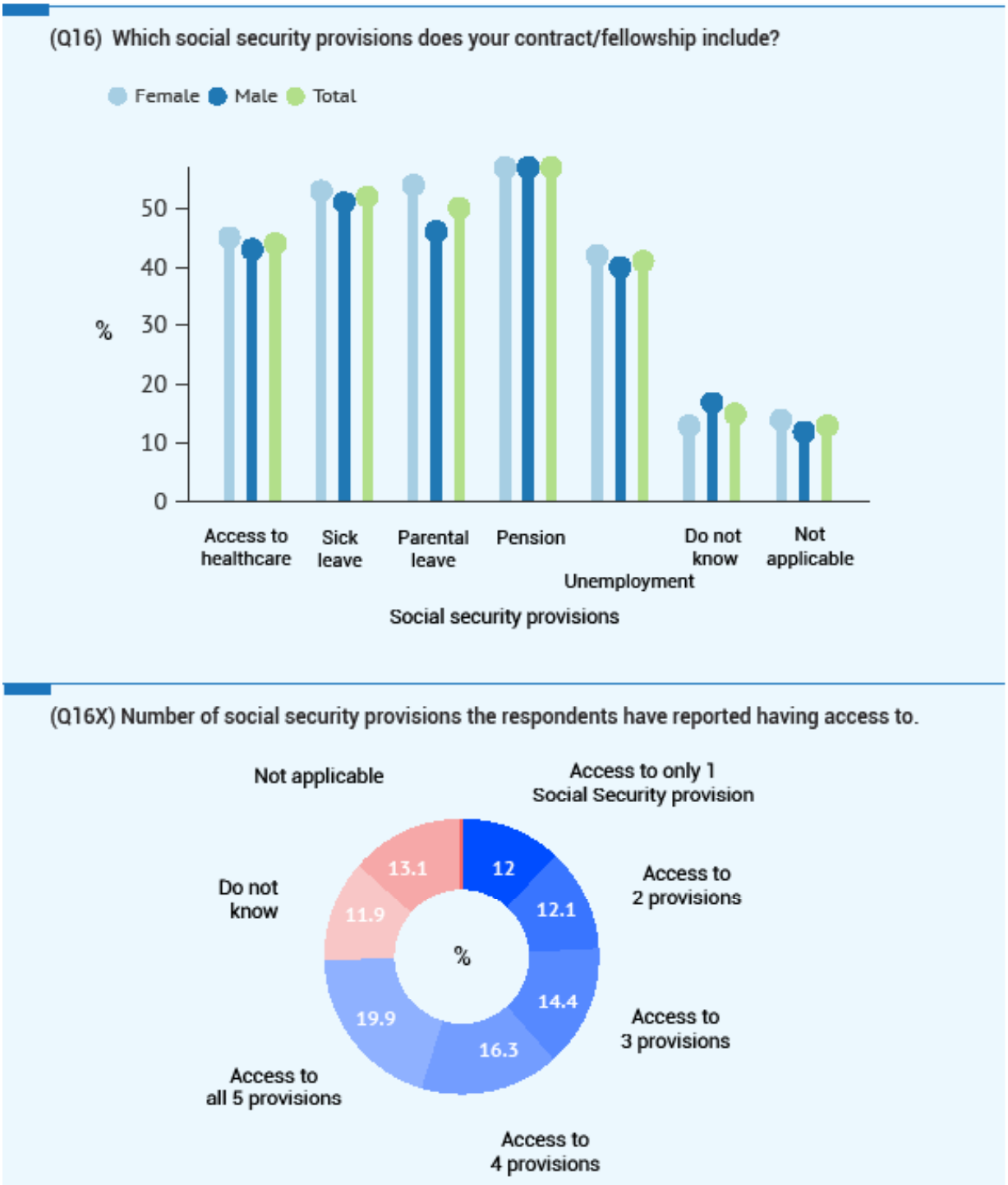


Figure 14: a) Social security provisions included in the fellowships by gender, and b) and how many of them the respondents have access to.

Region of Europe

Postdocs in Southern Europe had the least access to social security provisions, with 36.9% reporting that they either did not have access to any social security provisions or that they did not know if they had access to any, and only 9.5% reported having full access to social security provisions and another 7.5% reported having access to 4 out of 5 social security provisions. In general, postdocs in Northern and Western Europe had the best access to social security. But still, in Northern Europe 16.1% reported not having access or not knowing if they had access to any social security provisions and in Western Europe this number was slightly higher (18.3%). These postdocs also reported having access to most social security provisions. In Western Europe, 32.5% reported having access to all the social security provisions listed, and another 21.6% had access to 4 out of 5 social security provisions. In Northern Europe the corresponding percentages were 24.4% and 24.0%, respectively (See Fig. 15, Q16b).

(Q16b) Number of social security provisions the respondents have reported having access to.

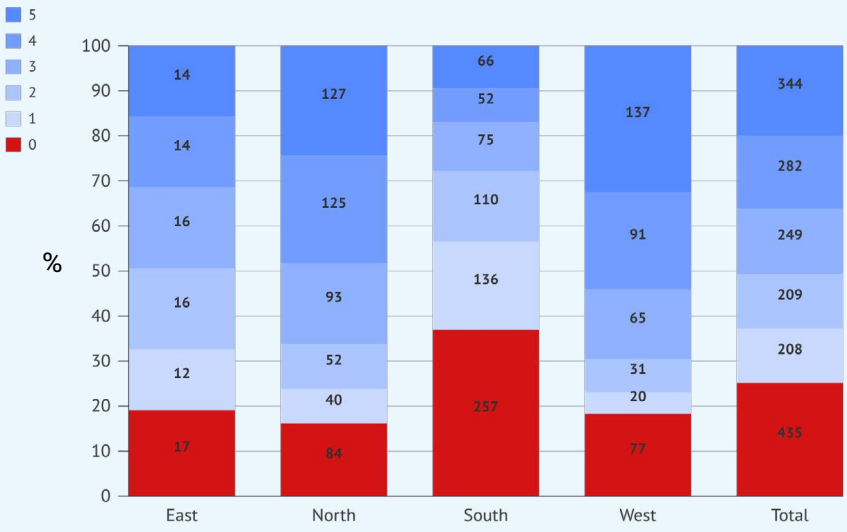


Figure 15: Regional Comparison of Social Security Access. Distribution by the number of social security provisions, from none to five.

Field of research

Postdocs in engineering and technology, and in medicine and health sciences had the worst access to social security provisions (Q16c - see appendix).

Academic age

With respect to academic age, the access to social security provisions varied with regards to two issues. Those with the lowest academic age were less likely to have access to unemployment benefits and to know what social security provisions they had access to. (Q16d - see appendix)

3.4 Role definition and clarity of rights and responsibilities

A clear definition of roles and clarity of rights and responsibilities is vitally important for postdocs' stability and can impact their perceived precarity. As was seen in the last section and as this section will further highlight, there is a lot of ambiguity about what rights and responsibilities postdocs have. To give a comprehensive overview, this section has been divided into three parts. First, we report on how clearly defined rights and duties were at the start of the current position and whether postdocs are included in the academic rule. Then, we turn to look at what rights and responsibilities postdocs have when it comes to 1) teaching and supervision, and 2) applying for funds and accessing ancillary costs.

When asked about how well established their duties and rights were in the beginning of their position, 24.1% of the respondents replied that they had been unclear, 39.0% replied that they had been partially defined, and 34.6% replied that they had been clearly defined. (Fig. 16, Q27). 83% answered that they had a named supervisor (Q22 - see appendix)

(Q27) How well established were your duties and rights at the beginning of yor contract/fellowship (e.g. working hours, leave/holidays, external collaborations)?

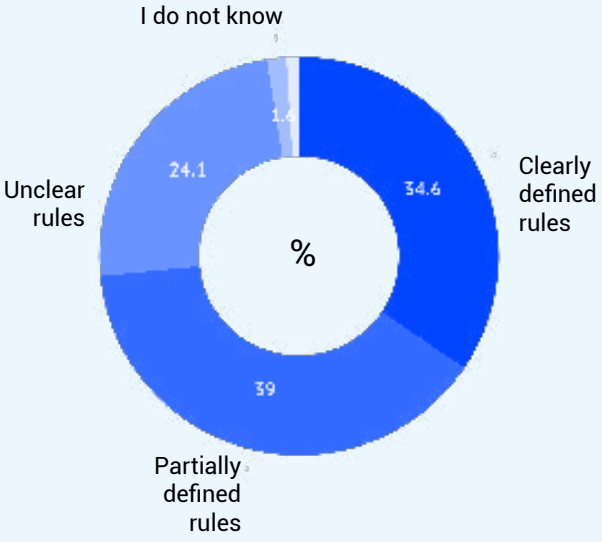


Figure 16: Distribution of respondents by how clear were the duties and rights at the beginning of their contracts.

Regarding whether postdocs were represented in the governing bodies at their institution only 10.5% responded that they were represented at all relevant levels, 35.3% responded that they were partially represented, 19.6% that they were not represented, and 30.3% that they did not now (Fig. 17, Q28).

(Q28) Do Postdocs have an opportunity to be represented in the management bodies of your university/institution?

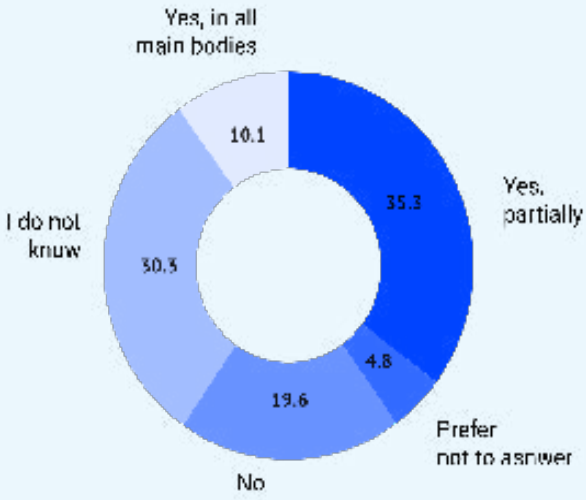


Figure 17: Percentage of respondents regarding the opportunities to be represented in the management

Region of Europe

In all regions, around 40% reported that their rights and duties had been only partially established in the beginning of their position (E: 40.4%, N: 37.8%, S: 38.4%, W: 42.3%) (Q27b - see appendix).

Regarding representational rights, the postdocs in Northern Europe stand out as those who are most unaware whether they are represented in institutional governance or not. Postdocs in Southern Europe show better awareness of whether they have representation or not, together with those in Western Europe they report the highest awareness of at least partial representation, but they also report the highest awareness of no representation (Q28b - see appendix).

Field of research

Postdocs within the fields of medicine and health science were those most likely not to know whether they had the representation or not, and the least likely to report that they had at least partial representation (Q27c, Q28c - see appendix).

Academic age

Postdocs with the lowest academic age were overrepresented among those not knowing if they were represented in governing bodies. Postdocs with the highest academic age were the most likely to declare the opposite, that is, not having the opportunity to participate in institutions' governing bodies. Postdocs with an academic age of 3-4 years were overrepresented among those knowing that they were able to partake in the academic rule (Q28d - see appendix).

3.4.1 Teaching and supervision

While over half of the surveyed postdocs stated that they contributed to teaching (54.0%), significantly more indicated that they would like to teach (81.9%) – (Figure 18, Q18, and Figure 19, Q19). In addition to teaching, postdocs were asked if they had the opportunity to supervise. Regarding whether allowed to supervise or co-supervise or not, 77.0% responded that they supervised, but 27.7% of all respondents stated that this supervision is not formally acknowledged (Figure 20, Q20). Significant differences were found for all four variables.

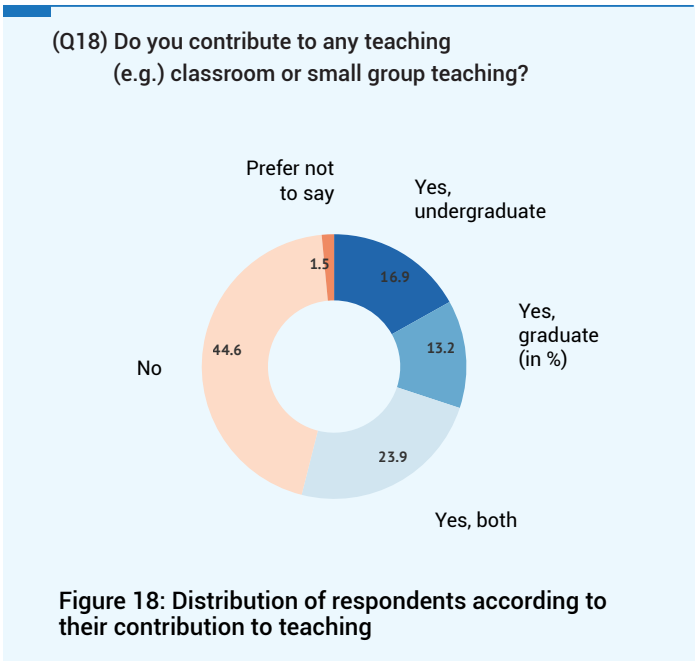


Figure 18: Distribution of respondents according to their contribution to teaching

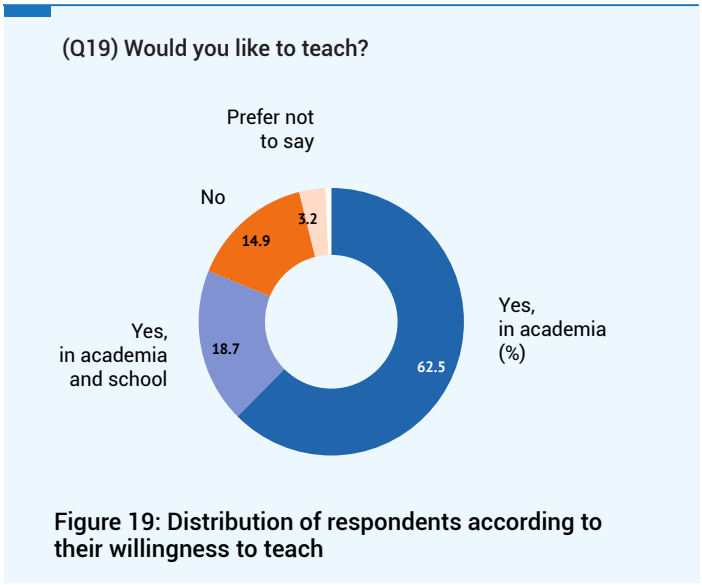


Figure 19: Distribution of respondents according to their willingness to teach

Gender

Male postdocs were more likely than female ones to want to teach in academia (Q19a - see appendix).

Region of Europe

Postdocs in Eastern Europe were more likely to be authorised to supervise (Q20c - see appendix). Postdocs in Southern European were more likely to co-supervise (Q20c - see appendix), and 27% reported they were teaching (Q18c - see appendix), and wanting to teach inside or outside of academia (Q19c - see appendix). Postdocs in Northern Europe were the least likely to report teaching duties (Q19c - see appendix).

Field of research

Postdocs in the humanities and social sciences were most likely not to be authorised to supervise (Fig. 18, Q20c). Postdocs in engineering and technology, natural sciences, and medicine and health sciences were the most likely to be authorised to co-supervise (Fig. 21, Q20c). Postdocs in natural sciences and medicine and health sciences were the most likely to not have their supervision formally acknowledged (Fig. 21b, Q20c). Postdocs in social sciences were those most likely to teach (Q18d, see appendix), and those in natural sciences and medicine and health sciences the least likely (Q18d - see appendix).

(Q20) Are you authorised to supervise students?

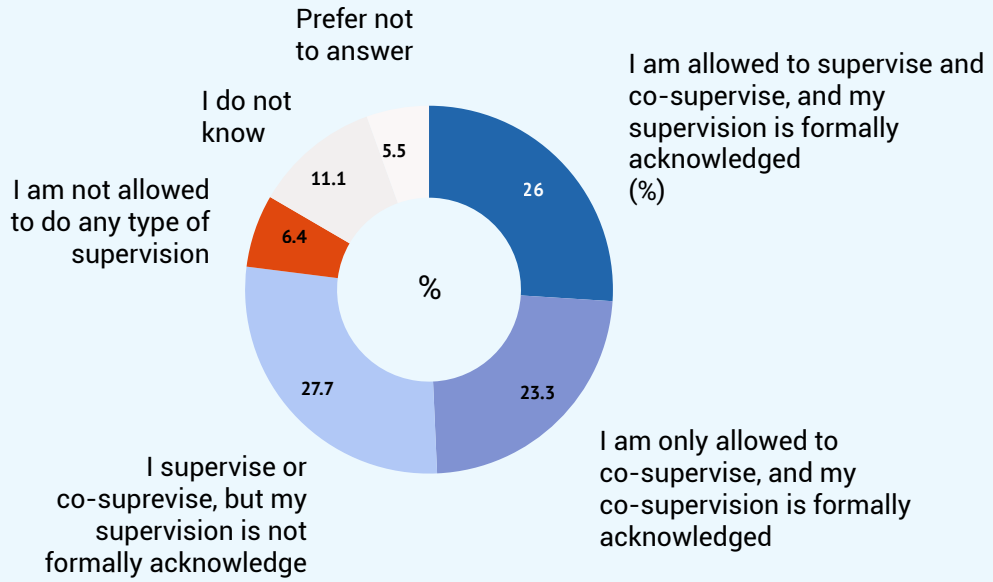
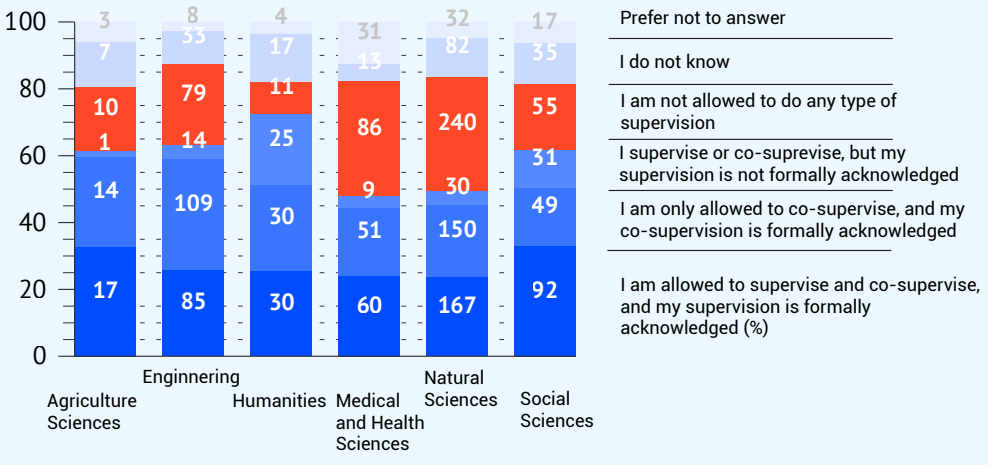


Figure 20: Distribution of the respondents according to their authorisation to supervise students

(Q20c) Are you authorised to supervise students?



(5) In which research field do you work?

Figure 21: Distribution of the respondents by research field according to their authorisation to supervise students

Academic age

Postdocs with the lowest academic age were least likely to know if they were allowed to supervise (Q20d - see appendix)

3.4.2 Applying for funding and access to ancillary costs

When asked if they were allowed to apply for funding as lead investigators, 45.3% of the postdocs answered yes, but 30% did not know (Fig. 22, Q21). When asked about access to ancillary costs for their work 46.1% reported they could fully access the funding, 29.3% could partially access the funding, 16.0% could not access the funding, and 8.3% did not know if they could access the funding (Figure 23, Q24).

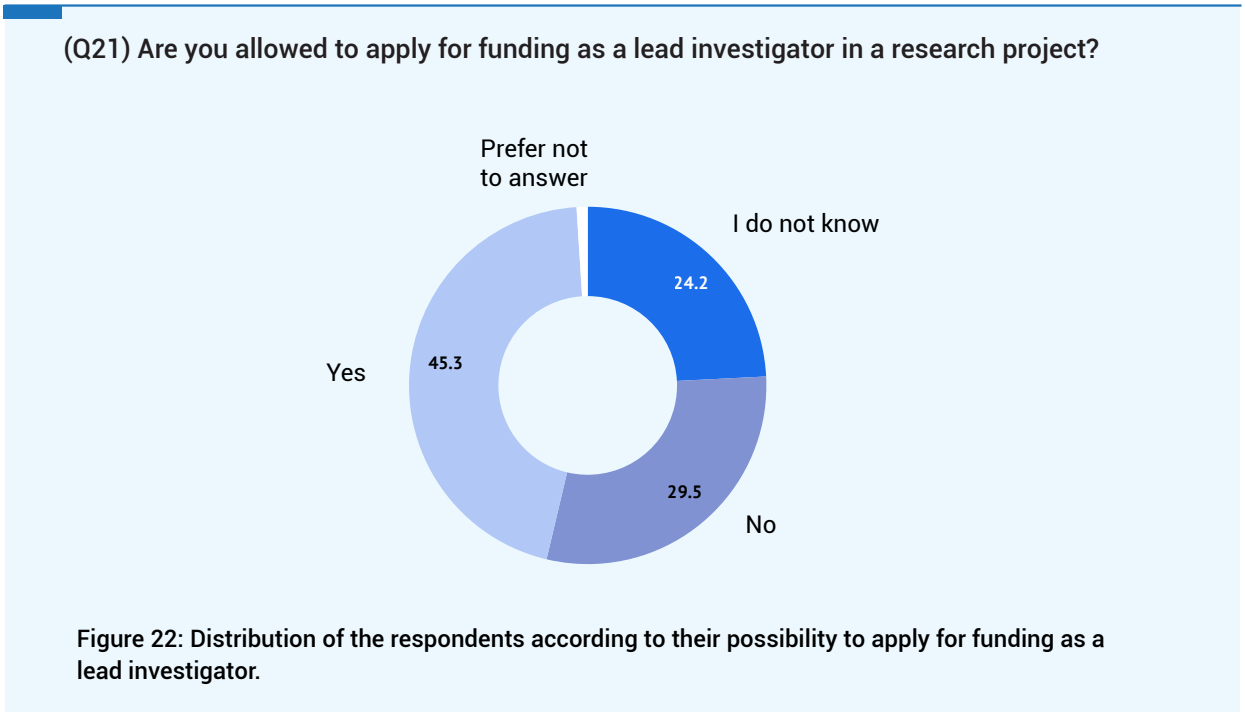


Figure 22: Distribution of the respondents according to their possibility to apply for funding as a lead investigator.

(Q24) Can you access the funding from your institution for research-related activities (e.g. travel costs, language proof-reading, publication costs)?

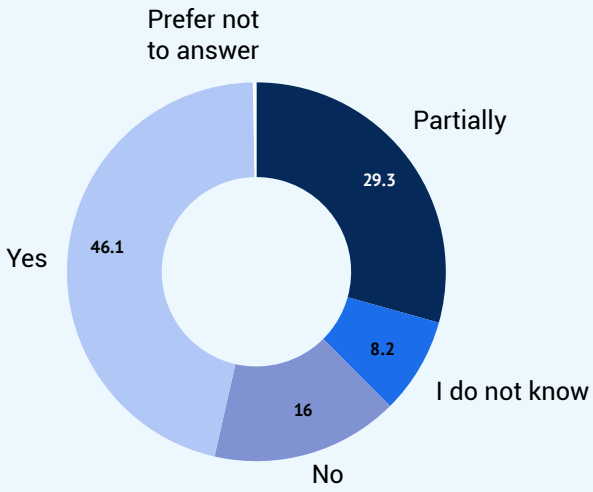


Figure 23: Distribution of the respondents according to their access to funding from their institution for research-related activities.

Region of Europe

Postdocs in Eastern and Northern Europe were most likely to answer that they were able to apply for funding as lead investigators, whereas postdocs in Southern Europe were least likely to do so (Q21b, see appendix). Postdocs in Southern Europe reported the least access to ancillary costs, whereas postdocs in Northern Europe reported the best (Q24b - see appendix). Postdocs in Eastern Europe were least likely to have a named supervisor (Q20b - see appendix).

Field of research

Postdocs in social sciences were least likely to have a named supervisor (Q22c - see appendix).

Academic age

Postdocs with the lowest academic age were overrepresented among those respondents who did not know if they could apply for funds as the lead researcher (Q21d - see appendix). However, they were the most likely to have access to financing ancillary costs, whereas those with the highest academic age were those most likely not to have access to such financing (Q24d - see appendix).

3.5 Career support and plans

3.5.1 Access to career guidance and support

Career guidance and support are vital for postdoctoral researchers in their pursuit of stable and fulfilling careers. When asked, only 23% responded that they received sufficient support from their institutions (Fig. 24, Q25), and when asked whether they had access to a career support office, 39.6% answered yes, 36.9% answered no, and 23.4% did not know (Fig. 25, Q26). Significant differences were found with respect to the region and academic age.

(Q25) Do you feel that in your instituion you receive enough guidande/advice about career options for postdocs? (from 1 = "not at all" to 5 = "very much")

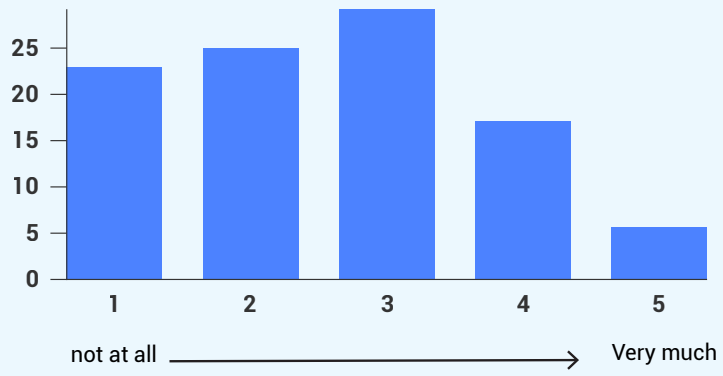


Figure 24: Perception of availability of guidance and advice about career options for postdocs.

(Q26) Does your institution have an office which provides any kind of support to postdoctoral researchers?

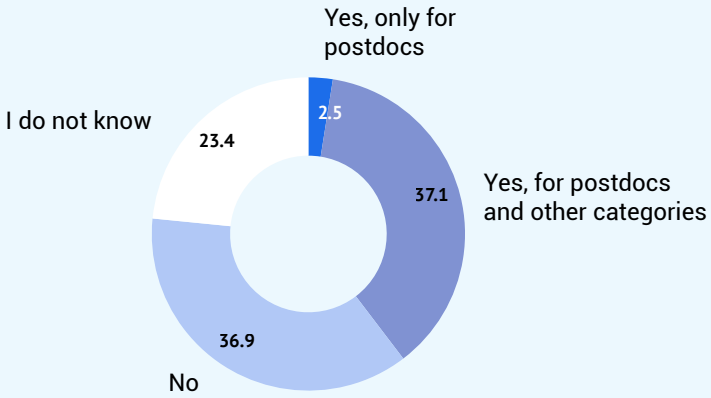


Figure 25: Availability at the respondent institutions of an office to provide support to postdoctoral researchers

Region of Europe

Postdocs in Southern and Eastern Europe had the least access to career support, whereas postdocs in Northern Europe had the best access. However, those in the north were also the most likely to be unsure whether they had access to such an office (Q26b, - see appendix). Postdocs in Southern Europe were those most likely to declare that the career support they received was insufficient, whereas those in Northern Europe were the most satisfied (Q25b, see appendix).

Academic age

Postdocs with an academic age of 2 or less years, were more likely to report being aware of a support office and receiving enough career guidance as compared to those with an academic age of 5 or more years (Q25d, Q26d - see appendix).

3.5.2 Barriers to career development and career development plans

More than half of respondents (59.8%) were actively searching for jobs, with 27.3% of these applying both within and outside of academia, 23.3% only applying for jobs in academia, and 9.2% only applying for jobs elsewhere (Figure 26, Q34).

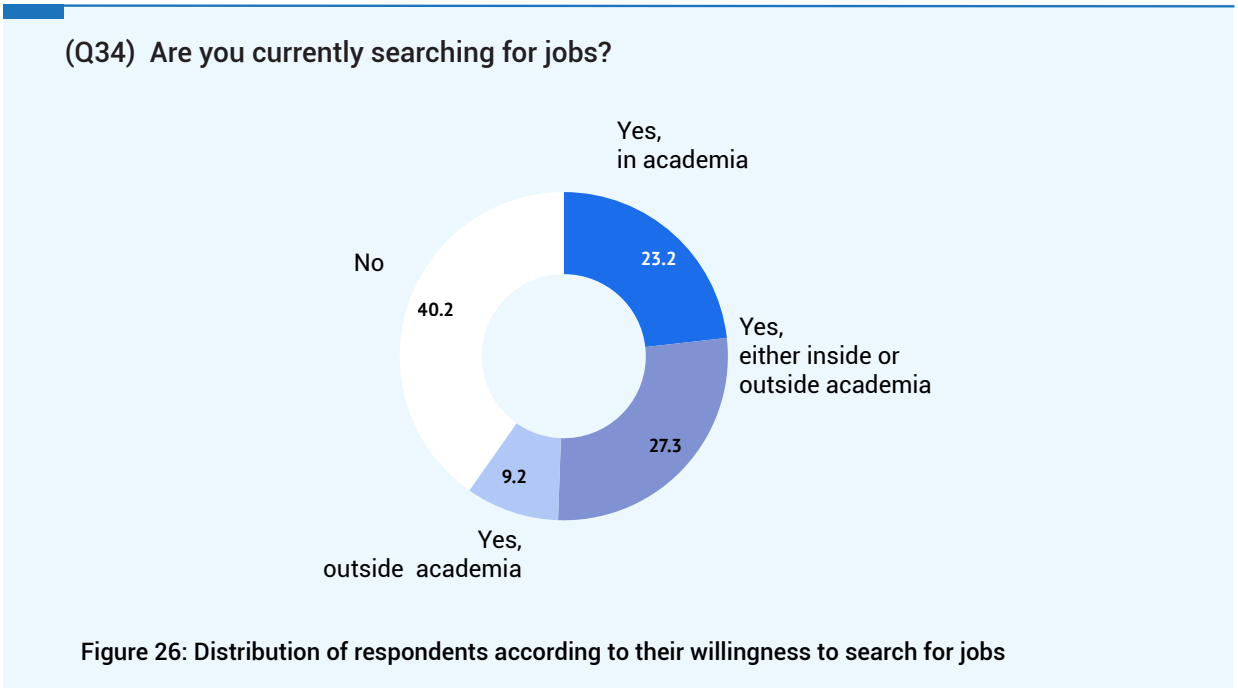


Figure 26: Distribution of respondents according to their willingness to search for jobs

A majority of postdocs were open for continuing working in academia either as a professor (54%) or in a researcher position (65.9%). 45.2% of postdocs were interested in working as a researcher outside academia. The answers clearly showed that research is the preferred career option for a significant proportion of respondents (Fig. 27, Q31a). Regardless, 39.4% felt that their career plans were either very unclear or unclear (Fig 28, Q33), and 74.4% felt it would be either very difficult or difficult to achieve their career goals (Fig. 29, Q32).

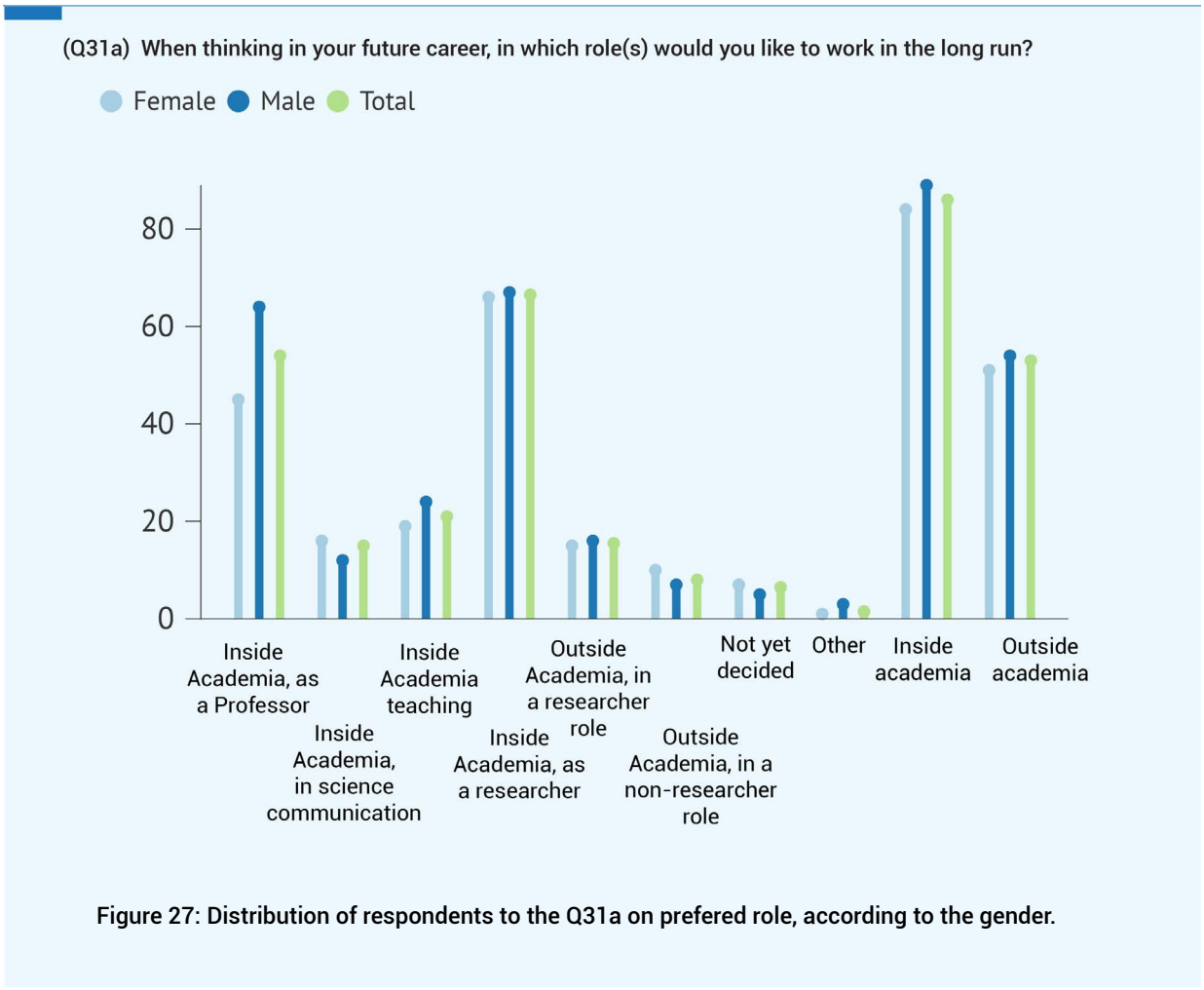


Figure 27: Distribution of respondents to the Q31a on prefered role, according to the gender.

(Q33) How clear is your career plan?
(from 1 = ''very unclear'' to 5 = ''very clear'')

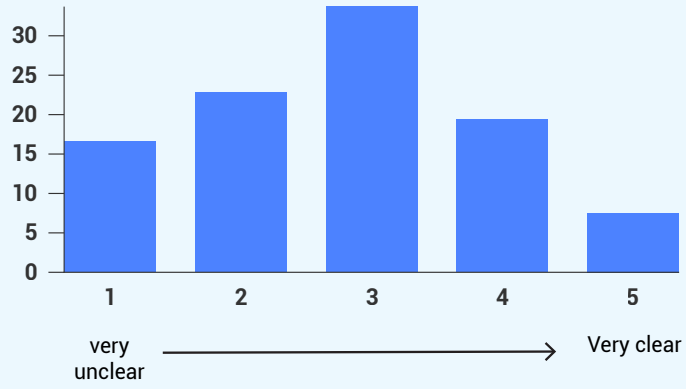


Figure 28: Distribution of respondents regarding their clarity regarding career plan?

(Q32) How difficult do you think it will be for you to achieve your career goal(s)?
(from 1 = ''very easy'' to 5 = ''very difficult'')

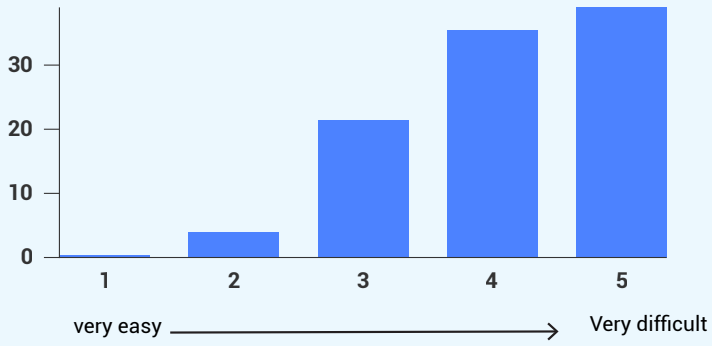


Figure 29: Distribution of respondents according to their willingness to search for jobs

When asked about whether the lack of employment opportunities was a barrier, most of the postdocs replied that it was (69.1%), with 45.3% replying that it was a very serious barrier and 23.7% a serious barrier to their career development. Also among the respondents, 57.6% reported the structure of careers, 54.7% reported the absence of researcher careers, and 44% reported that they considered the lack of career guidance and support to be either very serious or serious barriers in their career (Fig. 30, Q29).

(Q29) What do you think are the main barriers/obstacles for career development opportunities at your institution? (from 1 = "not barrier" to 5 = "very serious barrier")

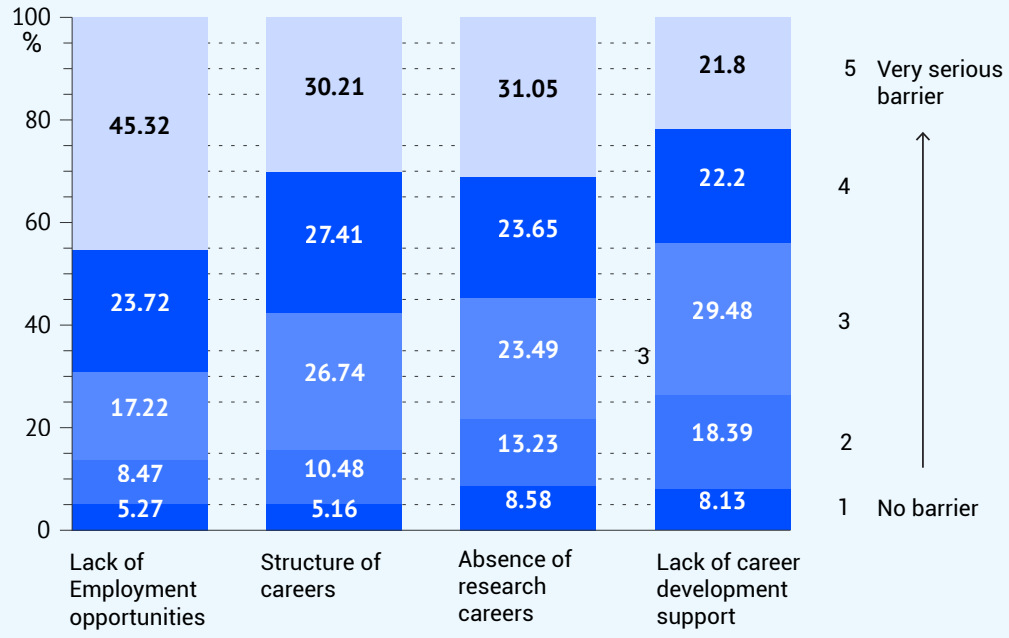


Figure 30: Distribution of respondents according to their impression on the barriers for carrer development opportunities at their institutions.

In an open ended question, 39.1% chose to provide suggestions to solutions for obstacles to career progress. Here, while phrasing of course differed, six trends in suggestions for possible improvements were identified (to constitute a trend, something must have been mentioned by at least 5% of the respondents):

1) Career development support (~20%)

2) Increased funding (~15%)

3) Adequate employment (~15%)

4) Reform of researcher careers (~9%)

5) Increased employment opportunities (~7%)

6) Increasing the transparency in the recruitment process (~6%).

Significant differences were found for all four variables.

Gender

Female postdocs were overrepresented among the group who identified the employment opportunities, poor career structures, absence of researcher careers, and lack of career development support as very serious barriers to career development (Fig. 31 Q29a). They were less likely to consider an academic teaching position or a professorship in academia. Additionally, they were more likely to consider alternative roles inside academia (science communication, research management, technology transfer), but more likely to consider a career in scientific publishing (Fig. 32, Q31a). Male postdocs were more likely to consider pursuing a career inside academia as professors or teachers, less likely to contemplate the alternative roles inside academia or a career in scientific publishing

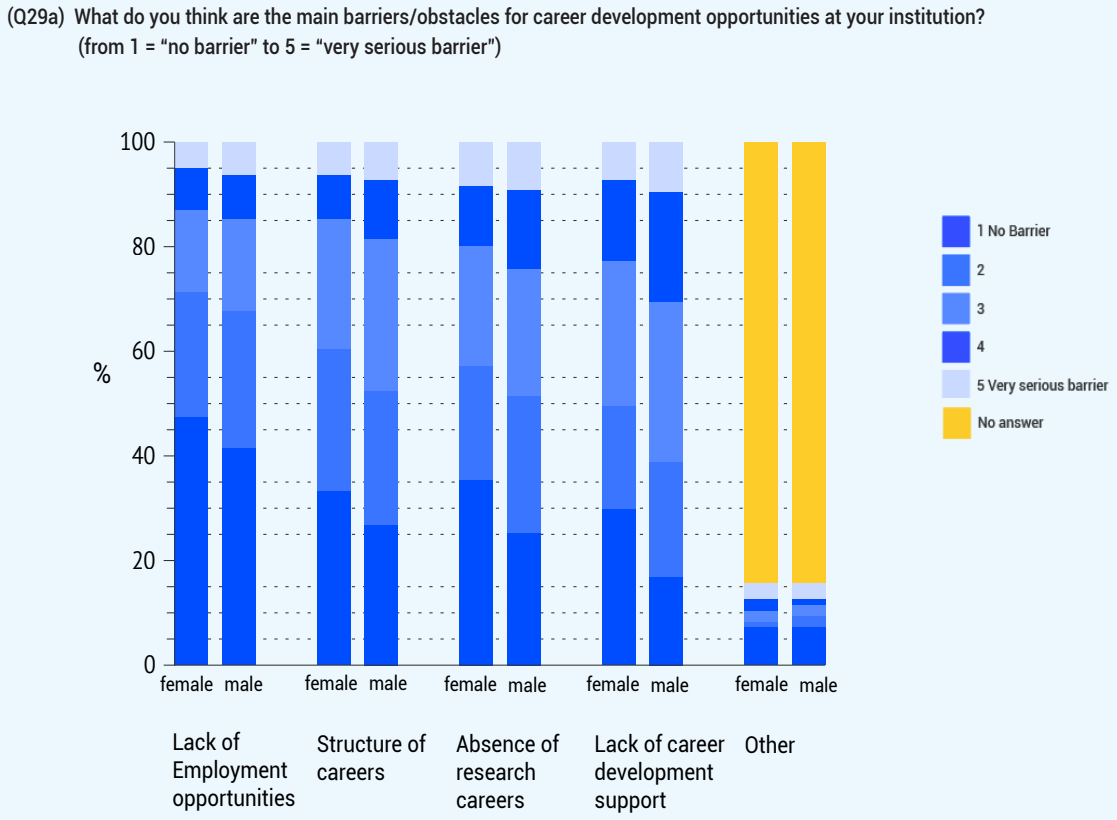


Figure 31: Distribution of respondents divided by gender, according to their impression on the barriers for carrer development opportunities at their institutions.

Nonetheless, both male and female respondents report to a large extent not considering the role of teachers in academia and not thinking about pursuing a career in scientific publishing.

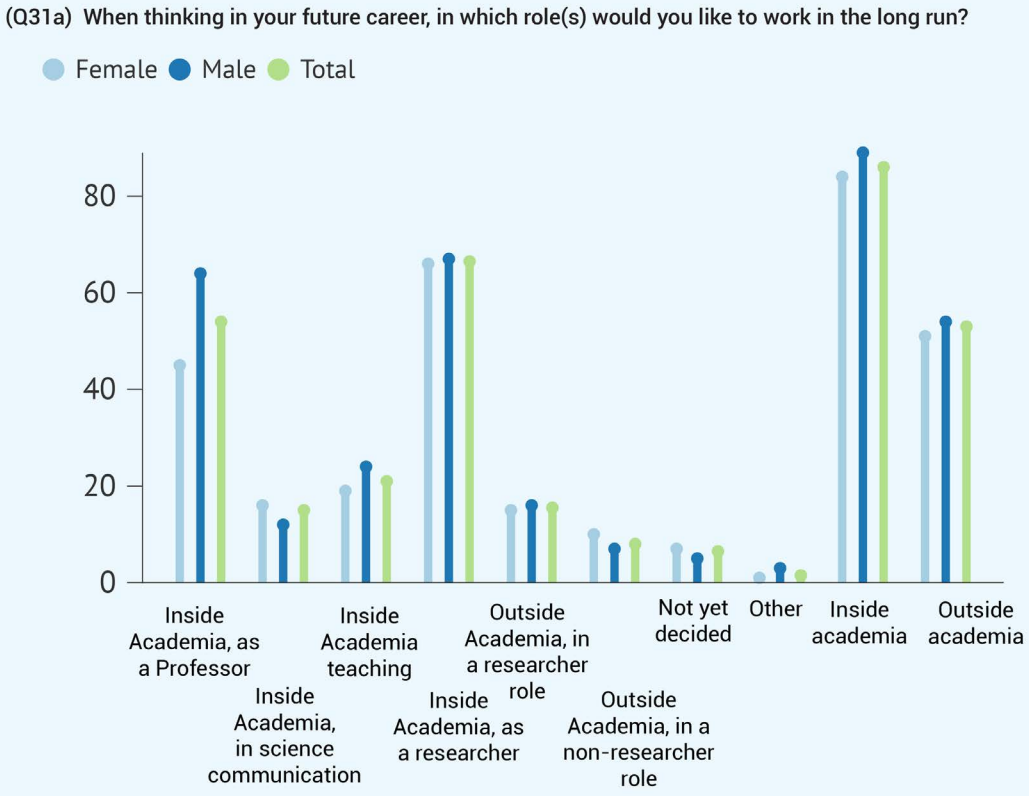


Figure 32: Distribution of respondents according to their preferred roles for working in the long run.

Region of Europe

No significant differences were observed between regions regarding the desire to become a professor in academia.

The potential career barriers were a concern for all respondents. However, postdocs in Southern Europe were overrepresented among those with serious or very serious concerns, whereas postdocs from Northern Europe were the least likely to answer this question (Fig. 33, Q29b).

Postdocs in Northern and Eastern Europe were least likely to respond that it would be very difficult for them to achieve their career goals. Those in Eastern Europe were overrepresented among those who answered that their career goals as being very easy to achieve, and postdocs in Northern Europe among those who answered it would be somewhat easy. Postdocs based in Southern Europe were overrepresented among those who responded that their career goals would be very difficult to achieve (Fig. 33, Q29b).

(Q29b) What do you think are the main barriers/obstacles for career development opportunities at your institution? (from 1 = “no barrier” to 5 = “very serious barrier”)

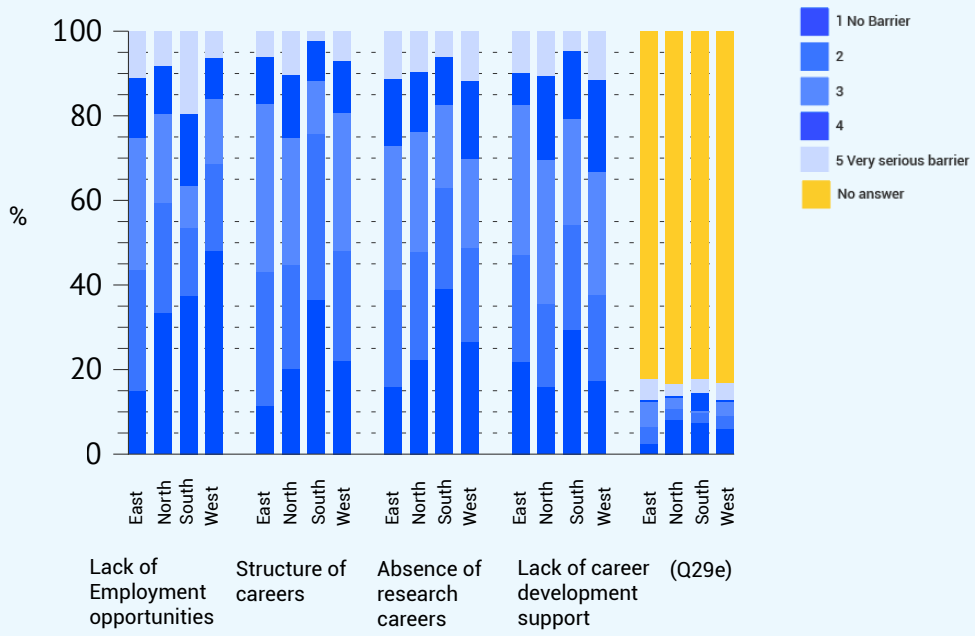


Figure 33: Distribution of respondents divided by their region in Europe, according to their impression on the barriers for carrer development opportunities at their institutions.

Postdocs in Northern Europe were more likely to want to consider a research career outside academia, while those in Western Europe were more likely to consider a career inside academia as a researcher or in an alternative. Postdocs in Southern European were less likely to be considering a career in academia as a researcher or in alternative roles, they were also more likely to not consider a research career outside academia, or a career as a public servant (Q31B - see appendix).

Field of research

Postdocs in the humanities and social sciences were overrepresented among those considering a career as professors and underrepresented among those considering working as a researcher outside of academia. Those in social sciences were overrepresented among those considering a career as a public servant, and postdocs in the humanities were overrepresented among those considering a teaching career in academia, although answers indicated that they preferred the role of professor. Postdocs in medicine and health sciences were underrepresented in the groups open for a job in academia. Postdocs in natural sciences were overrepresented among the group open to work as a researcher outside of academia (Q31c - see appendix).

Academic age

Postdocs with an academic age of 2 or less years replied more optimistically about both their ability to achieve their career goals and the severeness of the barriers they expect to find. The opposite was the case for those with an academic age of 5 or more years (Figure 34. Q29d).

(Q29d) What do you think are the main barriers/obstacles for career development opportunities at your institution? (from 1 = "no barrier" to 5 = "very serious barrier")

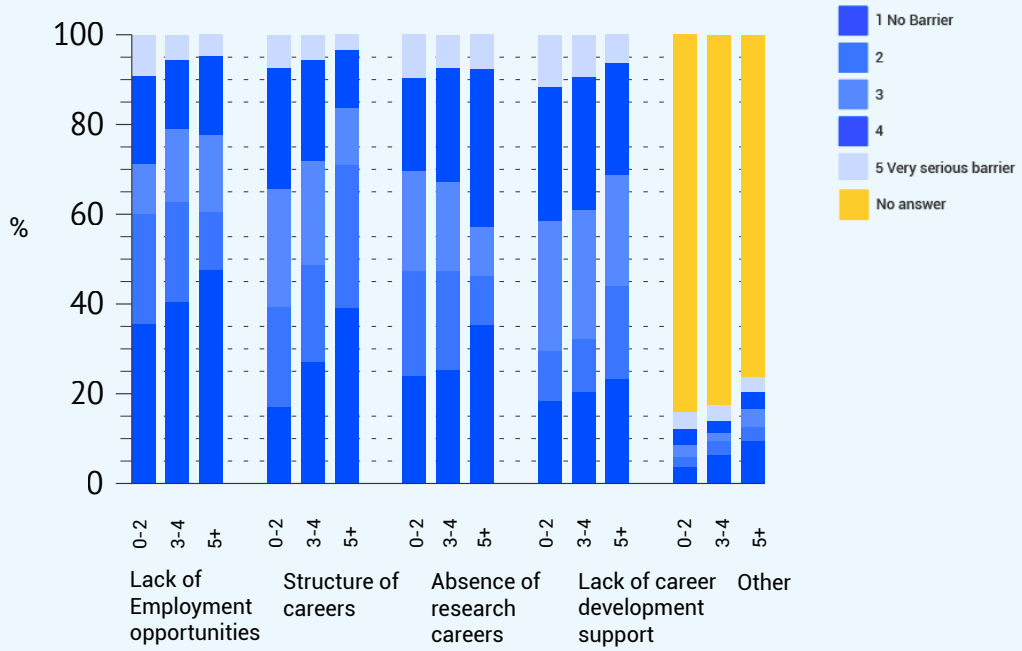


Figure 34: Distribution of respondents divided by their academic age, according to their impression on the barriers for carrer development opportunities at their institutions.

Postdocs with an academic age of 2 or less years were overrepresented among those open to work as a researcher outside of academia. Postdocs with an academic age of 2 years or less were the least likely to be actively searching for jobs.

Postdocs with an academic age of 5 or more were least likely to wish to work as a researcher outside of academia despite being those most likely to be applying for jobs both inside and outside of academia (Figure 35, Q31d subset).

(Q31d*) When thinking in your future career, in which role(s) would you like to work in the long run?

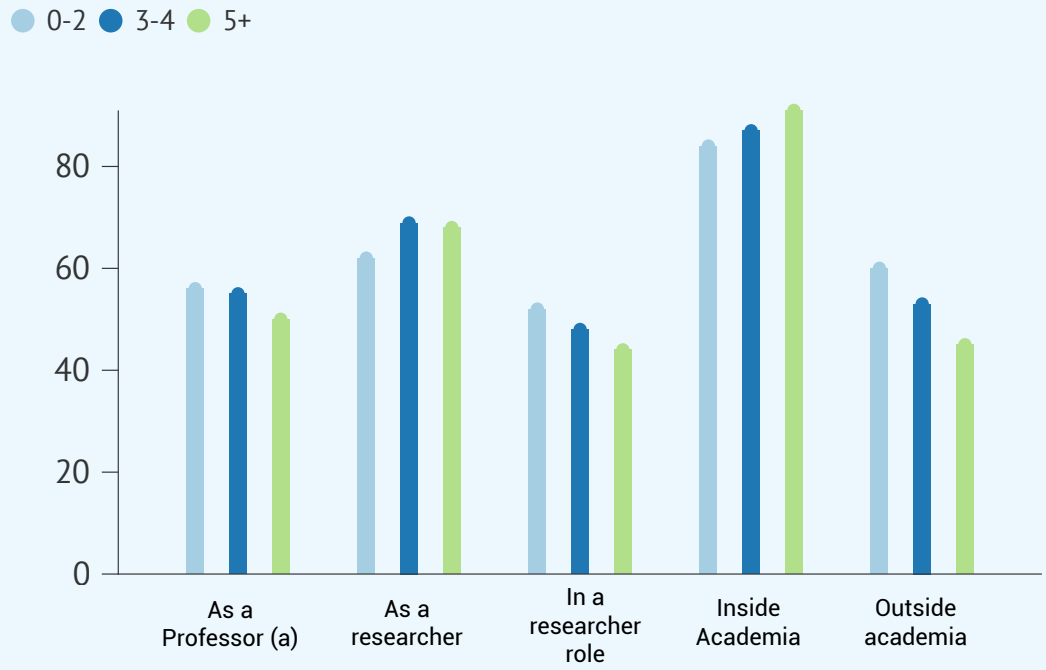


Figure 35: Distribution of respondents according to their role preference in the long run.

3.6 Work-life balance and wellbeing

3.6.1 Work-life balance

The survey confirmed that work-life balance is an issue for postdocs as 52.9% answered that there was an imbalance in their life, with 29% rating their work-life balance as very bad or bad (Fig. 36, Q41). Reporting on the average number of hours spent on research, over half of the researchers (54.8%) reported working over 40 hours per week on their research alone (Q30 - see appendix).

(Q41) How would you evaluate your satisfaction regarding your work-life balance? from 1="very bad" to 5="very good"

Figure 36: Percentage of respondents according to their satisfaction with their work-life balance, from Very bad (top) to Very Good (botton)

Nearly 16% of respondents were not living permanently in the same country as their partner (12.8%) or commuted between countries (3%) (Q37 -see appendix).

Among the respondents who felt that their private lives were very much affected by; 58.6% reported that temporary contracts as a reason, 37% the need to be mobile, 58.5% uncertain job opportunities, 41.9% a lack of stable income, 21.4% a lack of free time, and 24.7% high workload. This demonstrates the impact of precarity on postdocs' personal or private lives (Fig 38, Q40). Significant differences were found for all four variables.

Gender

Female postdocs were overrepresented among those who reported a work-life imbalance (Q39a- see appendix), and among those who reported that their private life is very much affected by the need to be mobile, a lack of stable income, a lack of free time, and a high workload (Q40a - see appendix).

Region of Europe

Postdocs in Eastern Europe were those most likely to report a high level of work-life imbalance, whereas the postdocs working in Northern Europe were those least likely to report these issues (Q39b- see appendix).

Postdocs in Eastern Europe were least likely to report that a lack of stable income or free time had an effect on their personal lives, however, they were the most likely to be concerned about unsure job opportunities (Q40b - see appendix).

The high mobility of the postdoc in Northern and Western Europe may come at a cost. These groups were more likely to report that they do not live in the same country as their partner (Q37b - see appendix), and were overrepresented among those reporting that the need to be mobile impacted their private life considerably (Q40b - see appendix). Postdocs in Western Europe were also overrepresented among those commuting between the countries (Q37b - see appendix).

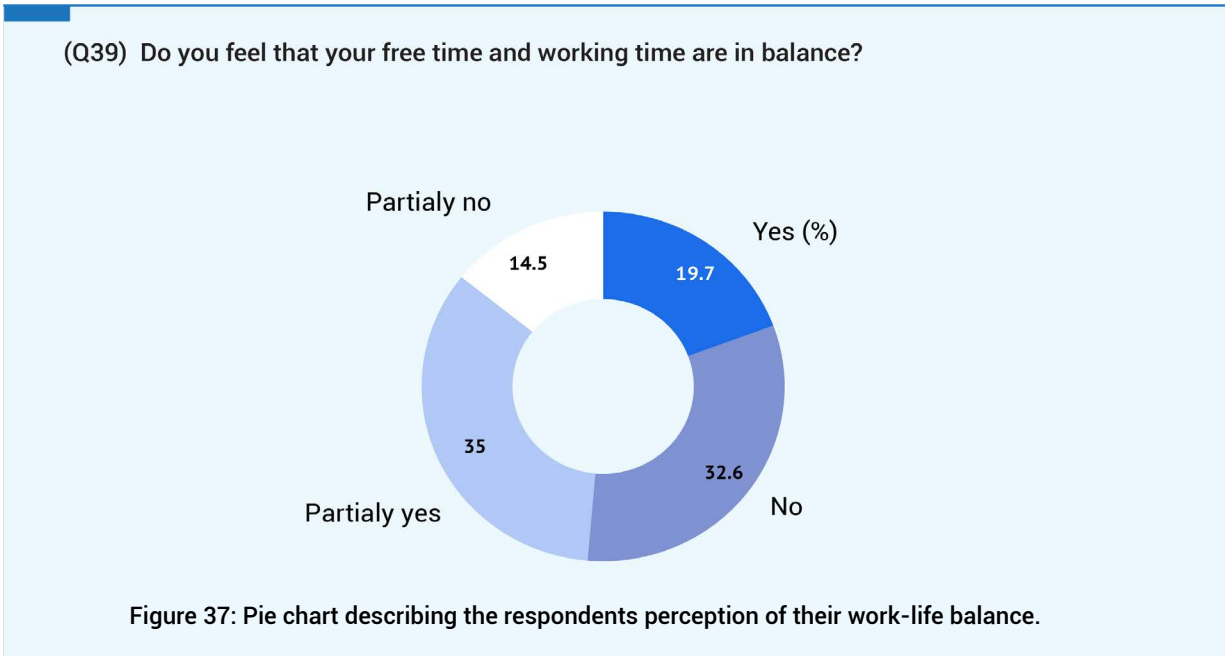


Figure 37: Pie chart describing the respondents perception of their work-life balance.

Postdocs from Southern Europe were overrepresented among those who reported that temporary contracts and lack of stable income had an impact on their private life (Q40b - see appendix).

Field of research

Postdocs in engineering and technology were most likely to be very satisfied with their work-life balance (Q41c - see appendix) and least likely to report that mobility affected their private life (Q40c - see appendix). Postdocs in medicine and health sciences were overrepresented among those not living in the same country as their partner (Q37C - see appendix) and those most likely to report that their private life was affected by a lack of stable income (Q40c - see appendix).

(Q40) Do you feel that your private life is affected by the following factors?
(from 1="not at all" to 5="very much")

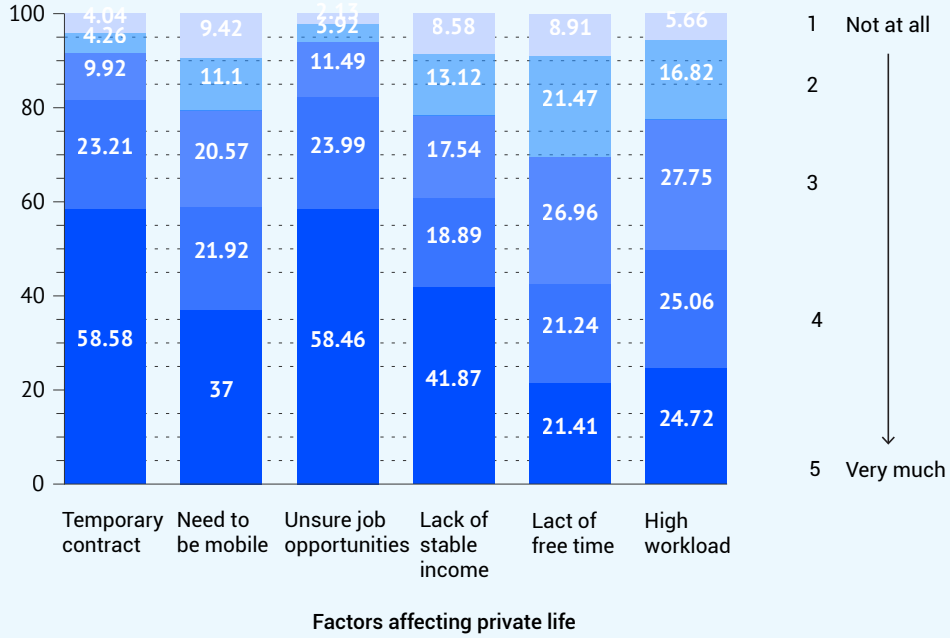


Figure 38: Distribution of the respondents answers regarding their perception of factors affecting their provate life, from Not at all (top) to Ver much (botton).

Postdocs in the humanities and the social sciences were underrepresented among those using 40 or more hours per week on research and overrepresented among those using up to 30 hours a week (Q33c - see appendix). Postdocs in the humanities were overrepresented among those who commute between countries (Q37c - see appendix).

Academic age

Postdocs with the lowest academic age were least likely to report an imbalance between their free- and their work time, whereas postdocs with higher academic ages were more likely to do so (Q39d- see appendix).

Also those with the lowest academic age were less likely to consider their private life to be affected by 1) temporary contracts, 2) unsure job opportunities, or 3) a high workload. Whereas those with the highest academic age were more likely to report their private life to be very much affected by all three factors. Postdocs with an academic age of 3-4 years indicated less that a lack of free time affected their private lives. (Q40d - see appendix).

Postdocs with an academic age of 5 or more years were more likely to be married or cohabit (Q36d - see appendix) and to have children (Q38d - see appendix). Conversely, postdocs with an academic age of up to 2 years were more likely to be single or not living with their partner (Q36d - see appendix), not living in the same country as their partner (Q37d - see appendix), and to not have children (Q38d- see appendix).

3.6.2 Wellbeing

Nearly 61% of respondents reported that their current career impacted considerably their well-being (rated as 4 or 5; Fig 39, Q42). Significant differences were found with respect to the region of Europe, field of research, and academic age.

(Q42) Do you feel that your well-being is affected by your current career?
from 1="not at all" to 5="very much"

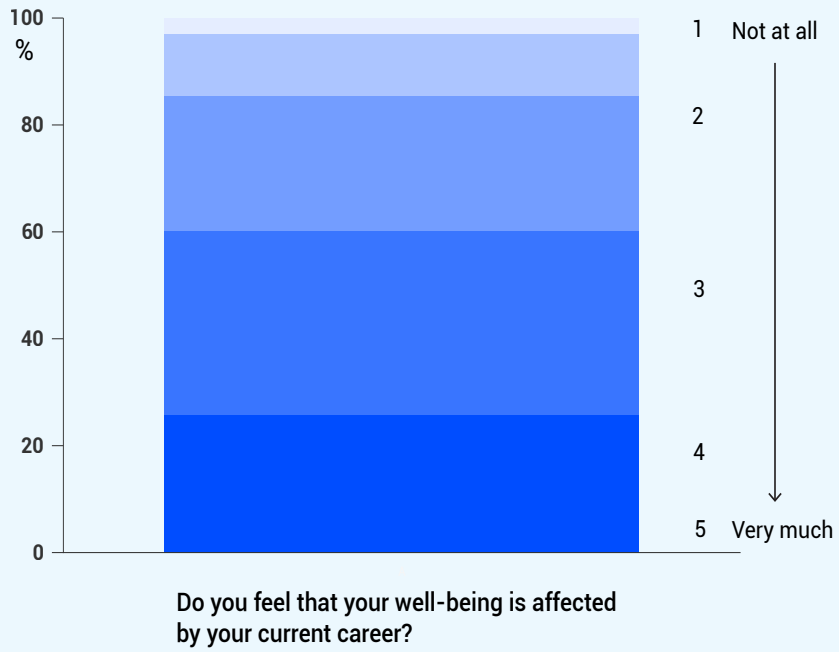


Figure 39: Percentage of respondents according to their perception of having the their well-being affected by the current career, from Not at all (top) to Very Much (bottom)

Region of Europe

Postdocs in Eastern Europe were those most likely to report that their well-being was affected by their career (Q42b - see appendix).

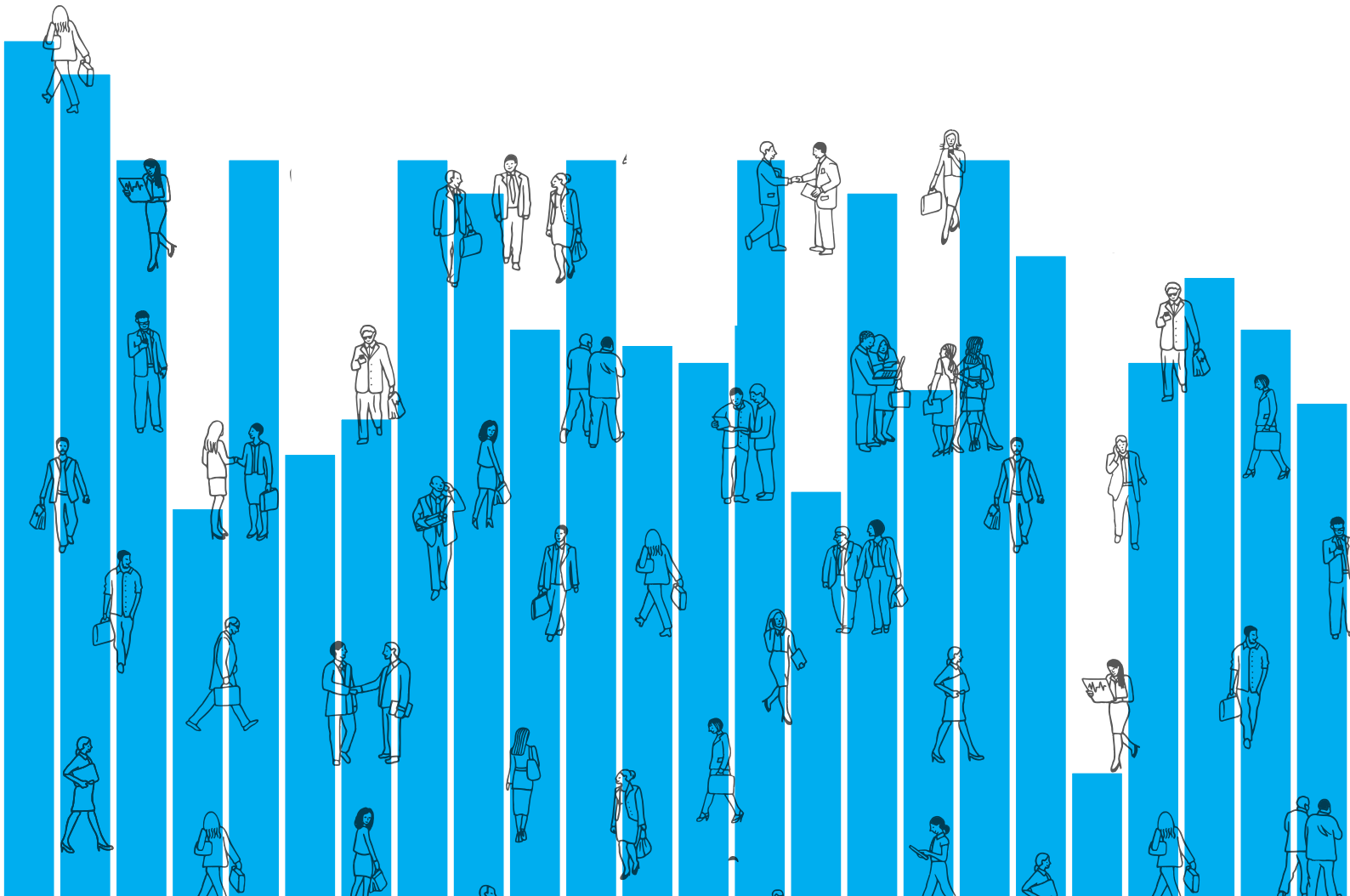
Field of research

Postdocs in engineering and technology were overrepresented among those reporting that their well-being was affected by their career (Q42c - see appendix).

Academic age

Postdocs with an academic age of 5 or more years were those most likely to report their well-being being affected by their career (Q42d - see appendix).

4
Reflecting on the Key Points for Action



4 Reflecting on the Key Points for Action

Eurodoc proposes **six key points for action** supporting a comprehensive reform agenda that moves beyond the existing fragmentation in the analysis of the challenges postdoctoral researchers face in their careers. Such fragmentation has been a barrier to understanding these difficulties as a policy priority in urgent need of structural change (Gaughan & Bozeman, 2019; OECD, 2023).

The six key points for action are **broad orientations** resulting from the thorough analysis of the survey results and a careful reflection on their meaning and policy implications. They are **consistent with Eurodoc's mission** of advocating for ECRs in Europe, **and** its **vision** of a fair and sustainable research culture that acknowledges and respects the essential contributions ECRs make to RPOs, scientific advancement, and society at large[1]. The six key points for action are **forward looking** and **reflect Eurodoc positions and contributions to discussions** informing the development of policies impacting the R&I sector, **and to the implementation of practices transforming research systems into more equitable, inclusive, and attractive environments** capable of retaining the most talented researchers (Eurodoc, 2017b, 2023; Marie Curie Alumni Association [MCAA] & Eurodoc, 2019). Additionally, these six key points for action **are informed by and can contribute to discussions and policy priorities at the EU level** such as the ERA (EC, 2020), the *Agreement on Reforming Research Assessment* (CoARA, 2022), or the recommendation for establishing a framework capable of attracting and retaining research, innovation and entrepreneurial talents in the EU (Council of the European Union, 2023), as well as other policies fitting under the EC three O's research and innovation agenda: open innovation, open science, and open to the world (DGRTD, 2016).

To be effective, **the six key points for action require the engagement and coordinated action of all stakeholders involved in R&I**, including ECRs. **ECRs** are the largest and most diverse cohort of researchers who also **play an important role in the improvement of the research culture and practice** (Kent et al., 2022). They have successfully led and have been involved in initiatives promoting change on a systemic level (e.g., ECRs training and working conditions, rewards and incentives, publishing, reproducibility of research practices), beyond the improvement of their own work or working environments.

Similarly to other actors in R&I policy, such as the OECD and the San Francisco Declaration on Research Assessment (DORA), Eurodoc advocates that effective structural, systemic change can only be achieved through a shared vision among all stakeholders. This shared vision should enable critical transformations in policies, processes, and power structures, as well as in the norms and values deeply embedded in contemporary academic culture (Hatch & Curry, 2020; OECD, 2021b, 2023).

1 Eurodoc (2024, September). Mission and Vision. Eurodoc, The European Council of Doctoral Candidates and Junior Researchers. http://www.eurodoc.net/eurodoc/mission-and-vision

4.1 Improve postdoctoral researchers' working conditions by offering them stable and more predictable career prospects based on standard employment

The UN 2030 Agenda for Sustainable Development includes Goal 8, which calls for the creation of high-quality jobs and the promotion of full and productive employment and decent work for all (UN, 2015). To truly embrace this goal, the R&I sector needs to guarantee (1) standard employment becomes the norm for postdoctoral researchers, and (2) stable and more predictable career opportunities for post-doctoral researchers across Europe and in all fields of research.

Figure 40: Authorship credit comic from " Piled Higher and Deeper " by Jorge Cham www.phdcomics.com, reprinted with permission of the author. All rights reserved

For these changes to be achievable, a stronger commitment to reforms and larger investments in R&I are needed from the EC, national and regional governments, and private investors (EC, 2020). Specifically, more robust, consistent investments in areas such as R&I human resources are required (ISE, 2022; Science Europe, 2022). As the 2021 EC-OECD STIP[2] survey on human resources for R&I policies revealed, more initiatives target individual actors, such as postdoctoral researchers, rather than institutional actors, such as HEIs and public research organisations. Many of these initiatives are small-scale, with budgets of up to one million euros per year (Barreneche & Keenan, 2020). These policies are either research-oriented or designed to foster brain circulation and the training and development of human resources. Non-standard or precarious employment, such as project grants, fellowships, and stipends, are the most common measures used to support ECRs' employment and career advancement (Barreneche & Keenan, 2020). This type of funding – short-term, external or competitive – has become an important source of financing for ECRs' positions (Wooley et al., 2016). Reforms and more substantial investments are also needed to ensure that researchers and RPOs have access to adequate, stable funding that reverses the decreasing trend in public core funding and ensures a stronger balance between short-term

2 Science, Technology and Innovation Policy

competitive funding and long-term strategic or core funding (AURORA et al., 2023). Continuity of funding is a key concern even for (senior) researchers who hold or have held large grants (Susi et al., 2019).

The pervasiveness of precarity and atypical working conditions

Precarity is highly disseminated among postdocs and its effects are pervasive and widely impactful in their lives and careers. Regardless of the funding source, the contracts of the postdocs surveyed by Eurodoc were short- to very short-term and often did not grant them full access to social welfare provisions (e.g., unemployment benefits, sick or parental leave). These results align with what other recent large-scale studies have reported (e.g., Christian et al., 2021; Nording, 2023; Wellcome, 2020, Woolston, 2020c, 2020d). Atypical work and uncertain career prospects may, however, be more widespread than what available evidence suggests. Not only is there no systematic career tracking of doctorate holders' careers across Europe and sectors of activity, but administrative register data has several blind spots regarding atypical workers, postdocs specifically, with the employment conditions and background characteristics of these researchers often missing from statistics (Ilsøe & Larsen, 2020; O'Connor et al., 2023; OECD, 2021b). The urgency and the limitations imposed by blind spots and other evidence shortages on R&I, researchers, and researcher careers were also recognised by the EU institutions that are now working to implement the ReICO (EC, 2024).

The many costs of being a postdoc and academia's loss of talent

Most postdoctoral researchers answering the survey expressed a desire to continue working in academia either as professors or in alternative research positions. However, many – especially those who obtained their doctorate in the last 3-4 years – also indicated a preference or openness to pursuing alternative careers in or outside academia. Being a postdoc often does not lead to a permanent position and involves significant personal (e.g., postponement of marriage or parenthood), professional (e.g., length of training), and financial sacrifices (Grinstein & Treister, 2018; Van der Weijden & Telkeen, 2023). The earnings penalty that postdocs experience can last up to 15 years after obtaining the doctorate (Kahn & Ginther, 2017). As a result, the benefits of a research career, especially in academia, are becoming less apparent for many postdocs, with alternative career pathways to pursuing an academic career no longer being a second choice but the primary option for employment for many (e.g., Afonja et al., 2021; Aarnikoivu et al., 2019; Noppeney et al.; 2022; Seo et al., 2021). These circumstances are starting to challenge universities and research institutes' ability to attract and retain talent, including at the level of doctoral training, and counteract trends toward academia's loss of competence and creativity (AURORA et al., 2023; OECD, 2021a; Waaijer, 2017).

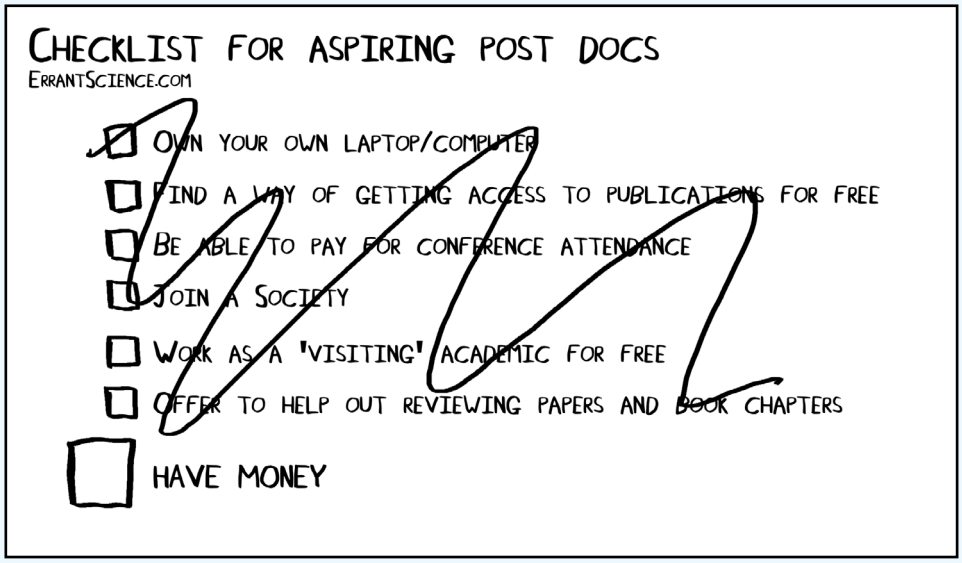
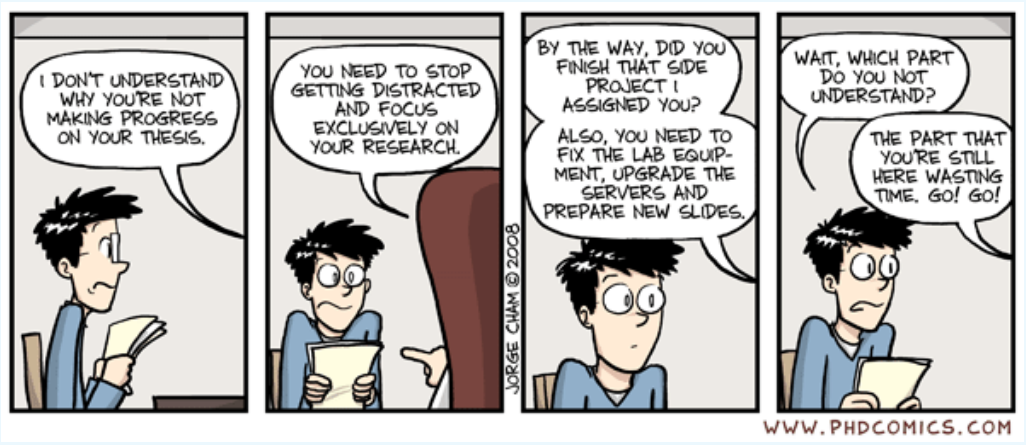


Figure 41: Comic from ErrantScience.com, by Matthew Partridge.

4.2 Provide postdoctoral researchers with nurturing and fair working environments, access to career guidance and representational rights, as well as ample opportunities for wide-ranging professional development

A core feature of today's research and HE sector is its hypercompetitive environment and culture (Fang & Casadevall, 2015). Such an environment and culture often creates aggressive and harmful working conditions, placing enormous pressure on postdoctoral researchers (Wellcome, 2020; Woolston, 2020c). They are also a core driver of research misconduct (Fang & Casadevall, 2015). ECRs – postdocs in particular – are those most affected by negative and distressing impacts of competition (e.g., Anderson et al., 2007; Christian et al., 2021; Hayter & Parker, 2019). To thrive in their careers, postdocs must continuously compete for publications, funding, and jobs, with these three forms of competition being closely intertwined (Waaijer et al., 2018). Despite recent positive steps, change is far from being effective (Hatch & Curry, 2020; Nature, 2023b). To support postdoctoral researchers effectively, it is necessary to break away from the current system of values and change the norms that are deeply rooted in the culture of the HE and research sector. This requires reforming policies and practices that foster highly aggressive and competitive working environments. Such reforms should aim to provide postdoctoral researchers with **(1)** fair, supportive, and high-quality working environments where they are recognised as members of the staff with clear roles, rights and responsibilities within the organisation; and **(2)** access to opportunities for multi-functional professional development, including career guidance, support, and representational rights. Students and staff – including ECRs – participation in HEIs or RPOs governance is among the EHEA fundamental values (Tirana Ministerial Communiqué, 2024).

More active commitments from governments and funders are essential for the implementation of reforms, such as research assessment, that will improve the working conditions and career prospects of researchers – postdocs specifically (AURORA, 2023). The current rewards and incentives system is among the key drivers of the hypercompetitive environment and culture pervasive in the research and HE sector (Fang & Casadevall, 2015). At present, research assessment relies excessively on a narrow conception of impact, quality, and performance, with quantity indicators, such as journal-based metrics and the H-index, often misused as proxies for excellence (CoARA, 2022). Key stakeholders, including governments, funders, and RPOs, have demonstrated an increasing aversion to risk and a focus on narrow, short-term gains that do not necessarily reward innovative, impactful, and rigorous research adhering to high-integrity standards (Wellcome, 2020). However, for reforms to be effective, they must also address the needs of institutions and researchers (Hatch & Curry, 2020). Poor workplace dynamics, which result from power imbalances between postdoctoral researchers and their PIs and supervisors, are often linked to deficiencies in management and leadership (Wellcome, 2020). Postdoctoral researchers should be recognised as a separate staff category, and clear, appropriate regulations must be established to address the lack of quality standards and the inadequacy of the human resources management policies and practices targeting them at the institutional level (Var der Weijden et al., 2016).



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More attention needs to be given to postdocs' needs and career interests, including the provision of career guidance that is tailored to them (Nature, 2023b; Var der Weijden et al., 2016). From the start of their employment, postdocs should have clear information about their career prospects in academia and opportunities beyond it (OECD, 2021b, 2023). They must also be made aware of the relevance of their skills and competencies for careers outside of academia (Hnatkova et al., 2022). Training typically focuses on the content of their job (e.g., methodology, fundraising, scientific writing) and does not reflect the multi-functional roles postdoctoral researchers are expected to play in society (Teelken & Van der Weijden, 2018). Supervision is mostly focused on job-related topics, and attention to other areas, such

as postdocs' careers and interests, usually depends on supervisors' willingness to provide advice or mentorship (Teelken & Van der Weijden, 2018). PIs – who often also serve as supervisors – control the content of the research conducted in their projects, which usually restricts postdocs' freedom to take initiative and pursue their research agenda (Herschberg et al., 2018). PIs also tend to be resistant to postdoctoral researchers' interest in positions outside academia, which might lead them to slow down or obstruct such a transition as well as to penalise the postdoc (Hayter & Parker, 2019). Additionally, there are not enough structures in place to measure performance on supervision and training (Wellcome, 2020).

Figure 43: Comic from ErrantScience.com, by Matthew Partridge.

Lack of transparency in work-related specifications and skills recognition

Many postdocs surveyed by Eurodoc did not have clear specifications for the number of weekly hours they were contracted to work, with more than half reporting working over 40 hours per week. Not all postdocs were hired full-time, and their work or skillset was often not duly recognised, particularly concerning supervisory duties. The dependency on PIs requires these researchers to show dedication and commitment to the work they were hired to do without necessarily being entitled to reciprocity (Herschberg et al., 2018). Postdoctoral researchers frequently occupy a peripheral position with weak organisational embeddedness and low visibility in their host institutions (Var der Weijden et al., 2016). They tend to be perceived as a source of cheap labour and not recognised as a separate staff category, with their role remaining unclear. They are generally required to do a lot of unpaid overtime and perform non-research-related tasks for PIs and supervisors (Fotta et al., 2020). Additionally, they are often required to perform tasks not directly recognised or demanded by the job, such as peer-reviewing publications or working on projects whose funding has ended. When recruiting and selecting postdocs for their projects, PIs often focus on their short-term interests and needs with a narrow set of objectives, leading them to

prefer hiring "good project workers" instead of searching for researchers capable of making a societal impact or possessing qualities for pursuing a longer-term research career (Herschberg et al., 2018).

The neglect or invisibility of postdocs at the institutional level

Most surveyed postdocs had unclear or partially defined roles, rights, and responsibilities, with many unable to cover the ancillary costs such as travel, publication, and language proofreading. Many also reported not being entitled to representational rights in HEIs and RPOs' governing bodies. Recognising postdoctoral researchers as a separate staff category and ensuring their involvement in HEIs and RPOs' governance would enhance their position and acknowledge their strategic role and importance to HEIs and RPOs' productivity and competitiveness (Var der Weijden et al., 2016). This recognition would also be an important mechanism for developing solutions that could immediately improve their working conditions and foster a sense of community among all actors involved in HEIs and RPOs' functioning (Lizzio & Wilson, 2009). Postdocs are not always provided with sufficient office space, computer facilities, or adequate opportunities for training and professional development (Fotta et al., 2020). They value being able to connect with others (i.e. senior staff members and colleagues) for networking or socialising (e.g., Hayter & Parker, 2019; Owusu-Agyeman, 2021; Wellcome, 2020). However, many postdocs feel discontent with the opportunities to bond with senior staff and colleagues and the support they receive from their professional networks.

Figure 44: Comic from ErrantScience.com, by Matthew Partridge.

Most postdoctoral researchers Eurodoc surveyed believed they did not receive enough guidance or advice about career options, with many being unaware of, or lacking access to, an office in their host institution that offered such support. This lack of access to career guidance and support was perceived as a significant barrier to career development. Career development for postdocs appears to occur unintentionally, with HEIs and RPOs investing little to no resources in supporting postdocs in career planning through guidance or mentorship (Var der Weijden et al., 2016), which are essential for a positive postdoc experience (Teelken & Van der Weijden, 2018). They foster a supportive working environment, boost confidence and the likelihood of accessing institutional resources. Additionally, they enhance performance and can be decisive in helping postdoctoral researchers access broad professional networks, both inside and outside academia, which determine their ability to find subsequent job opportunities (Hayter & Parker, 2019).

Postdocs with lower and higher academic ages are the most affected by institutional neglect

Institutional neglect and lack of guidance and support appear to predominantly affect postdocs who were awarded their doctorate either very recently or the longest ago. According to the survey results, postdoctoral researchers with the lowest academic age reported more often than their peers not having a clear understanding of their roles, rights, and duties, including the welfare provisions covered by their contracts. In line with findings from other studies, this group was also the most satisfied with their jobs and more likely to report feeling confident about their career prospects, which may be attributed to their lack of experience (Fotta et al., 2020; Wellcome, 2020). Conversely, postdoctoral researchers with the highest academic age reported receiving less guidance about career options, encountering difficulties in covering ancillary costs for their work, and lacking awareness of their potential representational rights in HEIs and RPOs' governing bodies – a feature they shared with their colleagues of the youngest academic age. Other studies have shown that postdocs of higher academic age **(1)** more frequently reported being negatively affected by a lack of institutional support from supervisors, harassment based on power positions, and dissatisfaction with workplace leadership and management (Christian et al., 2021); **(2)** struggle more than their peers with a lower academic age to find a permanent position in academia, as such opportunities decrease with time (Fotta et al., 2020; Van der Weijden et al., 2016).

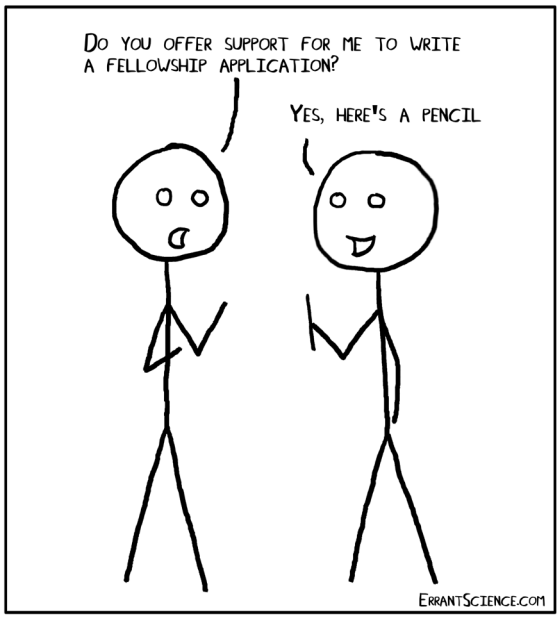


Figure 45: Comic from ErrantScience.com, by Matthew Partridge.

4.3 Implement a clear, common framework for attractive, sustainable research careers in Europe based on transparency, flexible career pathways, and an open labour market

Among the most impactful transformations the research and HE sector has undergone in recent decades is the shift from a model based on core institutional funding to one relying on competitive funding – making researchers and their host institutions more dependent on external, short-term, project-based funding (AURORA et al., 2023; OECD, 2021b). Concurrently, there has globally been an unprecedented rise in the number of doctoral graduates, without, however, the necessary reforms to career structures, especially in academia where the number of permanent positions has grown at a much slower pace (Leysinger et al., 2020). This change in ratio between permanent and non-permanent academic staff results in persistent problems, with limited career prospects, precarity, and insecurity having become the norm for many ECRs (OECD, 2023). This in turn affects the quality of HEIs' fulfilment of their mission and their core tasks not just in terms of research but also in terms of teaching and education. This has significant consequences also for the implementation and protection of fundamental values in areas as crucial as institutional autonomy, the academic freedom and integrity of researchers, teachers, and students as well as the participation of students and staff – including ECRs – in HE governance (Saugman & Schoch, 2024).

Moreover, poor working conditions and the lack of alternative, more appealing, and sustainable career paths are significant obstacles to academia's ability to retain its most talented researchers and attract good researchers from outside academia (OECD, 2021a). To ensure the attractiveness and sustainability of research careers, it is crucial to seriously and carefully consider postdocs' career options (OECD, 2023). This entails (1) developing a clear, harmonised EU-level research career framework offering post-doctoral researchers diverse, flexible pathways for employment and career advancement in or outside academia, and improving their mid- to long-term career prospects, (2) ensuring transparency, fairness, and effectiveness in postdoctoral researchers' recruitment and rewards practices, which would help overcome persisting barriers to their employment, professional development, and promotion.

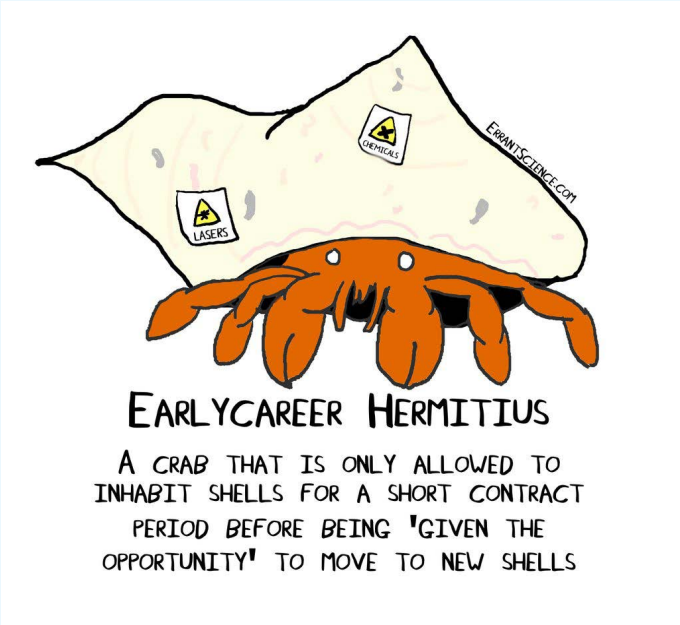


Figure 46: Hermit Animals. Comic from ErrantScience.com, by Matthew Partridge.

In line with what is envisaged for ERA, establishing a common, comparable framework for research careers and competencies would further the creation of an open pan-European labour market for researchers, and add transparency to existing career paths (EC-DGRTD, 2021c; OECD, 2023). The EU only recently began to address the heterogeneity of researchers' careers at the institutional system level putting forward in 2023 the Council Recommendation on a European framework to attract and retain research, innovation and entrepreneurial talents in Europe (Council of the European Union, 2023). While this initiative marks a step in the right direction, the tangible improvement of research careers is tightly bound to the implementation of the Council's recommendations. Actions are required at the EU institutional level, but more importantly at the national system level to reverse the fragmentation currently observed in the career frameworks of researchers (EC-DGRTD, 2011, 2020).

Implementing a common framework for research careers and competencies would help remove legal and other barriers to researchers' international and intersectoral mobility, clarifying the various career stages and the competencies associated with them across European national HE&R systems and institutions. European HE&R systems are complex and heterogeneous, with significant variations in career path structures and advancement opportunities for researchers as they progress from a doctorate to a professorship (Schiewer et al., 2014). Researchers' employing organisations are fragmented into many different types of research institutes and HEIs across all sectors of the economy (Giachi & Fernández-Esquinas, 2020). These RPOs frequently also differ considerably in their institutional arrangements and specific career frameworks. These variations are often overlooked by policy initiatives, which ends up favouring the development of a myriad of autonomous career frameworks that do not directly relate to other initiatives establishing professional development frameworks for researchers at the national or European level (EC-DGRTD, 2011).

Implementing a common, comparable framework for research careers and competencies should also illuminate other aspects, such as discipline-specific factors and the features of national and local labour markets that must be considered when framing researchers' opportunities for employment, career advancement, and mobility (Fotta et al., 2020; OECD, 2021a, 2023). There is a need for more flexible career paths allowing researchers to smoothly shift between academia, the public sector, and industry or the private sector (OECD, 2023). However, for these reforms to succeed, the career paths of researchers need to become more transparent, effective, and fair (Science Europe, 2022). Increasing ethics in recruitment and reward practices is required. Despite recent progress, strong disparities between countries persist in the number of positions that are externally advertised and in the satisfaction of researchers with the openness, transparency, and merit-based nature of recruitment procedures (EC-DGRTD, 2017, 2021a). Recruitment procedures vary widely across Europe, with different timelines and inconsistent requirements between countries and institutions, often leaving competitive advantages and criteria unclear to external candidates (Parada, 2016). Furthermore, obtaining a doctorate at the hiring institution often constitutes a considerable advantage in the appointment processes, with many European public universities preferring to hire their senior staff from local and national candidate pools (Seeber & Mampaey, 2022).

Lack of clear career prospects and disciplinary differences in postdocs' access to employment

The postdocs surveyed by Eurodoc are aware of and concerned about the implications of limited prospects for overcoming precarity and securing a permanent position, and the effect on their lives and careers, with many reporting they lack clear plans for future careers. The most mentioned barrier to career progress among respondents was a lack of employment, which they identified as the most serious challenge. Other significant obstacles to career progress included the rigid structure of career paths and the absence of dedicated research careers. Through the ERA, the EC aims to address many of these issues, which result from the fragmentation and lack of sustainability of research careers across Europe. This includes efforts to remove barriers to researchers' mobility that exist between countries,

institutions, and various sectors of the economy (EC-DGRTD, 2021c). Reforming research careers was one of the solutions the postdocs answering the Eurodoc Postdoc Survey proposed to the (many) career barriers they face.

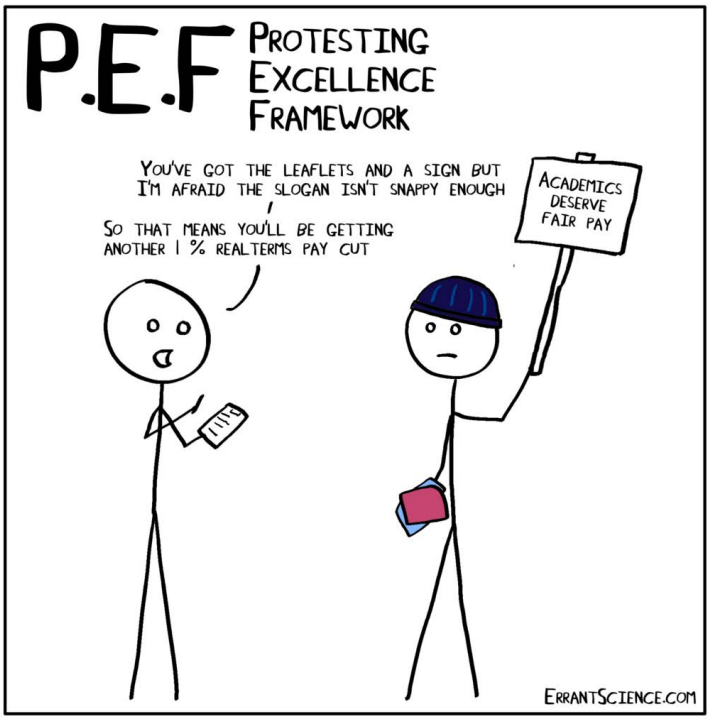


Figure 47: Protesting Excellence Framework. Comic from ErrantScience.com, by Matthew Partridge.

As the survey results show, researchers across different fields and disciplines face different expectations, employment opportunities, and paths for career progress. The extent and pace at which doctorate holders are absorbed especially by the non-academic or HE sector (greatly) vary across fields of research and national or local labour markets (Science Europe Working Group on Research Careers, 2016). While in some countries, regions, and disciplines these graduates transition easily and rapidly into positions in industry or the private sector, in others they encounter considerable barriers (Hnatkova et al., 2022). Opting to work outside academia is not a simple decision, especially for ECRs (OECD, 2023). Non-traditional academic career paths, such as dual positions with industry, or of two-way exchanges between academia and the non-academic sector are rare, and inter-sectoral mobility is not always valued by recruitment procedures for academic positions (EC-DGRTD, 2021a). As a result, transitioning out of academia frequently entails embarking on a one-way journey, limiting the opportunities of postdoctoral researchers to return to academic roles (OECD, 2021a).

Age, specialisation, and lack of networks as barriers to intersectoral mobility

The longer the postdocs Eurodoc surveyed held that position, the less open they were to pursue alternative careers to a career in academia. This finding is in alignment with previous studies. As these studies showed, as postdoctoral researchers advance in age and their degree of specialisation deepens, transitioning to non-academic employment becomes harder, with researchers becoming overqualified for industry positions and lacking the necessary networks facilitating the transition (e.g., Grinstein & Treister, 2018; Hayter & Parker, 2019). Moreover, as researchers age, the opportunities to change or secure new jobs tend to diminish, and the emotional toll of living in a constant state of uncertainty usually weighs more heavily on postdocs (Hayter & Parker, 2019, Nording, 2023). Most doctorate holders have acquired their degrees in their thirties (OECD, 2021a). Remaining in academia after graduation can act as a safety net, often delaying many postdoctoral researchers' decisions to leave well into their forties (Sarrico, 2022). By this stage, personal relations and responsibilities may have evolved, further constraining their options and opportunities (Nording, 2023, Van der Weijden et al., 2016).

Institutional inbreeding and lack of transparency in recruitment as barriers to mobility

A significant portion of the postdocs responding to the Eurodoc Postdoc Survey indicated that they obtained their doctorate from the same institution in which they are currently employed. Researchers based in Northern and Western Europe are more likely to be mobile both internationally and institutionally than their peers in Southern and Eastern Europe. Academic or institutional inbreeding, that is hiring faculty members from HEIs' pool of doctorate graduates, is a widespread practice on global level, with HE&R systems around the world varying in the extent to which they can mitigate it (Horta et al., 2021). The persistence of inbreeding within the culture of HE&R institutions undermines merit as the primary criterion for hiring staff, leading stakeholders such as the EC to issue recommendations highlighting the importance of equal treatment and transparency in recruitment practices (Henningsson & Geschwind, 2022). Notable examples include the 2005 European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers (Charter & Code), implemented through the Human Resources Strategy for the Recruitment of Researchers (HRS4R), and the recently published proposal for the European Charter for Researchers, which and expands and revises the principles outlined in the 2005 Charter & Code (EC, 2023c, EC-DGRTD, 2020).

4.4 Ensure common basic working rights and adequate employment conditions to researchers across Europe

The European Commission proposed the European Research Area in 2000 to create a single market for research, innovation, and technology across Europe. The goal was to foster collaboration among countries, improve research policies, and facilitate the free movement of researchers and knowledge (EC, 2020). However, insufficient engagement from member states has been slowing ERA's progress (EC-DGRTD, 2020). In 2020, through the Communication A New ERA for Research and Innovation, the EC proposed a renewed policy agenda and initiatives to boost member states' commitment to ERA and incentivising and reinforcing their strategic coordination and progress towards common objectives (EC, 2020). Among the EC's revised strategic priorities is a further deepening of ERA through a more profound integration between national policies, which would allow for greater connection and engagement from the different EU actors and R&I systems in the capacity-building and innovation while addressing the disparities that persist between them (EC-DGRTD, 2021c). However, for ERA to be achieved, EU countries have to make (sometimes deep) changes in the regulatory and administrative frameworks of their R&I systems (EC-DGRTD, 2020). The EU is also still far from its target of 3% of gross domestic product (GDP) expenditure in R&I, with substantial discrepancies in the R&I capacity of EU member states largely resulting from national governments' varying levels of investment and sectoral reform efforts (ISE, 2023; Science Europe, 2022).

Disparities in career frameworks and asymmetries in investments reveal a Europe where the spread of excellence and innovation – one of ERA's core priorities – progresses at different speeds, with some countries or regions leading and others lagging (Science Europe, 2022). In the EU, investments in R&I range from about 0.5% to 3.5% of a member state's GDP, with the highest levels of investment being concentrated in the North and the West (EC, 2020). Countries from these regions are also the ones consistently scoring higher in the European Innovation Scoreboard (EC, 2023b). The recent crisis that Europe and the world have faced – the 2008 economic and financial crisis, the COVID-19 pandemic, Russia's invasion of Ukraine – are likely to have deepened discrepancies in member states and regions' sectoral capacity and investments (EC-DGRTD, 2021c). EU-level funding and strategies alone are not sufficient to overcome these gaps in investments and to create a more level playing field in the capacity and performance of European R&I systems and institutions (Science Europe, 2022). In addition to allocating more funding for R&I, the EU's key sectoral funding programme – currently, Horizon Europe – must work together with Cohesion Policy (ISE, 2023; The Guild, 2021). Furthermore, national governments should be made accountable for their R&I strategies and related investments, and the mechanisms through which researchers access funding schemes must be adapted and simplified.

The prevalence of regional differences in the attractiveness of HE&R systems across Europe

The region of Europe where postdocs work, was the dimension that most consistently differentiated survey respondents across all the topics examined. Although precarity and uncertain career prospects

are pervasive across all countries and regions of Europe, a divide based on geographic location was apparent, especially between postdocs working in the North and the South of Europe. Postdocs working in Southern Europe reported more often fairing worse than their peers in many of the issues surveyed, such as a higher number of temporary contracts, lower access to social welfare, less clear roles, rights, and duties. These researchers were also the least optimistic about their career prospects, and the ones identifying the most barriers to career progress. More postdocs working in the North and in the South than in the East and the West of Europe answered the Eurodoc Postdoc Survey. Therefore, it is likely that the survey results did not fully apprehend all the nuances underlying regional differences in postdoctoral researchers' working conditions, wellbeing, and careers. Nevertheless, they provide valuable insights into why some institutions, countries, and regions struggle to retain and attract researchers, as well as why many postdocs wanting to pursue a research career feel forced to leave their home country and seek opportunities elsewhere in Europe or the world (EC-DGRTD, 2017, 2021a).

The attractiveness of national RPOs and HEIs are a key driver of the intra-European academic brain drain, which refers to persistent imbalances in researchers' migration flows within Europe (EC-DGRTD, 2017, 2021a). In the EU, there is a distinct South-North and an East-West pattern of mobility of highly skilled workers such as researchers, with Southern and Eastern Europe acting as the sending regions – i.e., the regions that are losing highly skilled workers due to permanent outward migration flows – and Northern and Western Europe as the receiving regions – i.e., the regions that are constantly receiving these workers (Cavallini et al., 2018). Countries' R&I capacity and investments affect both the material working conditions institutions and the HE&R systems offer to researchers (e.g., salaries, benefits, job security), and researchers' perception of the attractiveness of these institutions and the systems hosting them (EC-DGRTD, 2017, 2021a). As the MORE studies have consistently shown, dissatisfaction with funding and remuneration and higher levels of precarity in employment, together with researchers' perception of the R&I system's attractiveness are key drivers of mobility, especially because countries offering better material working conditions also tend to offer better professional development opportunities (e.g., career prospects, networking, working in high-quality environments and with distinguished peers). R2 researchers are the group that most frequently feel forced to be internationally mobile. The issue of forced mobility is often overlooked when discussing researchers' international mobility (Khan, 2021).

4.5 Promote gender equity while fostering diversity and inclusion in research careers

Since its foundation in 1957, gender equality has been at the core of the EU's priorities, leading to a multitude of policies and initiatives aimed at addressing gender inequalities and promoting diversity, equity, and inclusiveness, namely in R&I (EC-DGRTD, 2021b). However, progress has been slow, and in areas like women's presence, participation, and advancement in the R&I labour market, it has mostly come to a halt during the past decade (EC-DGRTD, 2021a). From the doctorate onward, at different career stages and across fields and institutions, women are more likely to drop out from a research career and are much less represented than men in the later stages of the research career and top decision-making and

leadership positions (Encinas-Martin & Cherian, 2023). The drop in the number of women participating in the HE&R workforce is particularly marked at the postdoctoral level, with their share in academic staff decreasing by around 6% as progress from the R2 to the R3 career stage occurs (EC-DGRTD, 2021b). Antagonistic working environments and implicit biases devaluing the research associated with women are the factors that have been pushing women away from academia the most (Spoon et al., 2023). These factors also have been hindering the recruitment, retention, and progress of female researchers in the HE&R sector (Kim et al., 2022).

Continued attention and efforts are required on the part of the EC, national governments, RFOs, and RPOs regarding the achievement of fair, open, equal, and inclusive career paths in R&I (EC-DGRTD, 2017, 2021a). Additionally, more information is needed concerning which of the implemented measures have proven effective and have led to long-term improvements, including Gender Equality Plans' (GEPs) ability to create gender-equal working environments (EC-DGRTD, 2023). The ReICO or similar could take on this task and help ensure the active monitoring and evaluation of the EU's progress towards gender equality in R&I.

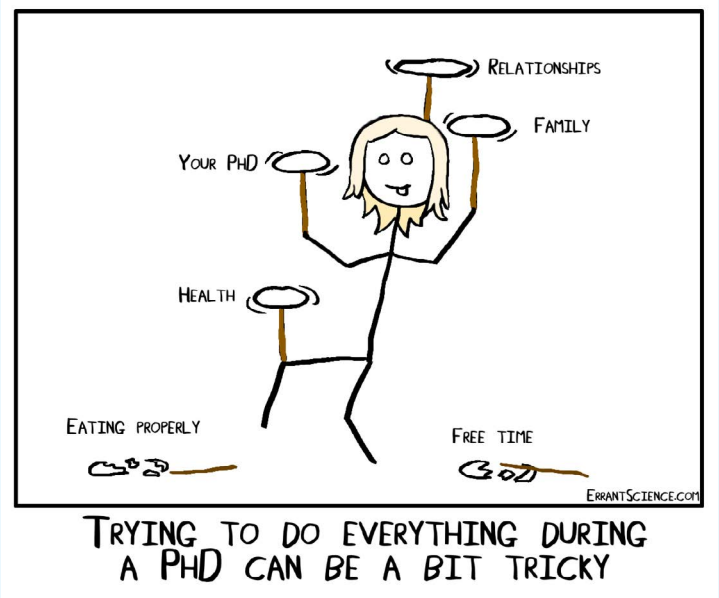


Figure 48: Spinning PhD plates 2. Comic from ErrantScience.com, by Matthew Partridge.

The many challenges female postdoctoral researchers face

The female postdoctoral researchers Eurodoc surveyed were more pessimistic about their career prospects and found it harder to balance work and family. They also were more likely to feel that certain aspects of their working lives significantly affected their private lives (e.g., lack of stable income, need to be mobile, high workloads). Various data shows that women researchers not only are less satisfied with key features of their employment but, in comparison to men, work more part-time and under precar-

ious working conditions, especially if they are part of a couple with children, with the number of female researchers with children being notably lower than that of males, especially among researchers holding full-time positions (EC-DGRTD, 2017, 2021a, 2021b). The COVID-19 pandemic further exacerbated these pre-existing gender imbalances, with women researchers. This has particularly affected women researchers who were also mothers of young children and are at the early stages of their careers, as they are more vulnerable to losing their jobs and report larger declines than men in access to resources or time they were able to devote to their research (EC-DGRTD, 2023; Myers et al., 2020; OECD, 2021a).

4.6 Promote postdoctoral researchers' mental health and wellbeing, and ensure them adequate work-life balance

Postdocs are not happy (Grinstein & Treister, 2018), a sentiment reflected in feelings of frustration, distress, and declining wellbeing and mental health, as well as in the growing number of those considering leaving academia (Guthrie et al, 2017). Their unhappiness has been consistently linked to the numerous challenges and demands of their roles, which often put them in a holding pattern of temporary contracts with no guarantee of succeeding in securing a permanent position, and create a lot of financial instability and uncertainty about employment and career progress (e.g., Afonja et al., 2021; Waaijer et al., 2017; Woolston, 2020c). Additional stressors include the HE&R sector culture of presenteeism, characterised by long hours and high workload, conflicting role obligations, high-performance expectations, repeated rejection (publications, grants, jobs), and, especially for ECRs, poor supervisory or mentor relationships, as well as low autonomy and lack of involvement in decision-making (Hadjisolomou et al., 2022; Jaremka et al., 2020; Levecque et al., 2017; Susi et al., 2019). Self-doubt, feelings of intellectual inadequacy, and of always lagging or not being as competent as peers – that is, feeling like an impostor – are other common (unintended) consequences of HE&R sector performance-oriented culture and of the harm such culture can cause to postdocs' wellbeing and mental health (Jaremka et al., 2020). Many postdoctoral researchers also report having regularly witnessed or suffered bullying, discrimination, and harassment, with competition also hindering the development of a sense of camaraderie and belonging to a community (e.g., Fotta et al., 2020; Russell et al., 2023; Wellcome, 2020).

These interacting circumstances result in unhealthy, aggressive, or harmful working environments and culture where stress and anxiety are normalised, and postdocs' physical and psychological health and wellbeing are regularly challenged (e.g., Guthrie et al., 2017; Hall, 2023; Sabagh et al., 2018). Postdoctoral researchers are significantly more likely than the general population to experience burnout, anxiety, and depression (Researcher Mental Health Observatory [ReMO], 2021). Many struggle to disconnect from work and engage in activities, such as sleep, exercise, or self-care that can help with recovery, which, coupled with continued performance pressure and the stress it entails, creates a vicious cycle conducive to burnout, especially when work and family life conflict (Sabagh et al., 2018). Many postdoctoral researchers report a poor work-life balance and feel they must prioritise work over family and personal relationships to be able to remain employed and move forward in their careers (e.g., Fotta et al., 2020; Wellcome, 2020). The COVID-19 pandemic only aggravated (early career) researchers' ill-being and poor

mental health, with many currently experiencing a state of chronic exhaustion (Gewin, 2021). Despite the gravity of the situation, ill-being and mental health problems continue to be stigmatised and often not acknowledged in HE&R, and little or no support is provided to those in need of help (Eurodoc, 2022; Nature, 2023a; ReMO, 2021). Postdoctoral researchers who are struggling often do not seek support nor are they aware of the resources that might be available (Forrester, 2021). Only by raising awareness of researchers' mental health and urging HE&R institutions to implement policies changing their culture and practices, will it be possible to improve postdocs' work-life balance and wellbeing and move toward the promotion of healthy and nurturing working environments (Eurodoc, 2023; ReMO, 2021).

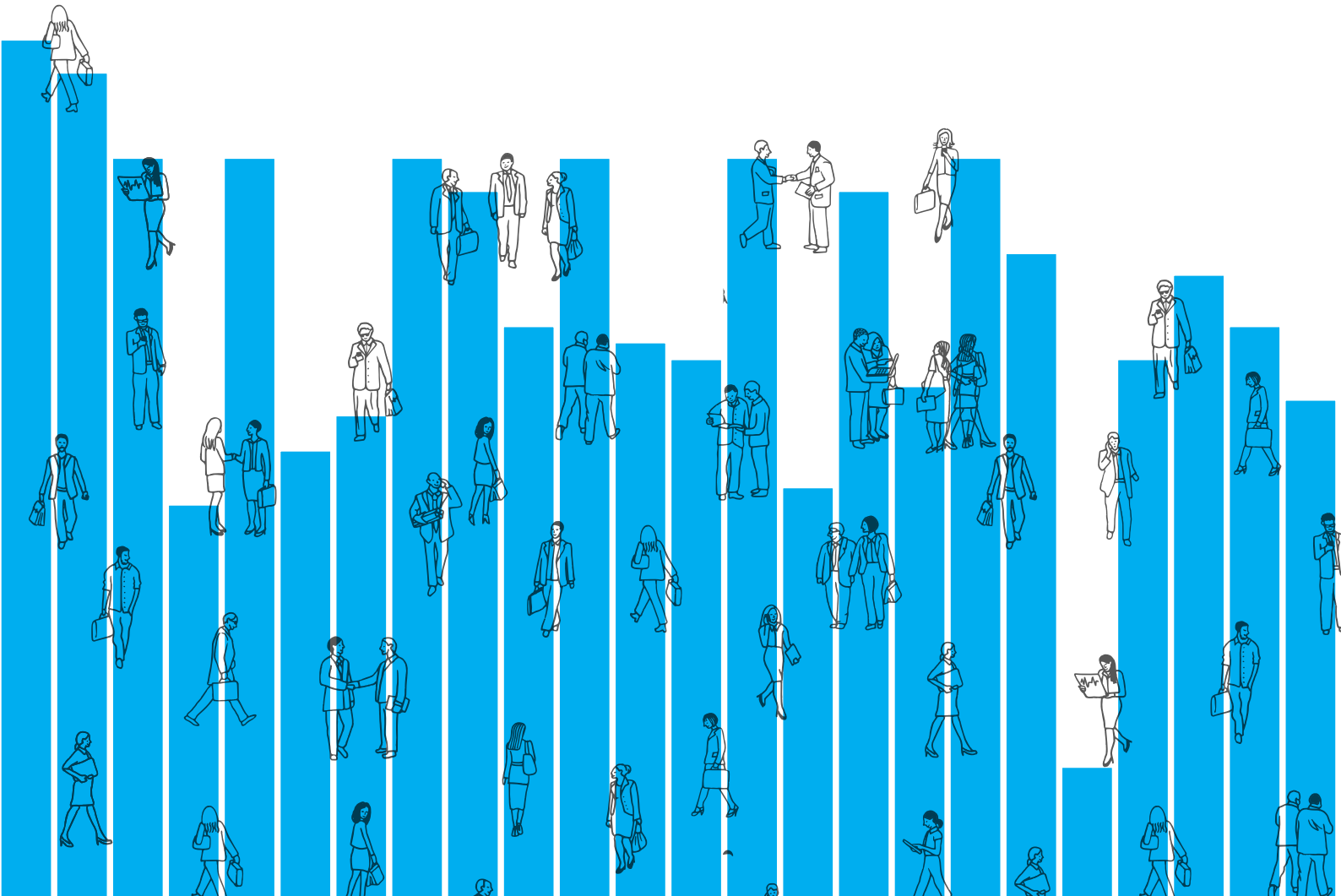
Figure 49: Comic from ErrantScience.com, by Matthew Partridge.

The negative impact of being a researcher in postdocs' lives and wellbeing

The majority of researchers participating in the Eurodoc Postdoc Survey perceived their careers as having a considerable negative impact on wellbeing, with distress growing as the number of years after obtaining the doctorate increased. They also felt there was an imbalance between their work and non-work life. Many rated their work-life balance as bad or very bad. Postdocs who had been in their position for longer were the least satisfied with how their work and non-work life evened out, and the ones to consider the most their private life was very much affected by their careers. Temporary work contracts and job uncertainty were the factors affecting survey respondents' private lives the most. Other work-related factors impacting their work-life balance were the lack of stable income, lack of free time, high workloads, and the need to be mobile, with several of the survey participants reporting either not living permanently in the same country as their partner or commuting between countries. The need to be mobile, either within the same country or across countries, is a factor that strains postdocs' family and personal relationships and makes them experience a bad fit between their work and non-work lives (Wellcome, 2020).

As postdocs enter their thirties, they often struggle with the feeling of having to put their lives on hold because of work (Nording, 2023). Many are at a stage of their lives where they maintain a long-term relationship, which requires them to manage dual careers and seek to co-locate, and makes them consider having or raising children (McAlpine et al., 2020; Nording, 2023). As a result, combining family with mobility is a concern for many postdocs, with personal and family-related reasons making a growing number of these researchers deciding not to move or return to their home countries (EC-DGRTD, 2021a). Despite being a growing phenomenon, dual-career couples in Europe are relatively neglected, with only a few HE&R institutions promoting dual-career opportunities for researchers and even fewer including

5
Conclusions



Conclusion

Eurodoc has been advocating for ECRs in Europe since its origin in 2002. Eurodoc supports a fair and sustainable research culture where ECRs are treated with respect and have access to long-term and stable career pathways that nurture the work-life balance and wellbeing of researchers. Awareness of the scarcity of literature and other sources of information on postdocs allowing for an in-depth characterisation of this population, and Eurodoc MOs first-hand knowledge on the challenges these researchers face regarding their careers, led Eurodoc ECDWG to conduct a Europe-wide survey – the Eurodoc Postdoc Survey – on the working conditions, career prospects, and work-life balance of postdoctoral researchers working in Europe. The data were collected before the COVID-19 pandemic.

The survey results show how serious the situation was even before the COVID-19 pandemic. Precarity was highly disseminated among postdoctoral researchers working across all countries and regions of Europe, and it very much impacted these researchers' expectations and career prospects, as well as their work-life balance and wellbeing. Important differences were observed regarding postdocs gender, field of research, region of Europe where they worked, and academic age.

Using the survey findings as its starting point, Eurodoc carried out a careful reflection on the meaning of such findings, their policy implications and arrived at six key points for action:

1. Improve postdoctoral researchers' working conditions by offering them stable and more predictable career prospects based on standard employment.

2. Provide postdoctoral researchers with nurturing and fair working environments, access to career guidance and representational rights, as well as ample opportunities for wide-ranging professional development.

3. Create a clear, common framework for attractive, sustainable research careers in Europe based on transparency, flexible career pathways, and an open labour market.

4. Address disparities in working conditions offered to postdoctoral researchers across Europe.

5. Promote gender equity while fostering diversity and inclusion in research careers.

6. Promote postdoctoral researchers' mental health and wellbeing and ensure their adequate work-life balance.

The six key points for action are forward-looking as they consist of broad orientations providing the foundations for a comprehensive reform agenda overcoming the existing fragmentation in the analysis of the challenges postdoctoral researchers face in their careers. To be effective, the six key points for action must be adopted by all stakeholders involved in R&I, including ECRs, which must act in coordination and endorse a shared vision of the reforms to be implemented. Only through the coordinated action and engagement of all R&I actors, positive change enabling the achievement of critical transformations at all levels of the system – from the policies, processes, and power structures to the norms and values deeply embedded in contemporary academic culture – can a culture and environment be ensured where ECRs "are treated with respect and have access to long-term stable career pathways".

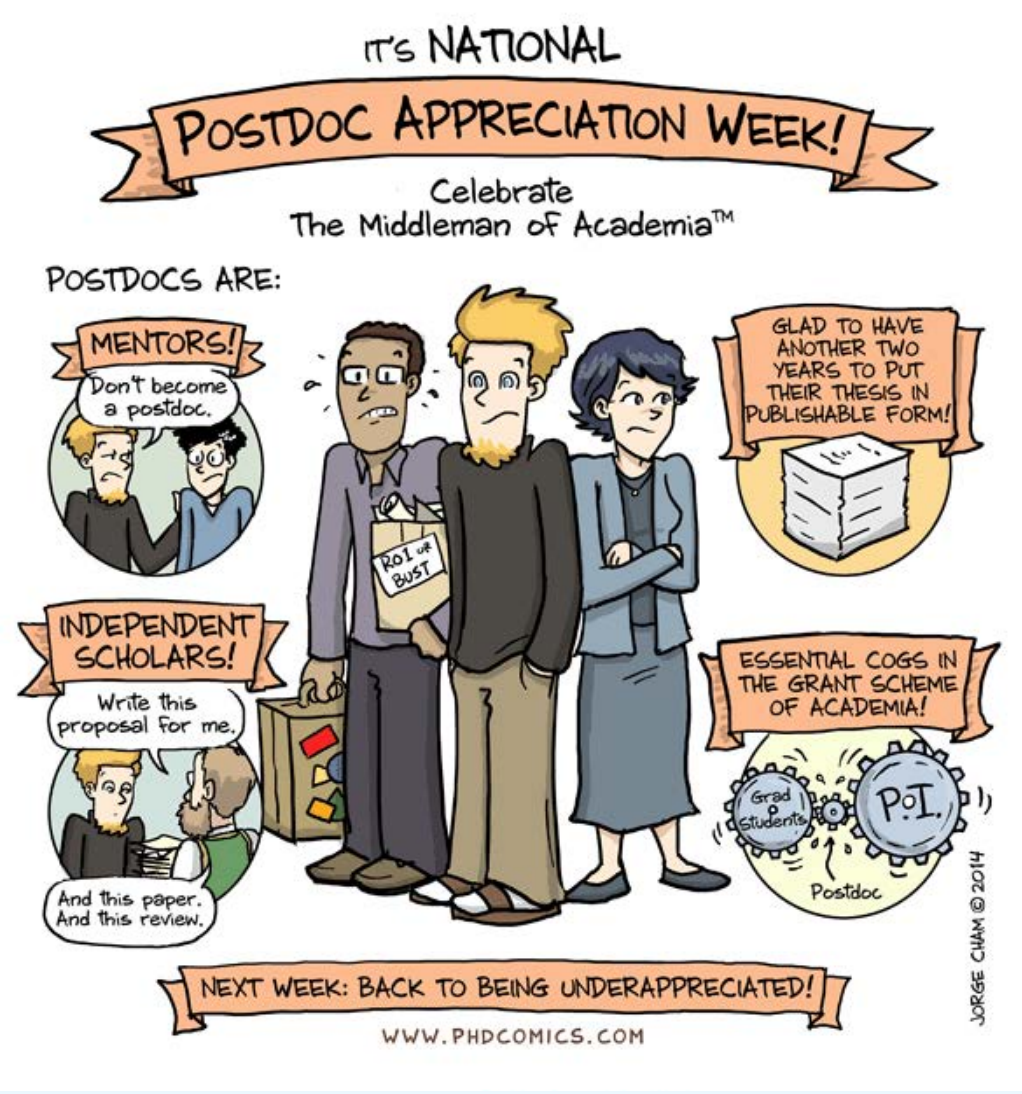


Figure 50: Postdoc Appreciation week! Authorship credit comic from " Piled Higher and Deeper " by Jorge Cham www.phdcomics.com, reprinted with permission of the author. All rights reserved

Report

EURODOC
POSTDOC
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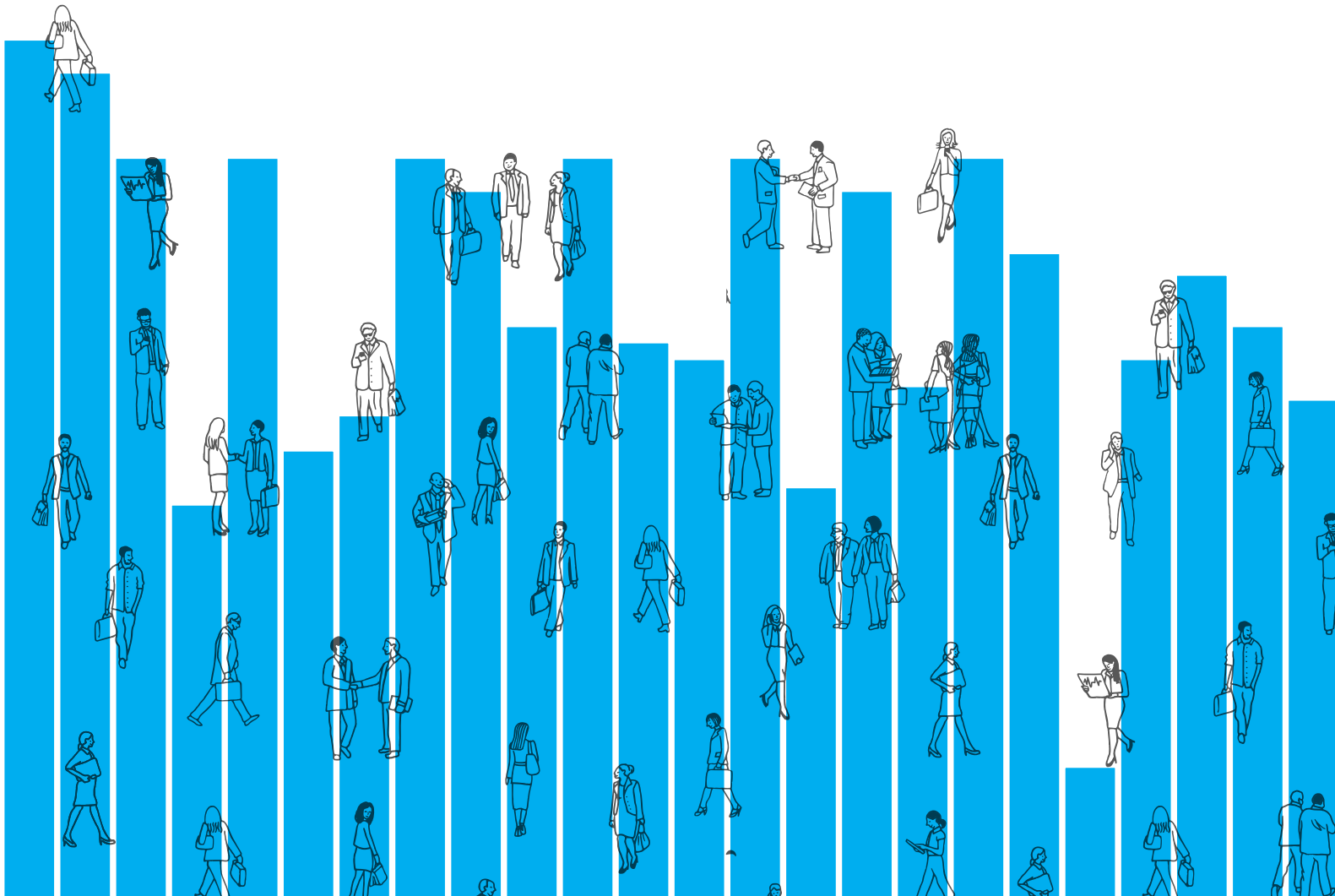

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