MAX PLANCK PhD NET

The doctoral network of the Max Planck Society

Max Planck PhDnet

PhDnet Report 2023

PhDnet Survey Group

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Chapter 1

Introduction

The Max Planck Society (MPS) is one of world's leading research institutions, conducting multi-awarded cutting-edge fundamental research, as no less than six Nobel Prizes were awarded to researchers of the society over the last four years. As of 2024, this multidisciplinary research is conducted in 84 institutes primarily located across Germany, employing over 24 000 people from 134 different nationalities, with 60% holding scientific positions[1]. The 3444 doctoral researchers (DRs) pursuing their doctoral degrees at one of the institutes directly employed by the MPS constitute a non-negligible portion of this scientific workforce. These DRs are part of the Max-Planck PhDnet, funded in 2003, which aims to voice the opinions of DRs, in close collaboration with the General Administration of the MPS to improve their working conditions in general. To achieve this aim, the Max Planck PhDnet is divided into several workgroups, in charge of topics of relevance to the network. We, the PhDnet Survey Group, constitute one of these workgroups. To strengthen our public voice, the PhDnet collaborate since 2019 with DRs of the Helmholtz Association of German Research Centres (Helmholtz Juniors), the Leibniz Association (Leibniz PhD Network), and the Institute of Molecular Biology Mainz, in a global network known as "N²".

The main duty of the PhDnet Survey group is to measure the *status quo* working conditions of the DRs in the MPS, identify potential systemic problems and collect opinions of the DRs across the society. To this end, we conduct a global survey among the DRs of the MPS every year since 2006, providing the results to other workgroups within the Max Planck PhDnet and to the general public, as a flagship research institution in Germany. This ambitious survey allows the DRs of the Max-Planck Society to report anonymously on their overall working conditions (income, working hours, employment situation), the quality of their supervision, their satisfaction with the available support structures, cases of conflicts and discrimination, their mental health and the impact of external geopolitical crises on their work, and it also allows us to collect demographic data on the people doing their doctorate in the MPS. In desire for a complete benchmark of the situation across N², the exact collectively-approved survey has been simultaneously conducted across the different networks.

In order to be inclusive on the working conditions of the DRs in the MPS, we included the DRs directly employed by the MPS but also DRs under various other types of employment (stipends, guest contracts ...), who are completely or partially affiliated with a Max-Planck-Institute, based on the email lists provided to us by the PhDnet Secretary group via the External PhD Representatives of each institute. Voluntary DRs

who graduated in 2023 and desired to fill out the survey were also included. This raises the official number of 3444 to 4965 DRs eligible to fill the survey.

The data gathered in the annual surveys is of a decisive importance to identify latent and recurring issues DRs may face, advocate for the implementation of global appropriate responses to the General Administration and policymakers, and assess their long-term impacts. Theses issues range from gender pay gaps to the conflict-resolution systems in the society, among others. Anonymized institute-specific reports generated from the results of our survey per institute allows the local DR representatives to identify institute-specific issues.

This report is arranged into chapters reflecting the key topics of our analysis. We summarize here the key findings of each chapter.

- **Demographics**
  - 43% of total eligible DRs at MPS participated in this survey report.
  - 49% of respondents identified as male, followed by 48% identifying as female, and less than 2% identifying as non-binary*.
  - Both BM and HS respondents are majority female, with the ratio of female-to-male DRs steadily increasing. CPT has remained fairly consistent with a 34/62 female-to-male ratio of respondents.
  - The majority (42%) of respondents come from outside the EU, while 39% come from within Germany.
  - Over 50% of DRs come from Western European descent.
  - The number of respondents with children or expecting children has remained fairly constant for the past 6 years.
  - The average respondent was 26.8 years old at the start of their doctoral degree.
- **Working conditions**
  - 88.7% of the DRs are employed under a contract, while 1.4 % are unpaid.
  - The average expected duration of PhD ranges from 3.8 to 4.1 years depending on section.
  - The net median income was in the range of 2001-2100€/month. Pay gaps are almost non-existent: gender (2.9-3.0 % in favour of men), section (1.5-3.0 % in favour of CPT), and citizenship (3.1-2.6 % in favour of EU-citizens).
  - 73.3% of the DRs work more than per work agreement. Working hours are higher in the BM section and among stipend holders. The main reason for working more than per work agreement is intrinsic pressure.
  - More than half (51.3%) of the DRs work at least two weekends/month. That tendency is higher among Asian ethnic people in general, and increases slightly with PhD year.
  - 61.4% of the DRs have considered quitting their PhDs at least once.
  - The work of 71.3% of the DRs is still affected by the consequences of the COVID-19 crisis. 13.4-22.5% of the DRs are mentally affected by international crises such as global warming, the war in Ukraine or the

*Percentages may not add up to 100% due to rounding.

Israeli-Palestinian conflict.

- **Supervision**
  - Less than half of DRs have a written supervision agreement (46%), these numbers are similar for the Thesis Advisory Committee (49%).
  - Frequency of actual and desired contact maps well for meetings with the direct supervisor. With the formal supervisor, a preference for weekly meetings is not always met.
  - DRs feel supported by their direct supervisor across a range of domains including daily routines like feedback and advice as well as research related topic. The area with the most room for improvement is support of a healthy work-life balance.
  - Yet, 64.2% of DRs report that the quality of their supervision could be improved at least to some extent, the most frequently mentioned issues are irregular meetings and not enough feedback.
- **Available Support Structures**
  - A majority of DRs sees a need for improvement of support for international researchers.
  - Use of the German language at work presents an obstacle to 25.6% of international DRs.
  - Overall, DRs fell less well prepared for a career outside of academia compared to in academia.
  - A majority of DRs report that the support for DRs with children could be improved, many DRs with children do not receive support from their institute across various domains.
- **Conflicts and discrimination**
  - 9.3% of DRs have reported a serious conflict at their workplace. Another 6.6% have refrained from reporting serious conflicts that occurred at the workplace.
  - The majority of those that did not report conflicts refrained due to fear of retaliation.
  - Over 20% of DRs stated that they have been discriminated against during their time at Max Planck, with the most common basis being either ethnicity, gender, or problems with hierarchy.
  - 9.5% of DRs in MPS reported experiencing sexual harassment at their workplace, with nearly 82% of cases reported by women.
- **Mental and Physical Health**
  - Around 45% of DRs experience symptoms corresponding to moderate levels of trait and state anxiety.
  - 32% report experiencing symptoms of mild depression, the prevalence of severe depressive symptoms increased slightly compared to the 2022 survey.
  - 34% of DRs experience at least mild somatic symptoms like back pain or headaches, 61% report that this impacts their work.
  - 23% of DRs are not aware that the MPS offers access to psychological support but awareness has increased drastically compared to the 2022 survey.

Chapter 2

Demographics

This chapter focuses on the demographics of MPS DRs, which considers total participation rate, age, gender, nationality, familial status, and current year of their PhD. Categories were also analyzed according to the DR's respective sections, which include Biology and Medicine (BM), Chemistry Physics and Technology (CPT), and Human Sciences (HS). We compare some of the results to the 2018 PhDnet survey [2] and 2022 PhDnet survey [3], which allows us to understand both a snapshot of what a typical DR's profile looks like, as well the changes in demographics over the years.

2.1 Participation

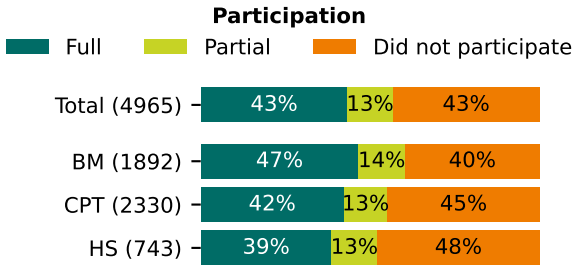

Figure 2.1: Rate of survey participation according to section.*

Of all eligible participants, 43% of DRs (2,135 out of 4,965 DRs) at MPS fully completed this year's survey. We observe a fairly even distribution of responses from each section, with the highest representation being from BM (47% response rate) and the lowest from HS (39% response rate) (Figure 2.1).

It is also worth noting that there were partially completed survey responses from another 13% (645 DRs) of the graduate population. While we still considered their responses, their incomplete answers account for the discrepancy in numbers across various prompts we analyzed within this report.

2.2 Gender

In total, 48% of participants identified as female, 49% identified as male, 2% identified as non-binary* , while the remaining preferred not to respond. Female-identifying DRs have increased by 2% compared to the last year, a steady trend from 2018 (41% female-identifying, 52% male-identifying)[2] (Figure 2.2). We aim to use inclusive language appropriate for capturing all gender identities, but since approximately 2% have reported identifying as non-binary, we have resorted to analyzing "male/female" or "men/women" categories for the conclusions we draw from our results.

BM has historically reported a larger representation of females than males, a trend that continues with a rise in 3%

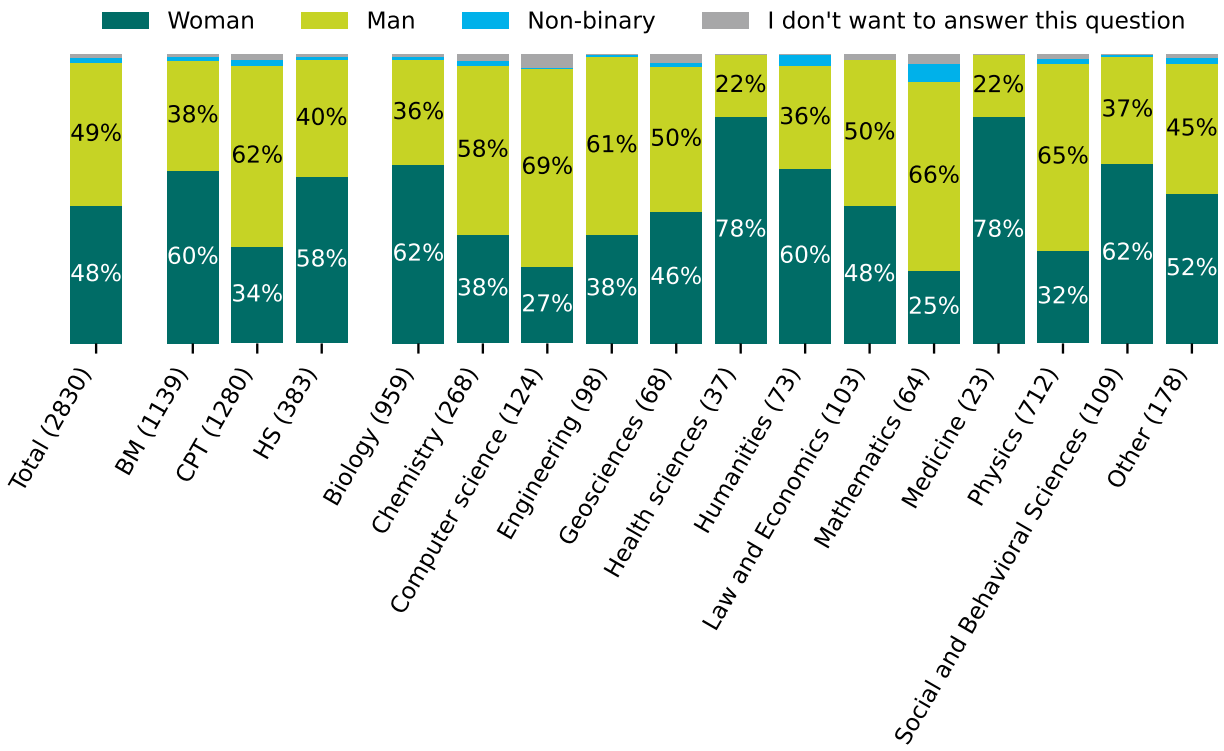

Figure 2.2: Gender ratio of DRs.

from 56% females/41% males in 2022 to 60% females/38% males in 2023 [3]. HS saw a similar change in gender ratios, from 54% females/42% males in 2022 to 58% females/40% males in 2023, while the CPT section with historically lower female representation has remained constant in female/male ratio within the past year with 34% female representation (although trends from 2018 show a net increase from 27%). Fields with the greatest gender imbalances include medicine (78% female), health sciences (78% female), computer sciences (69% male), mathematics (66% male), and physics (65% male). Notably, the field of mathematics has the greatest reported number of non-binary-identifying DRs.

2.3 Nationality & ethnicity

MPS is highly international, with 39% of DRs coming from within Germany (a drop from 45% in 2018 [2]), 19% from within the rest of the EU, and the majority (42%) of DRs coming from outside the EU. The general trend holds across the three sections, with BM recruiting the highest percentage of DRs from outside of the EU as well as EU countries excluding Germany (45% and 21% respectively), and HS having the highest representation of German DRs (49%) and lowest representation of non-EU citizens (33%) (Figure 2.3).

In addition to nationality, we collected information on ethnicity of DRs. We separated ethnic groups into the following categories: Western Europe, Eastern Europe, North Africa, Sub-Saharan Africa, West Asia/Middle East, South and Southeast Asia, East and central Asia, Pacific/Oceania,

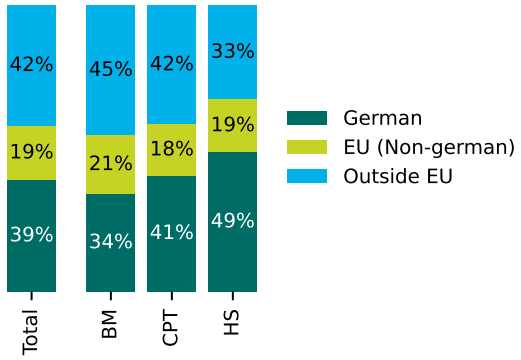

Figure 2.3: Nationality of DRs.*

North America, Central America and Caribbean, and South America.

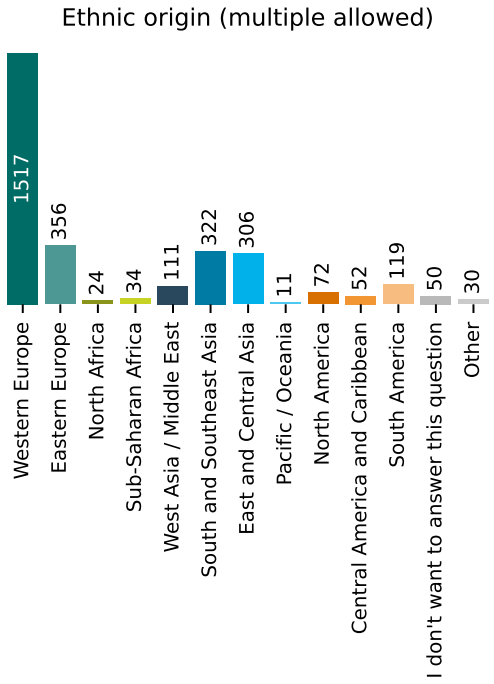

Figure 2.4: Ethnicity of DRs.

Notably, the overwhelming majority of DRs (over 50%) are Western European in ethnicity, while the next most common ethnicities are Eastern European, Southern and Southeastern Asian, and Eastern and Central Asian, comprising ~12%, 10.5%, and 10% of the respondents, respectively. Pacific/Oceanic and North Africans ranked lowest in numbers, comprising a mere 0.3% and 0.7% of respondents, respectively (Figure 2.4). When analyzing nationality according to ethnicity, the vast majority of non-Euro-ethnic DRs come from the non-EU category of nationalities. 95% of DRs with a German nationality are of Western or Eastern European descent, a similar trend as in the rest of the EU with 94% representation (Figure 2.5).

2.4 Familial status

Overall, the number of DRs with children or expecting children has reduced slightly from 8.5% in 2022 [3] to 7.5% in 2023. The percentage of women with children (or expecting) has stayed constant at approximately 9%, while there was a drop from 8% to 6.6% for men (Figure 2.6). The overall percentages are similar in range to the 2018 survey (8% of DRs with children or expecting), indicating little variation over the years for familial status of DRs at MPS [2].

2.5 Age and PhD progress

Respondents report an average age of 26.8 years at the start of their PhDs. The age ranges, plotted both in general and by gender and section as shown in Figure 2.7, take the form of a bell curve. However, HS section shows an noticeable increase at the tail end of the plot, indicating that a significant number of DRs start their degrees after the age of 34.

The HS section has an older average starting age (28.2 years old) compared to BM and CPT (average start ages of 26.7 and 26.5, respectively - see Figure 2.7). The high number of researchers in HS beginning their graduate studies in their thirties could originate from many potential rea-

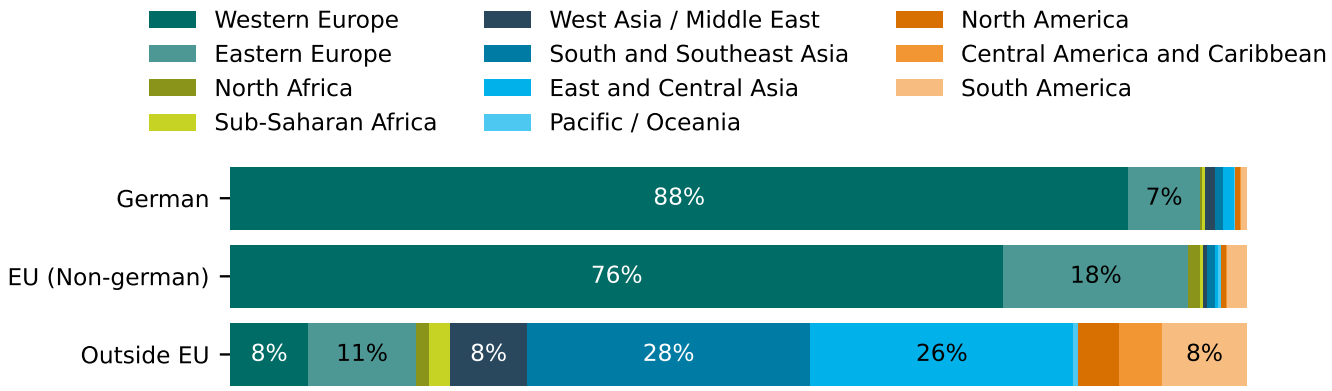

Figure 2.5: Nationality of DRs categorized by ethnicity.

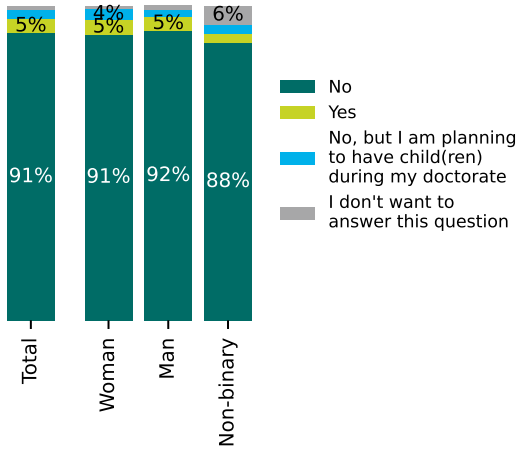

Figure 2.6: Population of DRs expecting children during completion of their degree.

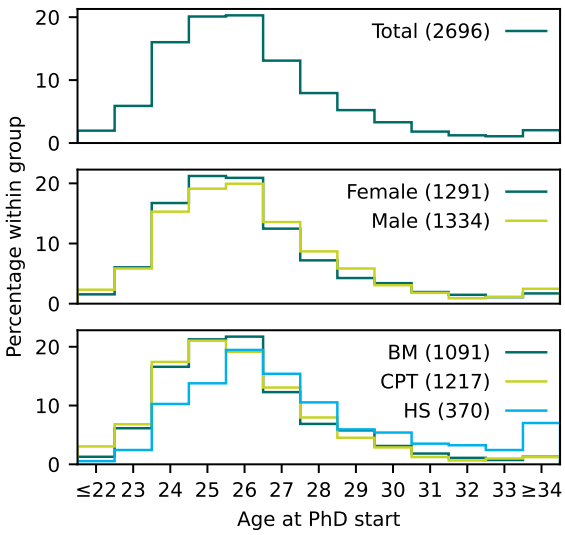

Figure 2.7: Age of DRs at the start of their degree.

sons - re-entering academia after exposure to other sectors could have provided them with greater financial stability. Alternatively, the academic culture within the MPS might have attracted the working professionals to reconsider academia as a viable career path.

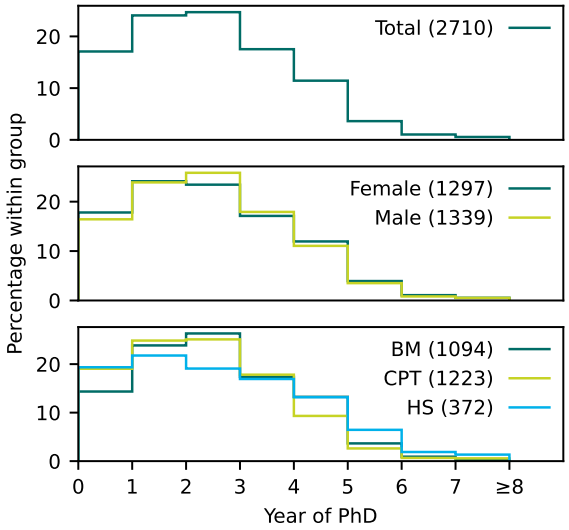

Figure 2.8: Year of PhD completion at the time of the survey.

The majority of respondents are in their second and third years of their PhD (Figure 2.8). The HS section has a large portion of their DR body in their fourth and fifth years, suggesting that a 4-year minimum PhD contract along with possible extensions is important for insuring sufficient time for PhD completion.

Chapter 3

Working Conditions

DRs play a crucial role in the scientific output of the Max-Planck-Society (MPS), doctoral contract holders representing 34% of the scientific employees of the MPS ([1], excluding stipend holders and guest scientists). Ensuring adequate overall working conditions not only helps DRs' productivity and continuity in science [4] [5] but also creates a positive atmosphere that influences the society's ability to attract new talent. In this chapter, we take a closer look at at the overall working conditions of DRs in the MPS: employment situation and funding, duration and number of working agreements, income and working hours.

3.1 Employment situation and funding

In this section, we give an overview of the employment situation of the DRs in the MPS to potentially spot any noticeable trends.

DR employment in the Max Planck Society can be categorized into six types including:

- Contract-based employment directly with the MPS
- Contract-based employment with an external funding part (university contracts, guest contracts etc...)
- External stipend/funding received from Germany
- External stipend/funding received from abroad
- Internal stipend/funding received within the MPS
- Unpaid employment.

The first two types belong to the bigger "contract holders" category. Contracts are a form of payment that is agreed upon for typically the entire duration of the DRs employment by DR and supervisor. A contract is sometimes subject to collective bargaining agreements or tariffs. The MPS offers "Doktoranden Fördervertrag" (support contracts) which are modelled on 65% of level E-13 of the TVöD tariff [6]. With a contract, the DR is legally bound to their workplace and pays into the social security system. That latter point constitutes the major advantage of a contract over a stipend (in addition to being based on working hours) in Germany as it comes along with retirement benefits, social and health insurance. Apart from these differences, the net income is usually similar for DRs employed with contracts and stipends. Stipends can take the form of external funding from within Germany, international funding, and internal funding from the MPS. With a stipend, the DR must go through the difficult process of arranging

their social security themselves rather than through the employer. Due to these issues and other problems, internal stipends have officially been abolished from the MPS [6] and are being phased out. However, we kept this as a category since our recent surveys showed that this type of funding was still present [3][7].

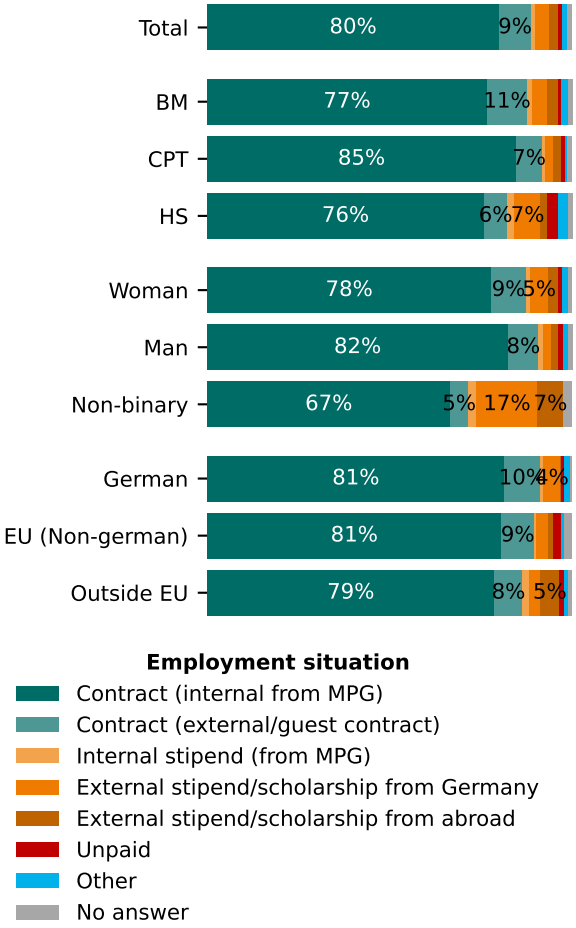

Figure 3.1: Employment situation of the DRs: General, per section, gender and citizenship.

Contract (internal and guest) are the main type of employment of DRs, with 88.7% of the being employed DRs under this scheme (Figure 3.1), 82-92% depending on sections (82.1% for HS section, 87.6% for BM and 91.8% for CPT) (Figure 3.1). These numbers are in a similar range compared to observation from previous years [3] [7]. It is noteworthy that a higher share of external stipends came from Germany (3.7%) than from abroad (2.5%).

A corollary is that the number of stipend holders is the highest in the HS section with 10.9% of the DRs in this section being employed under this scheme, while it concerns 8.5 % of the DRs in the BM section and 5.3% of the DRs of the CPT section (7.4% of the overall DRs). The same applies for the unpaid researchers: 3.2% of the HS section DRs are unpaid, a rate that is 3 to 4 times higher than in other sections.

Our results show that the ratio of men under contract (90.8%) was higher than the ratio of women (87.3%) and non-binary people under contract (71.4%), while the ratio of unpaid DRs was the same across genders. (Figure 3.1). A higher share of EU citizens were under contract (89.5-91.2%) than non-EU citizens (86.4%) (Figure 3.1). This could be explained by a higher share of non-EU citizens under an external stipend from abroad (5.1%) than the number of EU citizens with stipends.

An additional analysis of employment type per PhD year reveals a similar share of stipend-holders across the years, representing around 8% of DRs per year (Figure 3.2). The majority of these stipends are issued by German institutions (3.1-5.7% from year 1 to 4, 1.8% in year 5+), while 2.1-2.9% are issued by international institutions in years 1 to 4 (1.6 % in year 5+). The share of contract-holders was the same from year 1 to 4 (88-90 %). This share drops to 86% for DRs in their fifth year or higher. An explanation for that could be the share of unpaid DRs, reaching 7% for DRs in year 5 or higher, while less than 1% of the DRs are unpaid in years 1 to 4.

The share of contract holders was overall consistent through the fields of work within the CPT and the HS section (respectively 87-93% and 79-87%, Figure 3.3). This distribution was more widespread within the BM

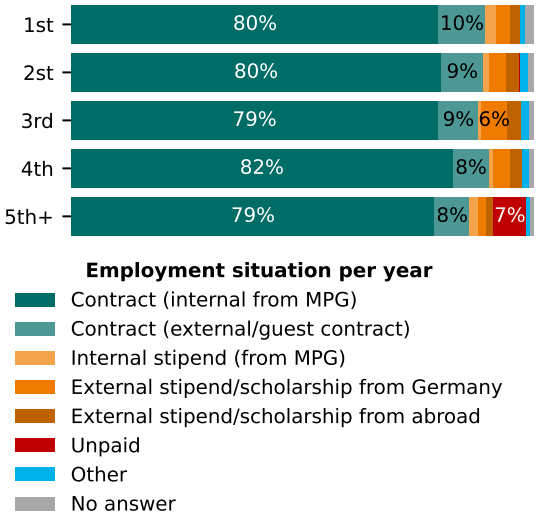

Figure 3.2: Employment situation per PhD year.

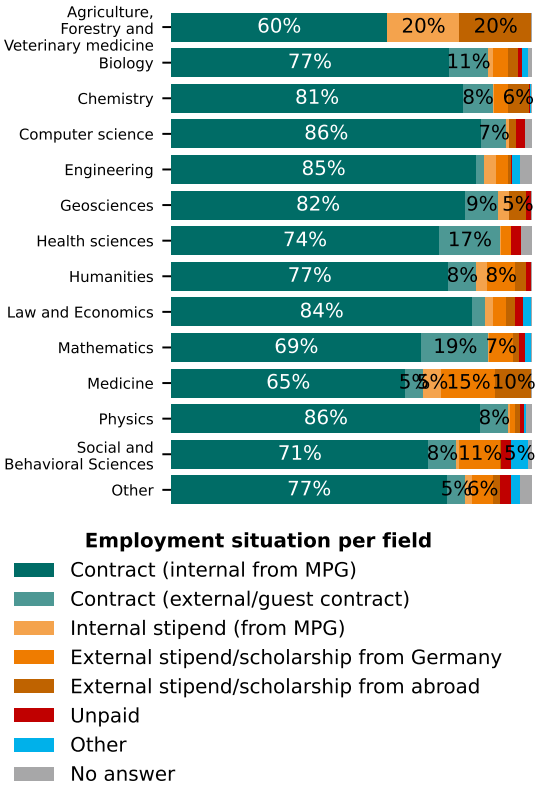

Figure 3.3: Employment situation per main field of work.

section, with 88–91% of contract holders in Biology and Health Sciences. However, in medicines, only 70% of the DRs were employed under a contract. The reported number of 60% of contract holders in Agriculture, Forestry and Veterinary medicines is to be viewed cautiously since only 5 respondents (0.2%) work in this field.

3.2 Duration and number of work agreements

This section focuses on the number and duration of work agreements the DRs hold. In this case, the term "work agreement" applies to any kind of agreement between the DRs and their employer i.e. their institutes thereby including contracts, stipends and other types of employment.

The official PhD guideline of Max Planck Society [6] suggests a "3+1" rule for support contracts: 3 years of an initial support contract with an additional possibility of extension of up to 1 year. This internal policy has been introduced to combat chain contracts and promote secure and stable working agreements. Specifically, this policy is stated to benefit international researchers, whose visas are often dependent on the availability of stable employment and who need to reapply and pay for a residence permit extension every time a new work agreement is signed. In response to the coronavirus pandemic, the MPS included another policy, making DRs affected by the pandemic eligible to apply for another extension of up to 6 months in addition to the "3+1" rule.

To assess the duration a PhD is expected to take, we used the difference between the starting point of the PhD and the time DRs expect to submit their thesis. The results are presented in the Kaplan-Meier Curve in Figure 3.4. According to this data, the average expected duration for the PhD work is 4.1 years for the BM section, 3.8 for CPT, and 4.1 years for HS. These numbers suggest

that the vast majority of DRs does not believe they can complete their thesis within the duration of their first work agreement. This is a trend that we have also observed in our previous surveys [3], [7].

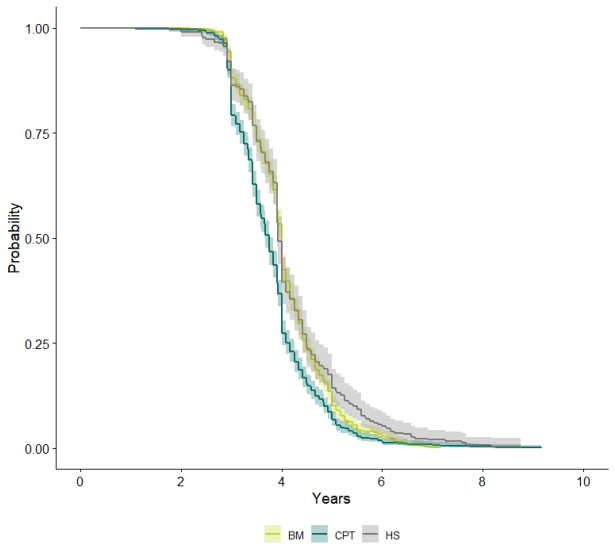

Figure 3.4: Kaplan-Meier curve for the expected time to completion of PhD project by section.

In this survey, we asked the DRs about the duration and number of work agreements (contracts and stipends) they have received during their doctorate. The resulting data is presented below.

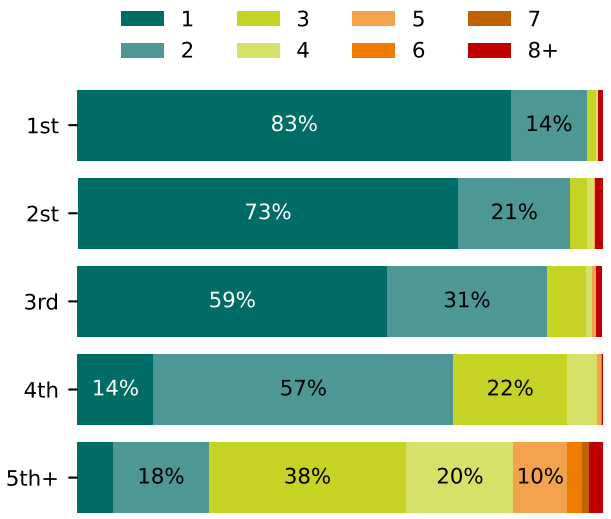

Figure 3.5: Number of work agreements per year of PhD.

Figure 3.5 summarizes the number of work agreements the DRs received in different years of their PhD. Similarly to previous survey results, the majority (83%) of the DRs in their first year received only one work agreement. This remains the case up to the third year of the PhD where 59% of DRs report having only one work agreement. The situation changes dramatically in the 4th year, where the majority (57%) is employed on their second work agreement and 28% report having three or more work agreements.
Figure 3.6 displays the distribution of work agreement duration by chronological order of the received work agreement. As we can see from the presented data, 75% of DRs receive an initial work agreement of 25 months or more, while 25% have a first work agreement of 24 months or less. The results also show that second work agreements tend to have a lower duration with 61% only lasting up to one year.

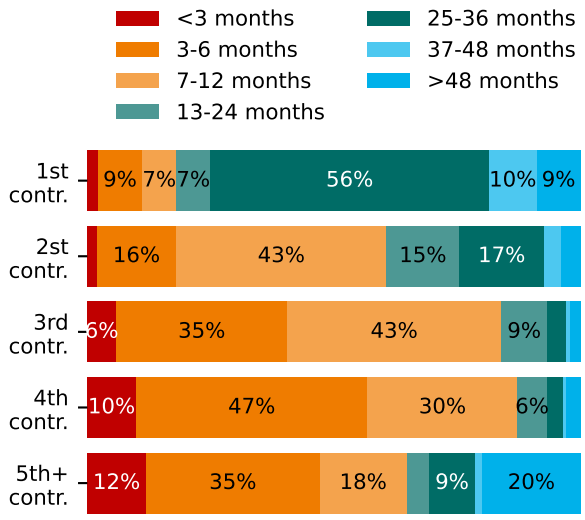

Figure 3.6: Distribution of work agreement duration by chronological order of work agreements.

Overall this data suggests a considerable variation in the number and duration of work agreements the DRs receive at their respective Max Planck Institutes. In many cases, the "3+1" rule seems to be ap-

plied, while a significant proportion of DRs (25%) still start their PhDs on a two-year or shorter work agreement. This observation cannot be explained by stipend or alternative employment regulations alone as 10% of first-year DRs are not employed under a contract (Figure 3.2). By the third year over 40% of DRs hold at least 2 work agreements, which goes against the "3+1" rule.

3.3 Unpaid DRs

In Figure 3.1, we saw that 1.4% of DRs who participated in the survey were unpaid. The gender distribution of unpaid DRs was almost the same as the gender distribution among DRs in general (Supplementary Figure A.1). A big majority of unpaid DRs were in this situation due to funding running out or funding extension not being granted (Figure 3.7). The majority of these DRs (47.1%) were were unpaid for three months or less, however, 35% of them were unpaid for more than six months, and 11.8% for more than a year (Supplementary Figure A.2). Further, 64.7% of unpaid DRs declare receiving unemployment benefits (Supplementary Figure A.3).

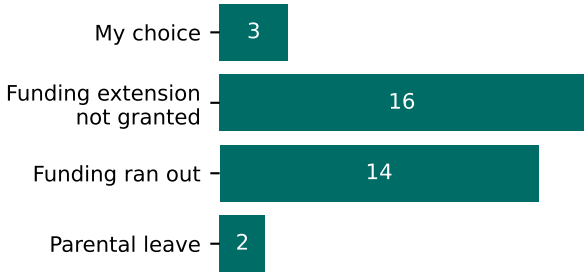

Figure 3.7: Reason why some DRs are unpaid.

3.4 Income

Income is a very important aspect of the working conditions of DRs, and among the key points of a working agreement. Sufficient income relieves them from financial pressure and from potentially having to take extra jobs to make ends meet. The recent changes in the funding system of the DRs in the MPS (contract as base funding and raise to 65% TvöD) improved this point a lot as shown by our recent surveys [3] [7] [8] and is confirmed here. In this survey, the indicated income values reported are after tax (income tax, social security etc). The median income is 2000-2100 €/month, regardless of section, gender or citizenship (Figures 3.8,3.9,3.10 and 3.11). This is higher than in 2022, likely due to the inflation compensation raises. The general average income is 2073 €/month.

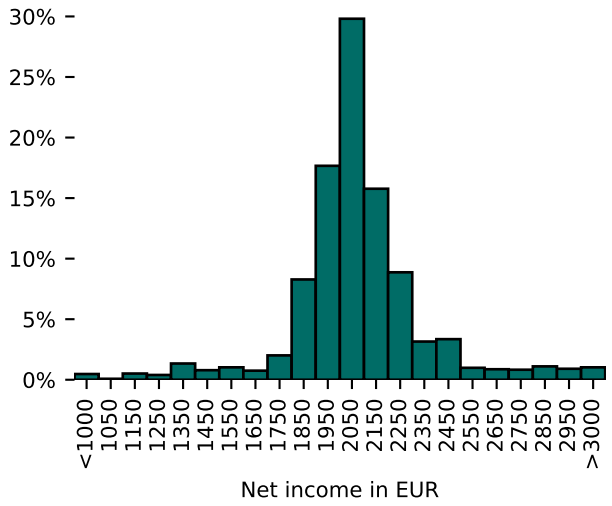

Figure 3.8: Income of the DRs.

Concerning income, differences between sections were barely visible: the average income in the CPT section is at 2103 €/month, while it is at 2072 €/month in HS (gap of 1.5% in favour of CPT) and at 2041 €/month in BM (gap of 3.0% in favour of CPT) (Figure 3.9).

The gender gap was almost non exis-

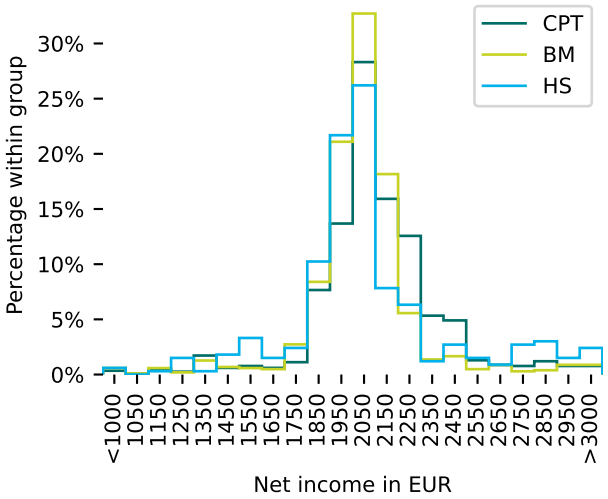

Figure 3.9: Income of the DRs per section.

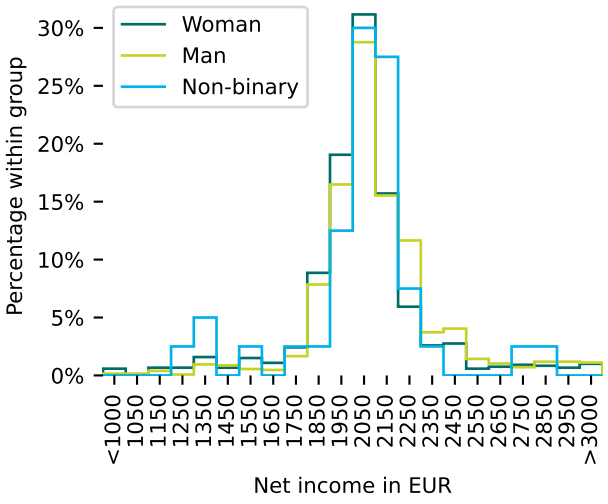

Figure 3.10: Income of the DRs per gender.

tent, as the average income for men was at 2105€/month, compared to the averages of 2044€/month for women (pay gap of 3.0% in favour of Men) and 2045€/month for non-binary people (pay gap of 2.9% in favour of Men) (Figure 3.10).

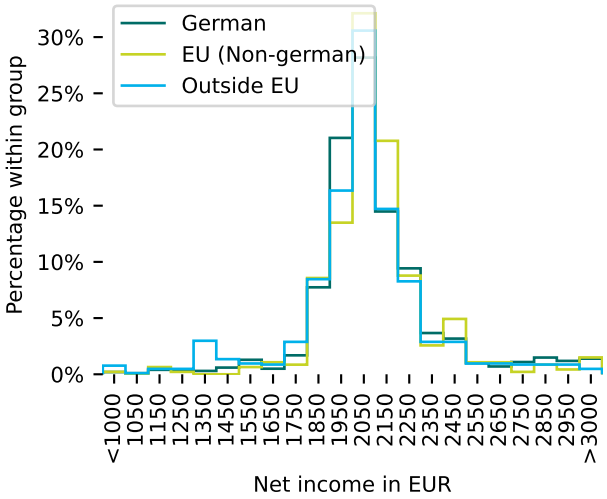

Figure 3.11: Income of the DRs per citizenship.

We did not observe a significant nationality gap in favour of EU citizens for income: the average income was of 2104€/month for non-German EU citizens, 2095 €/month for German citizens and 2041 €/month for citizens from outside the EU (corresponding to a pay gap of 3.1% in favour of non-German EU citizens, and 2.6% in favour of German citizens) (Figure 3.11).

3.5 Working hours and paid leave

3.5.1 Working hours

A reasonable work-life balance is critical to maintain productivity and satisfaction at work and preserve mental health [9] [10]). This can be achieved by a management of working hours and use of paid leave. We therefore surveyed our colleagues on both of

these aspects. A majority of the DRs are expected by work agreement to work between 38-40 hours per week (Figure 3.12). We observed that 73.3% of respondents report working more than indicated in their work agreement (Figure 3.12). Working hours are similarly tracked across the different sections (Supplementary Figure A.4).

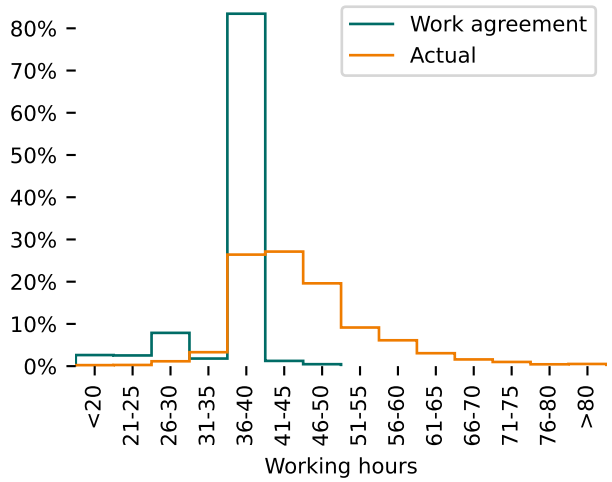

Figure 3.12: Working hours of the DRs by work agreement and reported.

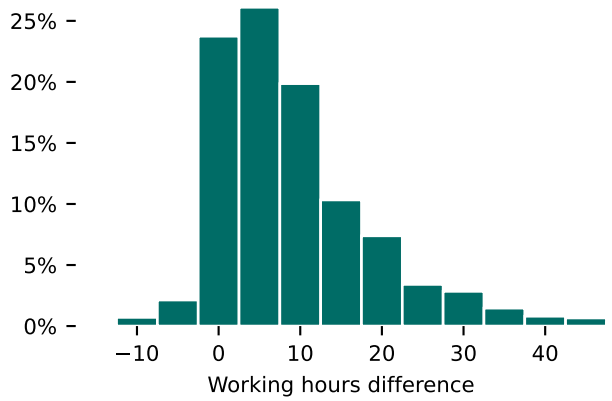

Figure 3.13: Difference between working hours by work agreement and actual working hours of the DRs.

Working hours were then broken down per gender, employment type, PhD year, section, field of work, citizenship and ethnicity.

A tendency for higher working hours for people under an external stipend from a foreign country or under an internal stipend from MPS could be observed, with respectively 40.3 % and 41.9 % of the DRs under those funding types working more than 50 h/week, compared to the other funding types (22.1% for internal contract-holders, highest share among the other funding types). On the other side, the share of DRs working 31-40 hours was higher among unpaid DRs and guest-contract holders (respectively 42.4 % and 38.9%, while that number was below 32% for every other funding type) (Figure 3.14).

PhD year was not correlated to higher working hours, with rather stable working hours recorded for years 2-5+ (Figure 3.14).

Working hours were much higher in the BM section than in the CPT and in the HS sections, with 77.0 % of the DRs in the BM section working more than 40 h/week, 65.0% in the CPT section and 55.1% in the HS section. The proportion of people working more than 50 h/week was similar across the CPT and HS sections (respectively 19.4% and 18.0 %) and higher in the BM section (25.7 %) (Figure 3.14).

Division by field of work confirms the highlighted tendencies, with higher working hours observed in medicine, health sciences and biology (respectively 20.0, 23.5 and 22.7% of the DRs working below 40 hours and 30.0, 29.4 and 25.3% of the DRs working more than 50h/week). The numbers observed in biology were similar to those observed in chemistry, computer sciences and engineering. In the CPT section, lower working hours were observed in physics, geosciences and mathematics (respectively 38.9, 44.4 and 51.8% of the DRs working below 40 hours and 17.7, 11.1 and 19.6% of the DRs working more than 50h/week). The numbers observed in geosciences were similar to the ones observed in social and behavioral sci-

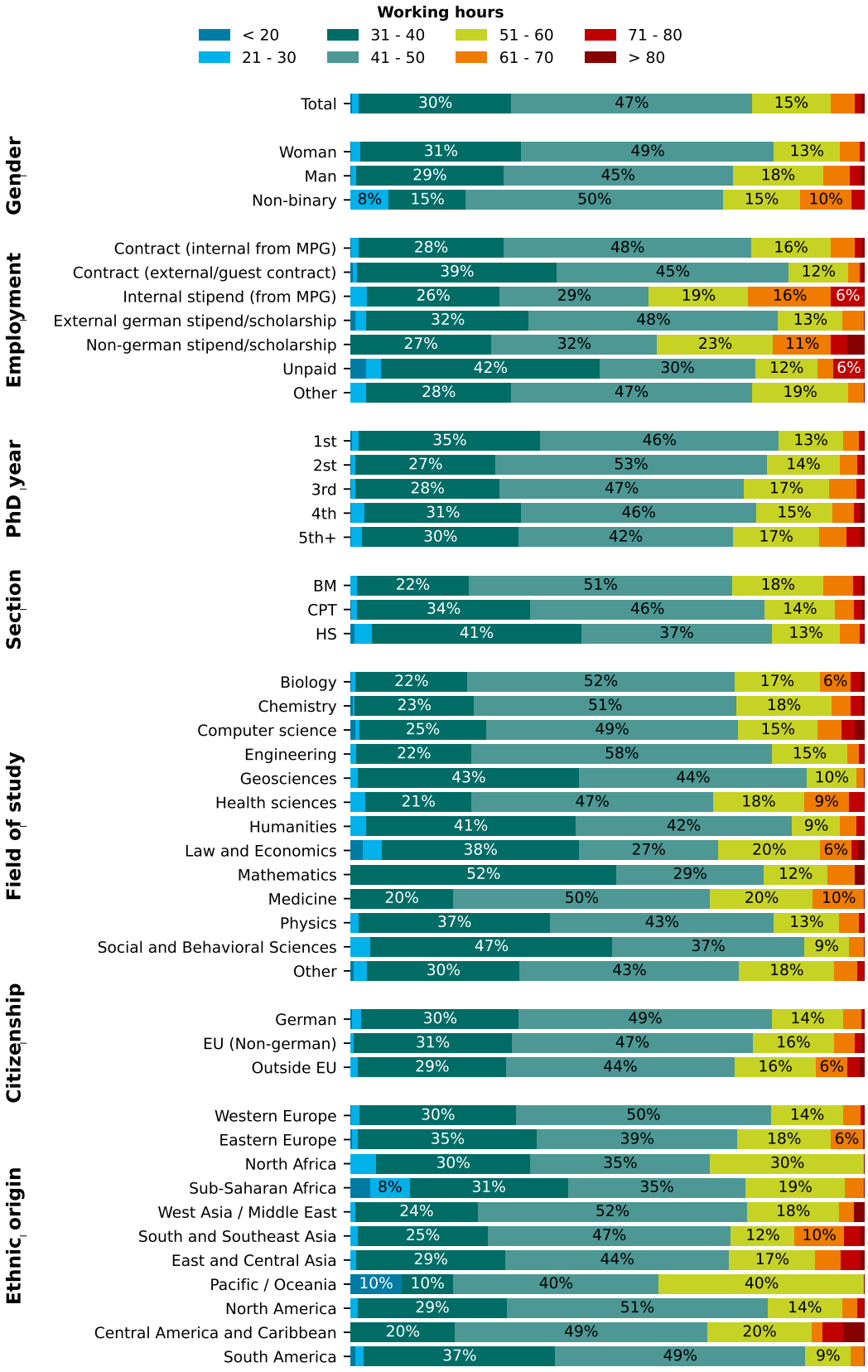

Figure 3.14: Working hours of the DRs per gender, employment type, PhD year, section, field of work, citizenship and ethnicity.

ences, humanities and law and economics, the only difference being a bigger tendency for higher working hours in that latter field, with 28.4% of the DRs working more than 50h/week (Figure 3.14).

Almost no working hour differences were noted across the different nationalities. The main point to note is that the tendency to work more than 60 h/week was higher among non-EU citizens (9.4%) than EU citizens in general (<5.9%) (Figure 3.14).

No clear correlation could be found neither between ethnicity and working hours, nor "geographical trends", although certain points are to note. DRs reporting South American, Eastern European and sub-Saharan African ethnicities show a higher trend for "healthier" working hours, with respectively 39.8, 36.3 and 42.3% of them working 40 h/week or below (Figure 3.14). People reporting Western European, North American and South American ethnicities show a lower tendency to work more than 50 h/week with respectively 18.1%, 18.8% and 11.5% of the people indicating these ethnicities reporting those working hours. At least 22.8% of respondents with other ethnicities report working more than 50h/week (22.8-30.6%, excluding Pacific/Oceania due to the low numbers). We observed a higher share of respondents working more than 60 h/week among DRs with Central/Caribbean American, Central/East Asian and South/Southeast Asian ethnicities (respectively 10.2%, 9.5% and 13.6%) while the share of DRs working more than 60 h/week with the other ethnicities is below 6.6 %. Note that the number of respondents for some of the ethnicities is very low (<100, <5% of the total number of respondents, Figure 2.4). Therefore, some of our ethnicity findings are to be viewed cautiously. However, due to the scarcity of ethnicity data in German science [11] at the time of this report in 2024, we still decided to report these findings.

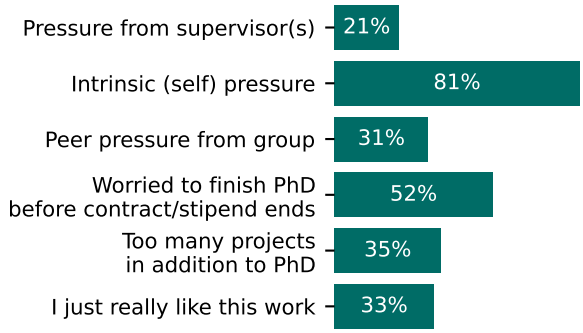

Figure 3.15: Reasons for working more than per agreement.

Of the DRs who reported working more than per agreement, 80.8% overworked due to intrinsic pressure, and 52% due to fear of not being able to finish their PhD before the end of their work agreement. More alarming is that 30.9% report working more than per work agreement due to peer pressure and 21.2% due to pressure from their supervisor (Figure 3.15).

3.5.2 Weekend work

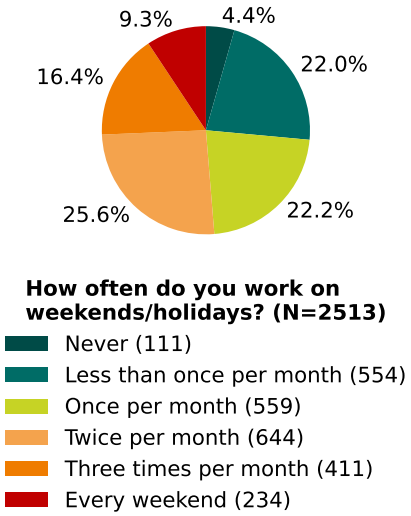

Figure 3.16: Frequency of weekend work among the DRs.*

On a similar note, 73.5% of the respondent declare working in the weekend at least

once per month and 51.3% declare doing it at least twice per month (Figure 3.16). We observe that the later in their PhD, the more likely the DRs are to work on the weekends (Figure 3.17).

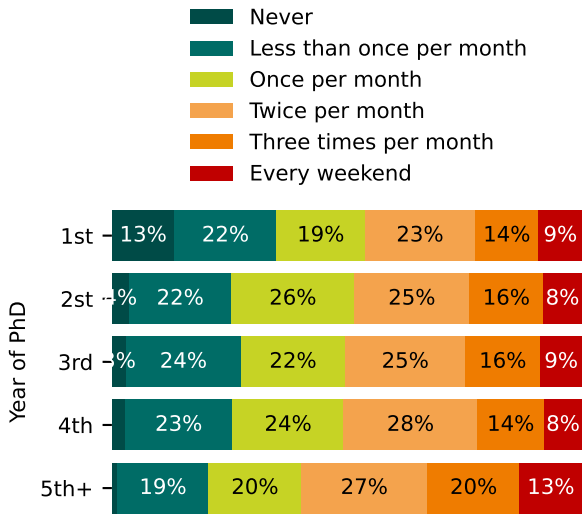

Figure 3.17: Frequency of weekend work among the DRs per year of PhD.

The frequency distribution of weekend work is somewhat similar across citizenships. The main difference lies in the proportions of DRs who never worked on the weekends: 3.5% for citizens from outside the EU, 5.8% for German citizens and 3.8% for citizens from EU excluding Germany; and the proportion of DRs working every weekend: 11.9% for citizen from outside the EU and 10.2% for non-German EU citizens, which is almost twice a much as the share of German citizens working every weekends (6.1%) (Figure 3.18).

The tendency for weekend work was higher among people from Asian ethnicities in general, with respectively 58.0%, 66.8% and 69.0 % of the DRs from a Western Asian, Central and Eastern Asian, and Southern and Southeastern Asian ethnicity working at least two weekends per month. This rate was quite similar among other ethnicities (44.5-55.6%) (Figure 3.18). As previously stated, the results presented in Figure 3.18 for the ethnicities with a very low representation are to be viewed cautiously.

3.5.3 Paid leave

Access to guaranteed paid leave is an important right in a work contract as it allows people to take time off work. In this survey, 30.8% of the DRs report taking 15 out of 30 days off or less (less than half than stated in the work agreement) in the past year. Further, 44.2% took more than 20 days in the past year and 22.4% took more than 25 days and therefore used all of their entitled paid leave (Figure 3.19). We observe a positive trend since 2020. Overall, 63.7 % of the DRs feel free to take holidays (Figure 3.20), which is higher than what was observed since 2019[3], [7] and [8]. Among the DRs who do not feel free to take holidays, 56% declare not feeling free to take holidays because of their high workload and 24% of them because of pressure from their supervisors (Supplementary Figure A.5). We also observe that the later the respondents are in their PhDs, the smaller the share of them feeling free to take holidays (70 % for 1st year DRs, <58% for years 5+) (Figure 3.20)

3.6 Desire to quit

Our survey suggests that 61.4% of DRs have at least once considered quitting their PhD (Figure 3.21).

We observed that a higher share of DRs in the HS section (67%) considered quitting than in the the BM (63 %) and CPT sections (58%) (Figure 3.22). The main reasons for the consideration to quit were, regardless of section, the feeling of not being qualified enough, an unattractive career prospective, difficulties coping with the high workload and difficulties with a supervisor.

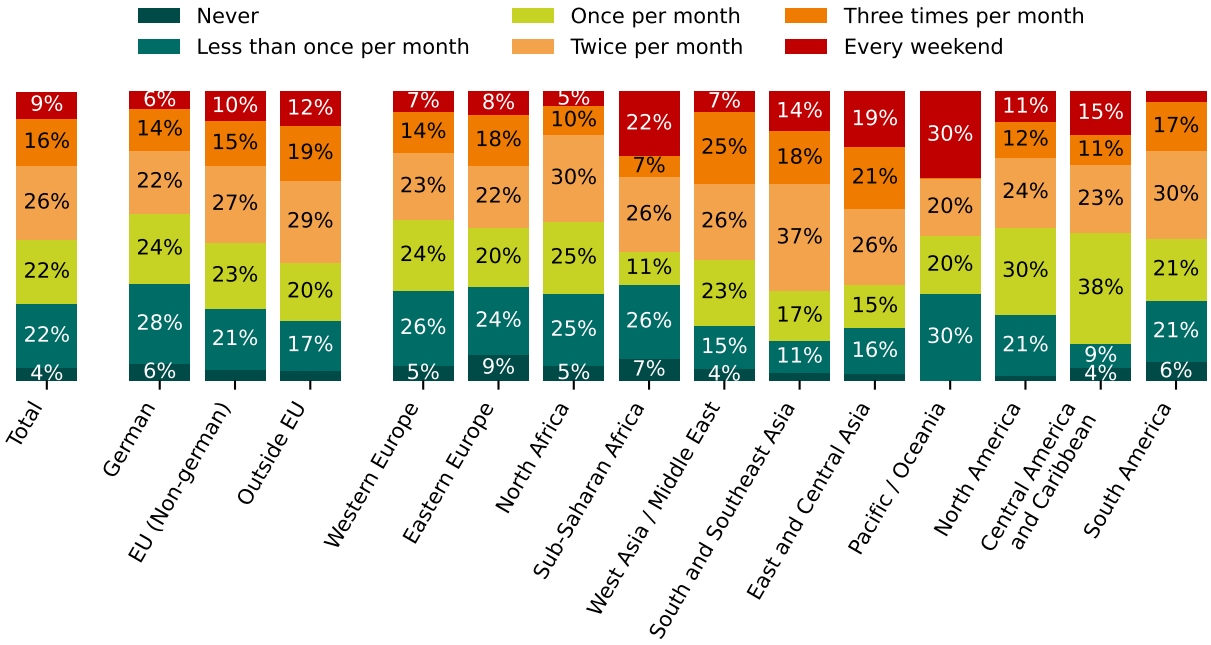

Figure 3.18: Frequency of weekend work among the DRs per citizenship and ethnicity.*

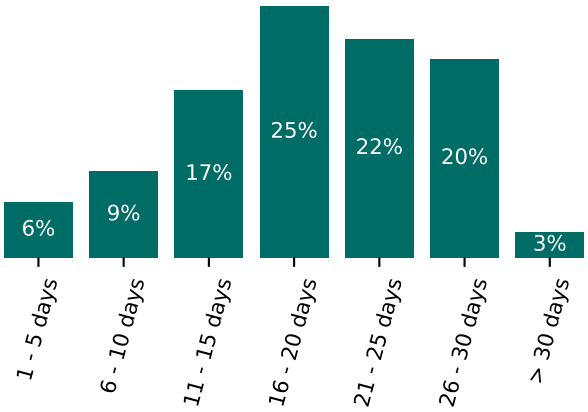

Figure 3.19: Number of paid leave used by the DRs in 2023.*

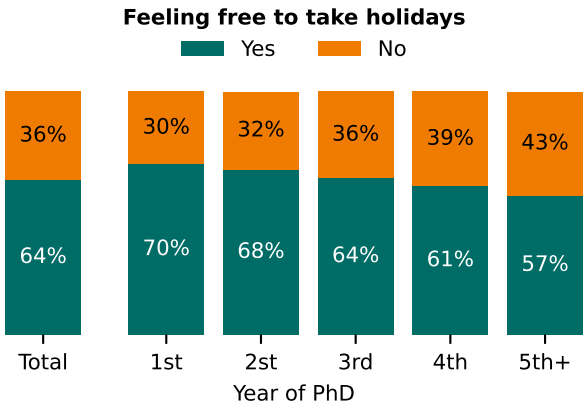

Figure 3.20: Feeling free to take holidays, by PhD year of respondent.

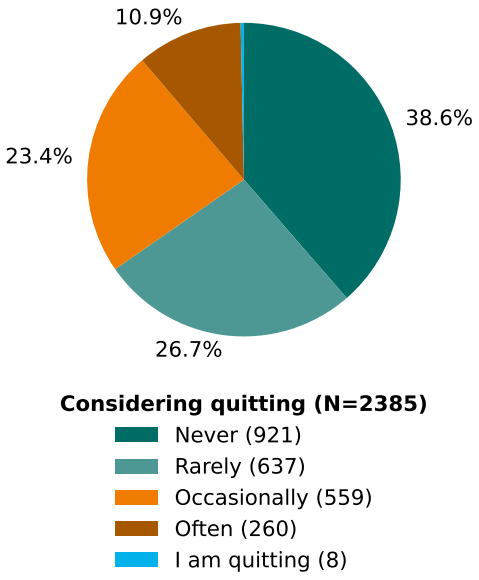

Figure 3.21: Considering to quit their PhD by the DRs.

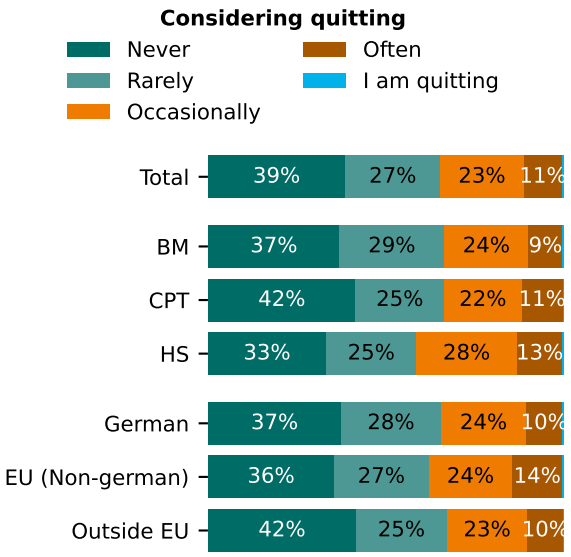

Figure 3.22: Considering quitting their PhD by section and citizenship.*

The major differences one could spot on these reasons between the three sections were that a higher share of DRs in the CPT and BM section desired to quit because of absence of significant academic results (respectively 34% and 30%, while it is 16% in the HS section), while a higher share of DRs in the HS section considered quitting due to financial issues, or a project not being funded anymore (respectively 16% and 6%, compared to the 7-10% and 1-2% in the other sections) (Supplementary Figure A.6).

No significant difference in desiring to quit was observed between the different nationalities (Figure 3.22). The main reasons were the same as mentioned above, with the addition of the absence of significant academic results as a main reason to consider quitting. The main differences between citizenship were financial problems and administrative problems. Generally, these problems were a more important reasons for the desire to quit their PhDs for non-German citizens (respectively 10% and 4% for non-German EU citizens and 15% and 5% for non-EU citizens) (Supplementary Figure A.7). The non-EU citizens account for 57 and 58% of the DRs who considered quitting their PhDs due to theses issues (Supplementary Figure A.8).

3.7 Impact of International crises

In this section, we discuss the effect of different international crises on the work of DRs.

The world had been impacted by numerous national and international crises in 2023. Those crises were either already present before 2023 or caught fire in that year. Some DRs or their loved ones are directly impacted by crises and suffer from the consequences of war and a decline in living conditions. Other DRs may be affected more indirectly through what psychologists coined "news related stress". More specifically, this means that frequent exposure to news about crises and their consequences may lead to increased symptoms of depression and anxiety[12]. Due to the international nature of those crises, DRs in the Max-Planck Society can thus be significantly impacted, which in turn affects their work. For the first time the PhDnet survey thus introduces this section with the objective of identifying the effect of crises on DRs as well as to investigate whether they received support from their institutes.

The consequences of the COVID-19 crisis were still felt by 71.3% of the DRs in 2023 (Figure 3.23). It is the crisis with the biggest impact on the expected duration of PhDs: in total 43.3 % of the respondents who were affected by it expect a thesis delay, with 24.7 % expecting a delay of 6 months or more. These numbers are to be put in perspective considering that a non-negligible number of DRs who went through the peak of the coronavirus crisis (2020-2021) had already

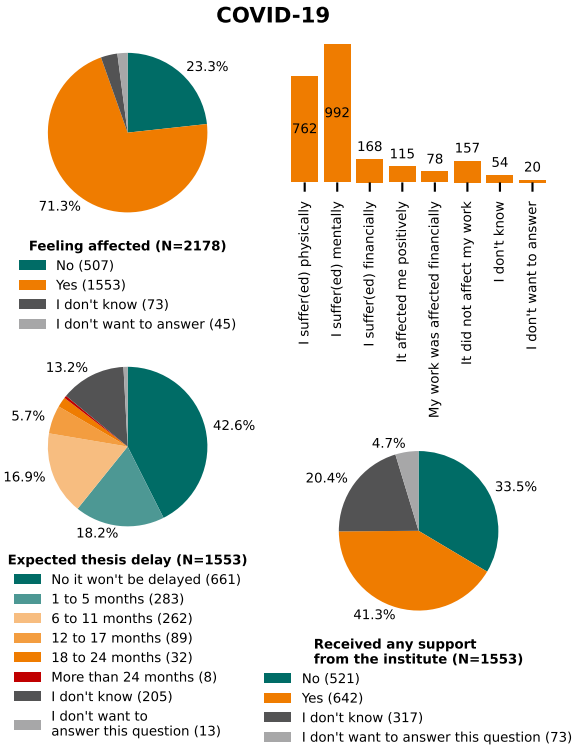

Figure 3.23: General impact of the COVID-19 on the DRs.

graduated at the time the survey was conducted.

The collective resilience shown in the workplaces' adaptations to continue functioning under the imposed conditions (social distancing, total lockdowns, quarantines and others) is a great example of what our societies could do when a collective effort is needed. The response to the COVID crisis therefore brought various novelties that were initially uncommon into everyone's reach. Although that crisis is mostly over, people got used to the special working conditions of this period, marking a clear break from the before-covid time. We therefore surveyed the DRs on the work practices novelties they would like to keep, or not.

Our results show that 84% of the DRs would like to at least keep to a certain extend the possibility for home office, 72% would like to keep the resulting video meet-

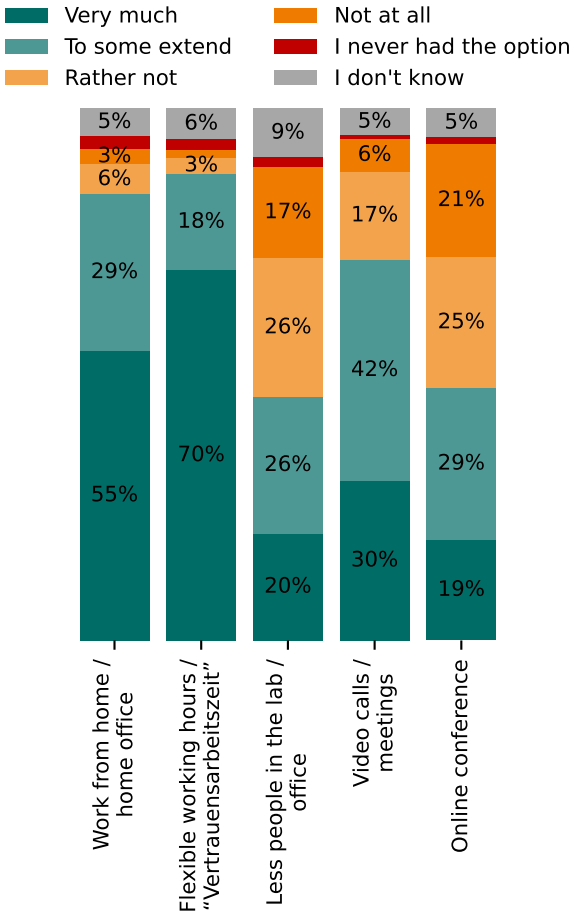

Figure 3.24: Desire to keep the changes in working conditions brought by Covid.

ings, and 88% would like to keep the flexible working hours (Figure 3.24). The DRs were mixed on the reduction of office occupation and the online conferences, with a similar share of people desiring and preferring not to keep the reduction of people in the office (respectively 46 and 43 %), and the online conferences (respectively 48 and 46%).

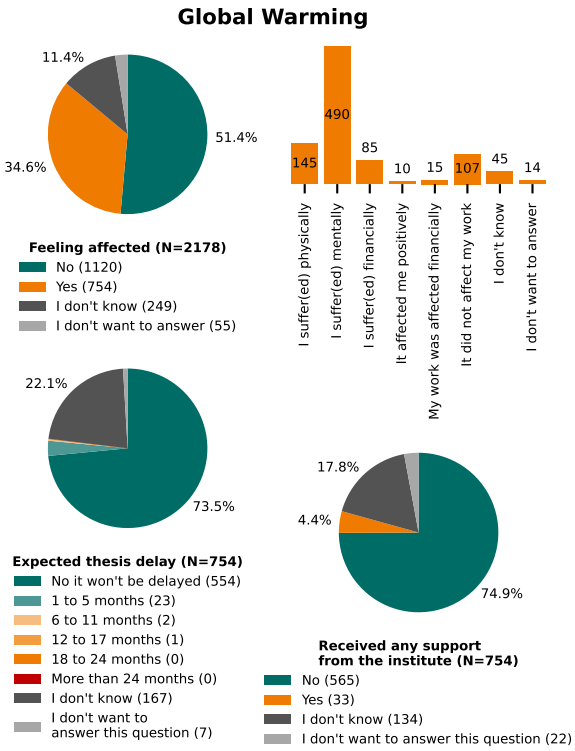

Figure 3.25: General impact of global warming on the DRs.

Global warming is also a crisis of major concern, as 35% of the respondents declare having been affected by it (Figure 3.25). This is in the range of the numbers indicated for European countries (France, Portugal, Finland and UK surveyed, respectively 35%, 37%, 31% and 28%) in a global 2021 Survey on eco-anxiety among 16-25 years [13]. Among the DRs who indicated having been affected by global warming, 65% suffered mentally from it.

Of all respondents, 58% declared that they had been affected by the energy crisis resulting mainly from the War in Ukraine.

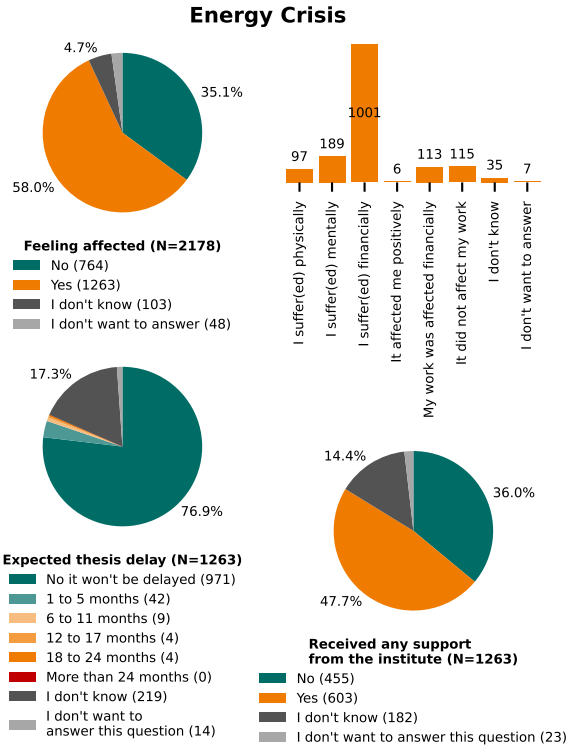

Figure 3.26: General impact of the energy crisis on the DRs.

Among those who were affected, 79 % declare have been affected financially by it, and 48 % received help from their institute (Figure 3.26).

Armed conflicts such as the War in Ukraine, or the Israeli-Palestinian conflict affected respectively 19.8 % and 18.5 % of the DRs (Figures 3.27 and 3.28). DRs were mainly mentally affected by them (82 % of the affected people for the Israel-Palestine conflict, 68 % of the affected people for the War in Ukraine). The war in Ukraine had financial consequences on more DRs (27 % of the affected respondents) and their work (9 % of the affected respondents). Notably, the support from the institutes was reported to be significantly more present for the War in Ukraine (14.4 % of the affected respondents received help from their institutes, while it corresponds to 8.2 % of the respondents that were affected by the Israeli-Palestinian conflict).

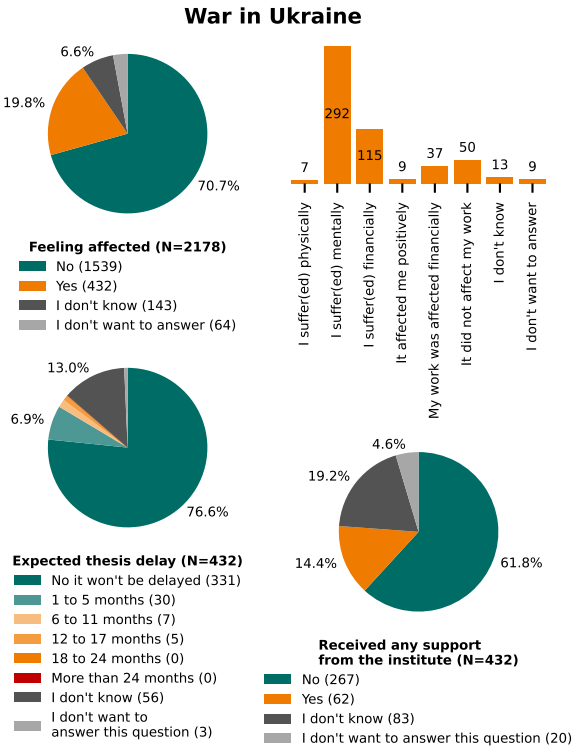

Figure 3.27: General impact of the war in Ukraine on the DRs.

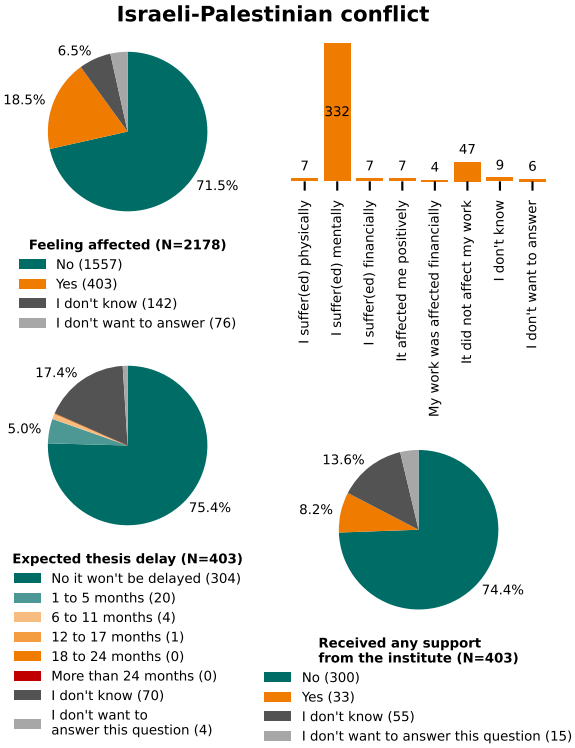

Figure 3.28: General impact of the Israeli-Palestinian conflict on the DRs.

Chapter 4

Supervision

The quality of supervision plays a key role in DR's daily work routines, achievement of research goals and professional as well as personal development. As such, the role of supervisors often extends beyond expertise in the research topic and also includes mentoring and providing guidance on strategies to achieve future professional goals. To assess the current quality of supervision and to identify areas of improvement, we surveyed the presence of official components such as supervision agreements, the frequency of communication between DRs and their formal as well as direct supervisors, the overall satisfaction of DRs with their supervision.

4.1 Official structures

For all DRs, the MPS DR training guideline [14] sets out two components as official structures of supervision:

- A written supervision agreement specifying the rights and obligations of the DR and supervisor.
- A Thesis Advisory Committee (TAC), whose members are independent of one another; documented meetings of this Committee should be held at least once a year.

Our results show that less than half of DRs (46%) who responded to the survey have a written supervision agreement, 20% do not have one and 34% are not aware if such an agreement is in place or not (Figure 4.1).

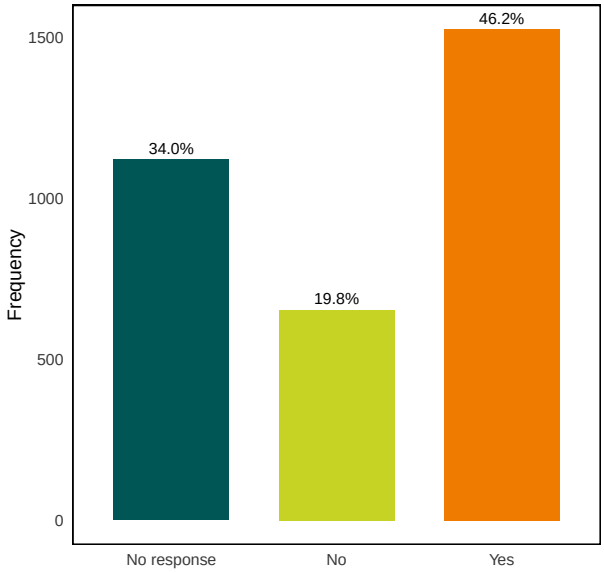

Figure 4.1: DRs with supervision agreement.

These figures are similar for the TAC (Figure 4.2). Here, 49% of DRs have a TAC , 17% do not, and 34% do not know. Furthermore, our survey shows that 35% of DRs have both of these official structures in place while 6% have neither. While improvements need to be made for DRs who do not have either of these formal structures, it is also striking that many DRs do not know about these official guidelines or are not aware if they have been put into place for them.

Beyond the official requirements of a supervision agreement and TAC, other (writ-

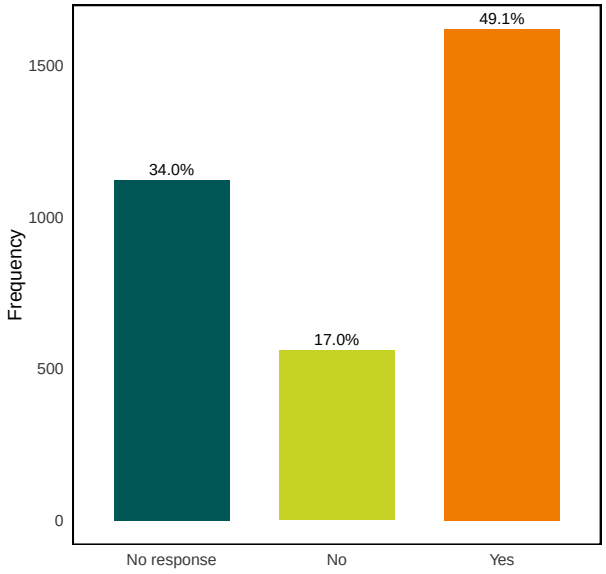

Figure 4.2: DRs with TAC.*

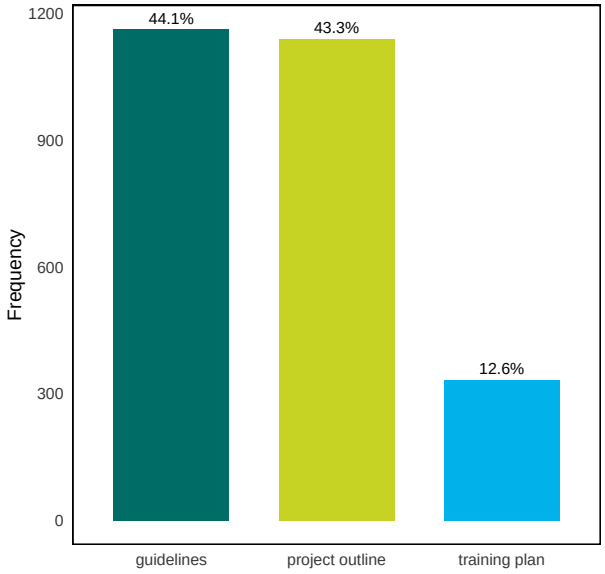

Figure 4.3: DRs with other documented agreements.

ten) forms of documenting expectations and progress can be very beneficial (Figure 4.3). As such, around 35% of DRs have a project outline in place specifying the scope and goals of their project. This outline can also include more detailed information on methodology and time frames. Similarly, 34% of DRs are aware of formal guidelines that can help them to structure their PhD. Of the DRs who took part in the survey, only 10% have a training plan in place that sets out other forms of mandatory professional training such as university or graduate school courses. This number may be low because not all DRs are required to complete such courses. Similar to the data on supervisions agreement and TAC, around 34% respondents are not aware if either of these additional forms of formal guidance are in place for them.

4.2 Frequency of contact with supervisor

Frequent contact with the respective supervisor(s) is important for DRs in order to receive feedback, set out timelines and responsibilities and to plan future projects. Since almost all DRs have a formal and a direct supervisor, we report the frequency of communication for both supervisors separately. Overall, DRs meet their direct supervisor more often than their formal supervisor. Our results show that the actual frequency of contact with the direct supervisor maps well onto the desired frequency, meaning that most DRs meet their direct supervisor as often as they would like to (Figure 4.4). In most cases, meetings with the direct supervisor take place monthly or more often than monthly. Weekly meetings are most desired and also take place for the majority of respondents.

The discrepancy between actual and desired contact is slightly higher for meetings with the formal supervisor (Figure 4.5). The survey results suggest that a preference for weekly meetings with the formal supervisor is not always met. Less frequent forms of contact such as annual meetings also occur more often with formal than with direct supervisors.

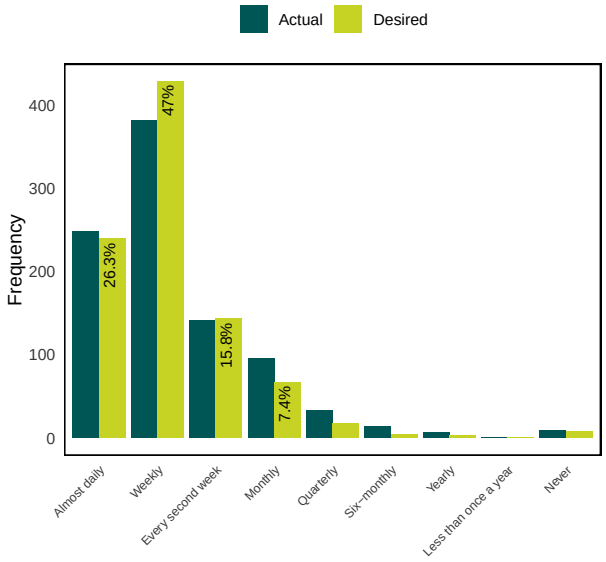

Figure 4.4: Actual and desired communication with direct supervisor.

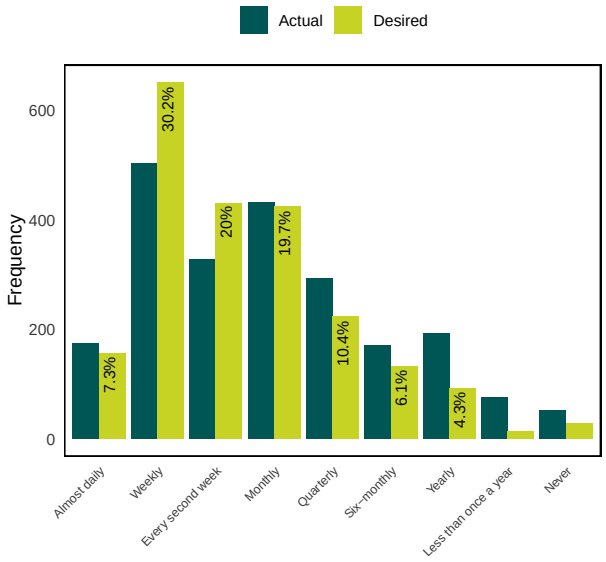

Figure 4.5: Actual and desired communication with formal supervisor.

4.3 Support

Supervisors are able to offer support in different domains and to foster a professional and friendly environment for their DRs and other staff. Since the majority of DRs work more closely with their direct rather than formal supervisor, we aimed to find out more about the domains in which DRs feel supported by their direct supervisor and where more support may be necessary. Below, we show support that DRs who indicated that they have a direct supervisor received across two domains: day-to-day work routines and research practice. To ascertain levels of support, we asked DRs whether they agree that their direct supervisors supports them in the domains we listed. In total, 920 DRs responded to the questions concerning support in daily work routines. Our results suggest that for most DRs, support needs are met in this domain (Figure 4.6), with 63.9% of DRs fully agree that their direct supervisor gives good advice and 69.9% fully agree that they receive constructive feedback. Similarly, 58.3% fully agree that their direct supervisor treats them professionally. With 45.1%, less than half of the DRs who responded to the questions fully agree that their direct supervisor supports a healthy work-life balance. Support of work-life balance is also domain with the the highest percentage of full disagreement (6.3%) and partial disagreement (7.2%). In the other domains, fewer than 5.5% fully or partially disagree.

DRs reported similarly to question related to research practices. Here, 914 DRs responded to the relevant questions. Figure 4.7 shows that 65.8% of these DRs fully agree that their direct supervisor supports them in working independently, 68.1% fully agree that they are supported in using good scientific practice, 63.7% fully agree that

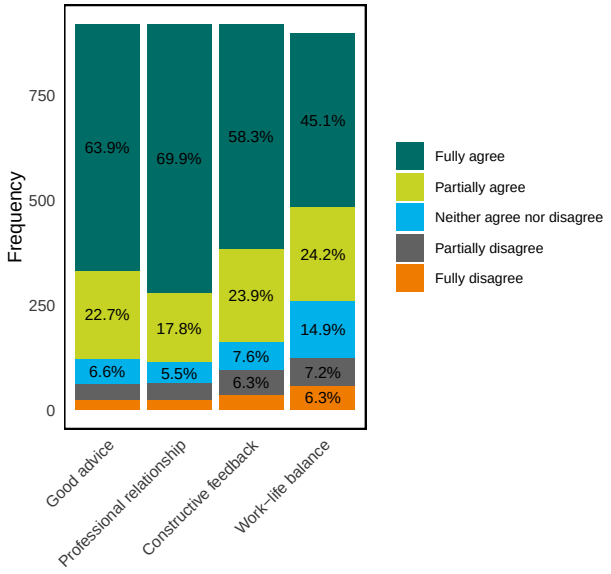

Figure 4.6: Support in daily routines by direct supervisor.

their direct supervisor is well informed in the respective research field and 61.2% fully agree that their direct supervisor supports them with own research ideas. Across all research related domains, less than 5.5% of the 914 DRs reported that they receive too little support.

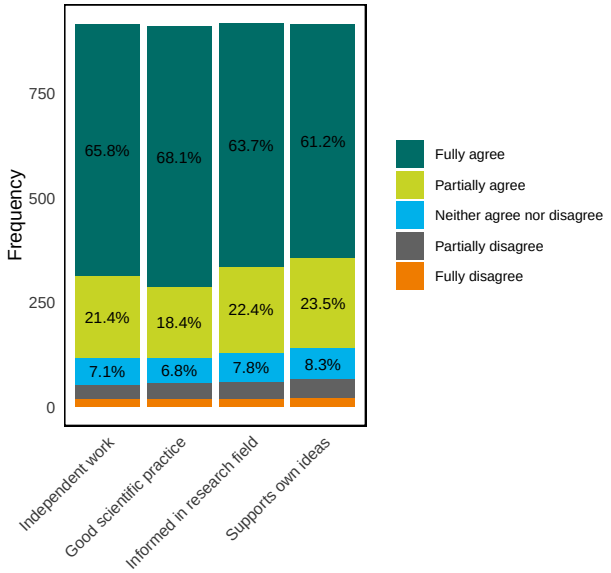

Figure 4.7: Support with research practice by direct supervisor.

4.4 Encountered problems

Lastly, we focus on satisfaction with the quality of supervision as well more frequently occurring problems. Here, DRs indicate whether they would like to see the quality of their supervision improved or if they are satisfied with the current quality. Responses are displayed in Figure 4.8, with "not at all" indicating that nothing needs to be improved. Only 15.6% of DRs indicated that no improvements need to be made to the quality of their supervision, while 25.6% would like to see improvements very much and a majority of 38.6% to some extent.

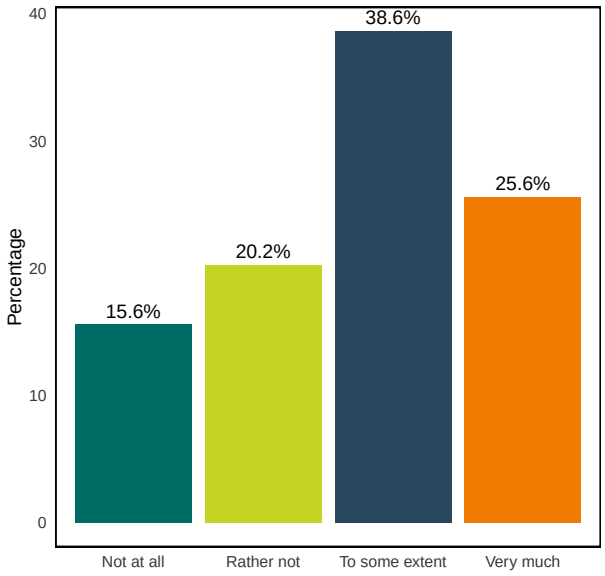

Figure 4.8: Desire for improvement of supervision quality.

To gain a better understanding the specific problems related to quality of supervision, we investigated what kind of issues DRs experience most often in interactions with their supervisor(s). Figure 4.9 shows the percentage of DRs who indicated that they have ever experienced any of the problems listed in the survey. The most frequent issues highlighted are irregular meetings (32.3%), a lack of expertise in the research group (32.4%) and not enough feedback (30.9%). Further, 29.0% of DRs indicated

that they do not feel encouraged enough by their supervisors. Less frequent are the issues regarding disagreements between supervisors (13.1%) and disagreements about publications (12.0%).

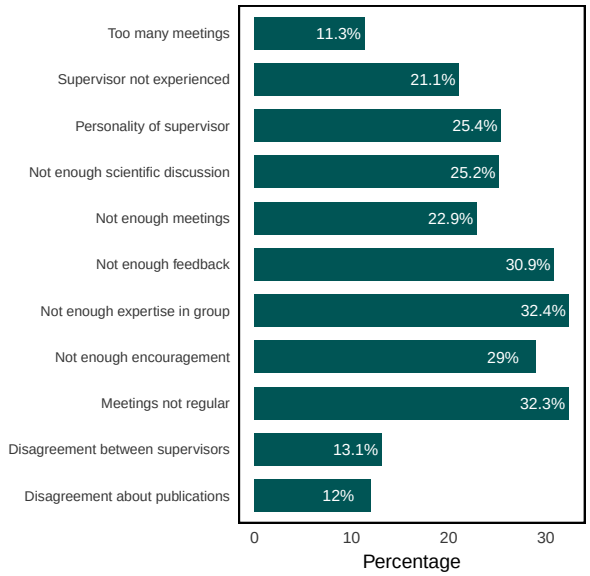

Figure 4.9: Encountered issues regarding supervision.

Chapter 5

Available Support Structures

Beyond the support offered by the supervision team, DRs benefit greatly from support structures offered by their department or institute. In this section, we specifically focus on integration, support with career development and assistance with care giving responsibilities.

5.1 Integration

Since the Max Planck Society draws from the experience of international researchers including DRs, it is crucial to provide support to assists DRs in the process of settling into the new environment and to ensure that all DRs have an enriching and inclusive experience at their respective institute. To better understand what structures are in place and where potential issues lie, we asked DRs what kind of support they got when they started their position and if support was lacking in any areas. Additionally, we focused on the experience of non-German speaking DRs to investigate any additional support needs.

As a first insight into the experience of international DRs, we asked participants whether they think that the level of support that the MPS offers for international DRs should be improved. Figure 5.1 shows that a majority of DRs would like to see improvements in support to some extent (43.7%) and 29.1% very much so. This indicates that there may be support needs specific to international DRs that are not met so far in a majority of cases.

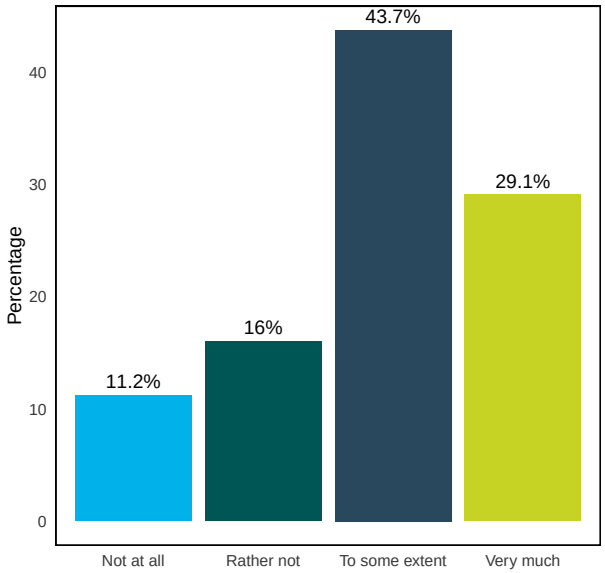

Figure 5.1: Need for improvement of support for international researchers.

To better understand where additional support may be helpful, we asked DRs to indicate in which areas they would have needed more help. Notably, all participants had the option to respond to this question rather than international DRs specifically. Yet, a number of issues listed point to specific additional support needs for this group.

In total, 1145 participants responded to the questions regarding support needs in different areas of the on-boarding process at their respective institutes. These 1145 DRs

indicated whether they received enough support or if they would have needed more support. As can be seen in Figure 5.2, a large majority of respondents indicate that they did not receive enough support across all domains we listed except for finding accommodation and university enrollment. Please note that this may be due to a bias in over-reporting of encountered problems, where mostly those participants responded to this questions who experienced an issue and want to make it known. Nonetheless, the data may give an indication on areas where more on-boarding support is required. As such the domains where most respondents indicated that more support is needed are visa application (85.3%), translating documents (84.5%) and registration of residency (82.9%). As mentioned above, just under half of the 1145 respondents indicated that they received enough support with finding accommodation (48.4%) and with university enrollment (46.2%).

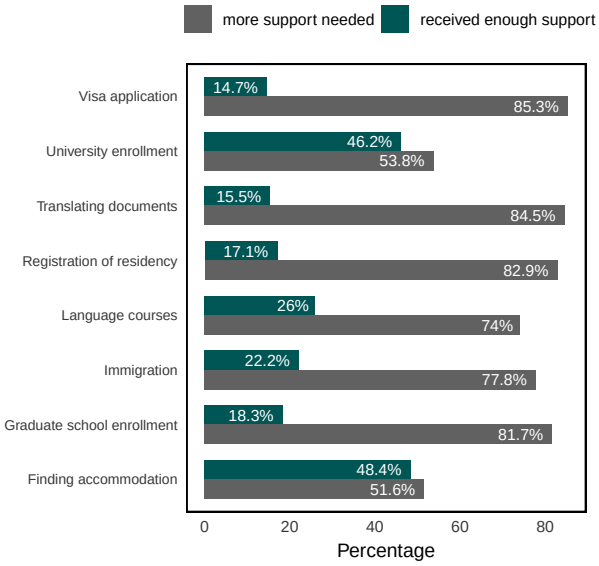

Figure 5.2: On-boarding related issues where more support may be needed

Focusing further on German as a potential obstacle for international DRs, we first surveyed the German language level of DRs who are not German citizens (Figure 5.3). Of these, 20.6% have no knowledge of German and 44.3% report that their knowledge was at a beginner level at the time of taking the survey. 24.9% place their knowledge at an intermediate level, and only 7% of DRs who are not German citizens consider themselves to be fluent in German.

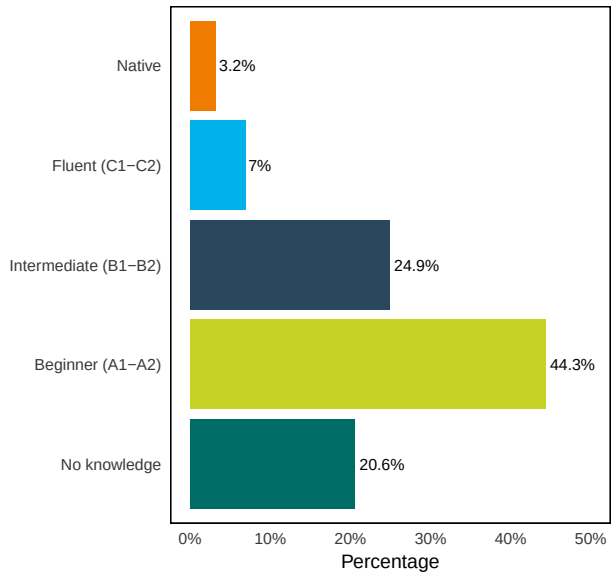

Figure 5.3: German language level among non-German citizens.

Focusing again on DRs who do not have German citizenship, we find that most DRs feel that their level of German or others speaking German does not impact them negatively at work at all (47%) or rather not (24.6%) (Figure 5.4). Concerningly, around a quarter of DRs who responded to this question (25.6%) feel that others speaking German at work presents an obstacle to them to some extent and 2.9% even indicated that this is very much an obstacle.

Especially considering that German presents an obstacle for some DRs, it is important to provide access to language courses for all DRs and other Max Planck staff. As displayed in Figure 5.5, a majority of non-German speaking DRs has access to in-house language courses at their institutes. The most frequently indicated alternative to these courses is monetary

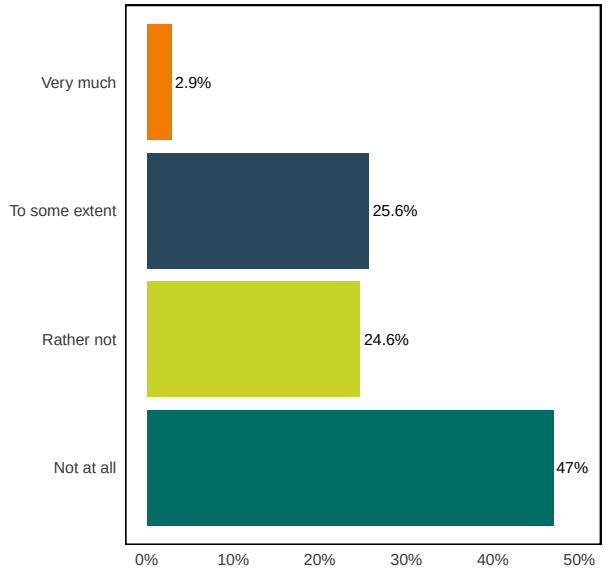

Figure 5.4: Extent to which German is an obstacle for non-German DRs.*

support for external language learning programs (19.2%). Notably, 7.3% of DRs who do not speak German reported that their institute provides no support with learning the language.

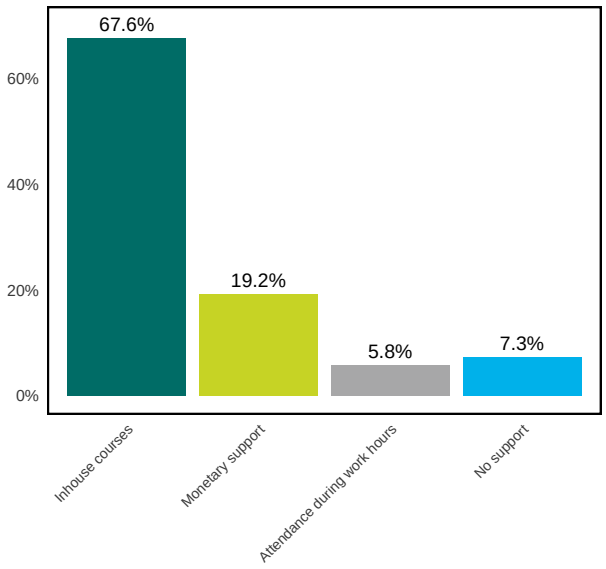

Figure 5.5: Available support to learn German.*

5.2 Career development

The Max Planck Society provides a range of resources to assist DRs with the development of career plans and with gaining specific skills needed for different career paths. To assess how beneficial these resources are and if there may be potential for improvement, we included a range of questions on career development in the survey.

To provide an overview, Figure 5.6 shows different career paths and percentage of DRs' interest in pursuing these. Most DRs are aiming for a career in academia or in non-academic research. Further education, starting a business and taking an extended career break are among the less common plans. Our results also show that as of the time of taking the survey, 20% of DRs had previously worked in a full-time job outside of academia while 71% have not worked outside academia full time.

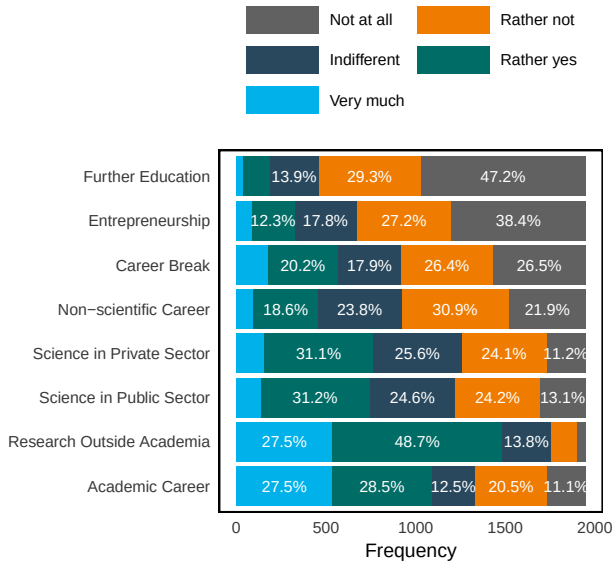

Figure 5.6: Future career plans after PhD.

Focusing only on the 660 respondents who indicated that they would rather not or definitely not want to pursue a career in academia, we explored possible reasons for these DRs to leave academia. Figure 5.7

shows the percentage of these 660 DRs who indicated that the listed reasons are a factor in their decision to leave academia. As such, unattractive career prospects (71.7%) and straining working conditions (65.6%) are the reasons that are referred to most often. Further, 41.5% of DRs who want to leave academia indicate that negative experiences are a reason for this, and 26.1% feel unqualified to pursue a career in academia.

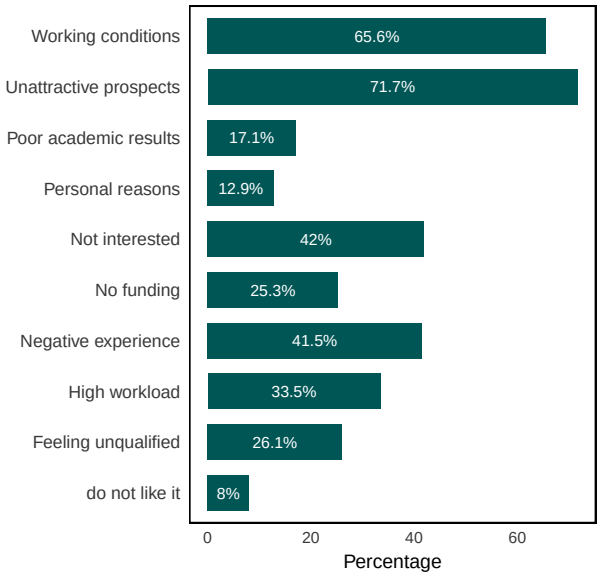

Figure 5.7: Reasons for leaving academia.

Making a broad distinction between career paths in academia and outside of academia, we focus on how prepared DRs feel for these two possibilities (Figure 5.8). Of all respondents, 2235 reported their feelings towards a career in academia and and 2229 for outside of academia. The percentages in the plot are based on these response rates, respectively. As the figure below illustrates, 53.7% of DRs feel well prepared for a future career in academia, and 14.4% even feel very well prepared. However, perception of preparedness is overall lower for a career outside of academia. As such, 21.1% of DRs feel unprepared for this, and 6.8% very unprepared. This shows that perhaps a greater effort can be made to increase career support for those DRs who want to pursue a career outside of academia to insure that they feel prepared for this path and can make informed decisions.

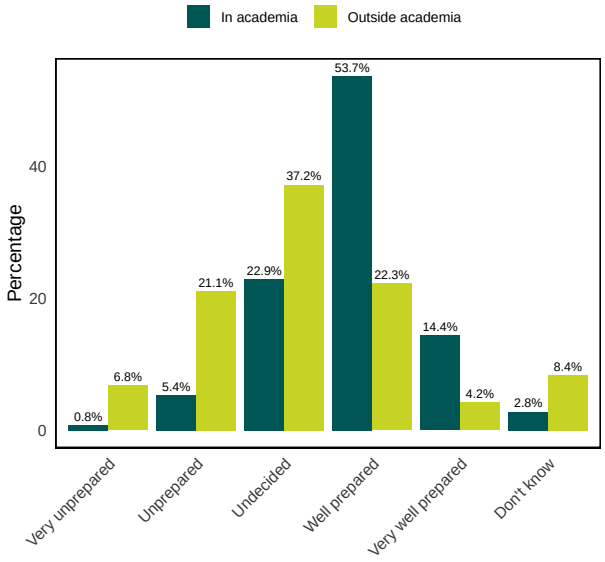

Figure 5.8: Preparedness for future career

To better understand which career support structures are currently in place for DRs, we asked respondents to indicate the extent to which different services are available at their institute (Figure 5.9). Again, our results indicate that support for the development of a career outside of academia may be lacking, as 34.4% of DRs indicate that no support is available to them to help transition to a career outside of academia. Examples for support structures mentioned in the survey were career fairs, talks and networking events. Focusing on access to courses, a majority of respondents indicated that their institutes supports them in taking soft skill courses (54% to some extent; 19.1% to a great extent), and a majority also feels supported to take practical courses, for instance to learn new methods (48.7% to some extent, 16.9% to a great extent). Overall, our results show that a majority of DRs is aware of different support structures to assist with career planning but that improvements may be made to support career pursuits outside of academia.

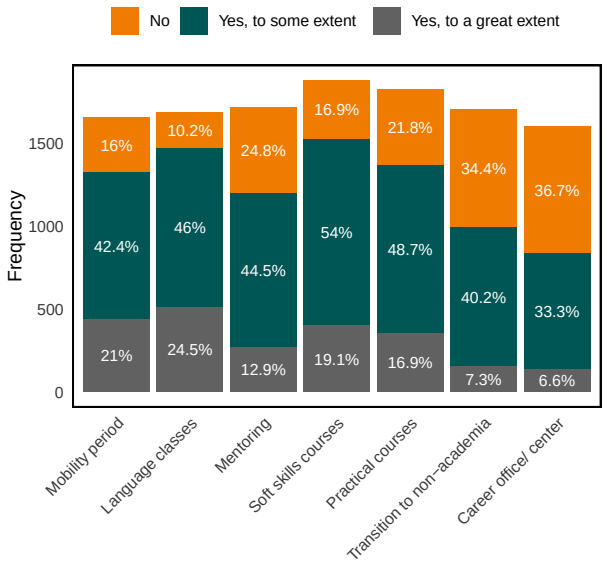

Figure 5.9: Available career support.

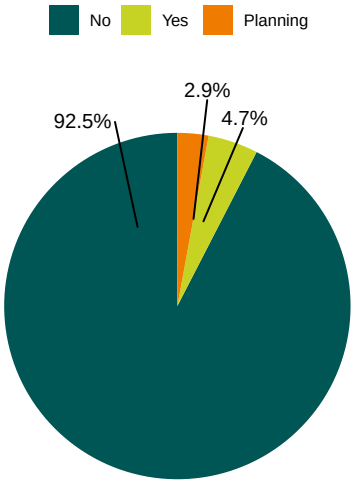

Figure 5.10: DRs with children.

5.3 Family

Lastly, we focused on support structures for DRs who have care-giving responsibilities for their own children or for other people in their household. Since the majority of DRs does not have any care-giving responsibilities, it is especially important not to overlook those who do care for someone else and to ensure that any additional support needs are met. Overall, 92.5% of DRs do not have children, 4.7% have children and 2.9% are planning to have (additional) children during the time of completing their doctorate (Figure 5.10). Further, of 2245 DRs who answered this question, 3.9% have care-giving responsibilities apart from children and 93.9% do not. A further 2.2% of respondents did not want to answer this question (Figure 5.11).

To get a better understanding of potential issues in the support of DRs with care-giving responsibilities, we first asked respondents to indicate whether they think that family support for DRs could be improved within in the MPS. Notably, all DRs could answer this question regardless of if

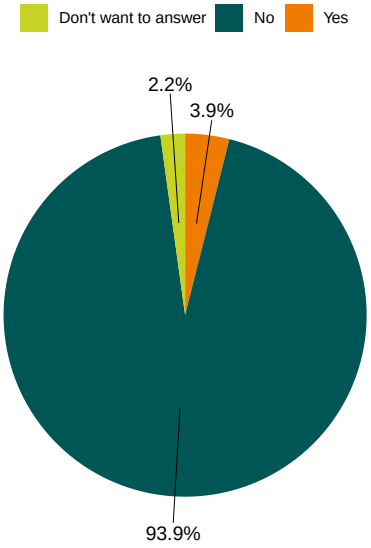

Figure 5.11: DRs with care-giving responsibilities apart from children.

they have any children or additional care responsibilities. Figure 5.12 shows that 36.5% of the 1269 DRs who answered this question think that family support within the MPS could be improved to some extent and 26.6% would like to see family support improved very much. Our results also suggest that in total, 36.9% see less or no need for improvement.

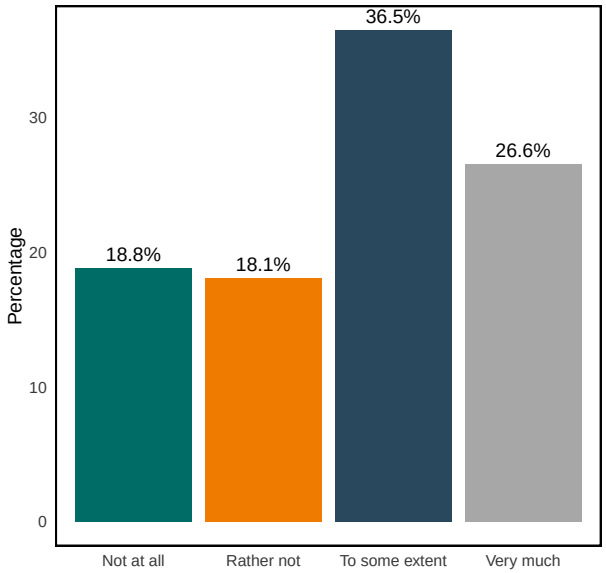

Figure 5.12: Need for improvement of family support.

Focusing on the 4.7% of respondents who have children, we investigated which support structures are in place to accommodate childcare needs (Figure 5.13). Responses to this question may also be an indication of how the need for improved family support pointed out above could be met. Encouragingly, none of the DRs with children indicated that their institute offers no support or that they are not aware of any support structures.

Looking at different support options more specifically, 40.8% of DRS with children indicate that they have access to daycare via their employment at a Max Planck institute. A further 25.2% indicate that this access exists in principle, but that the respective daycare centers were full at the time of taking the survey. The support options that were mentioned the least frequently are financial support for childcare (5.8%) and reimbursement for additional childcare costs that occur during business travel (9.7%). Here, it may be interesting to investigate further why a minority of DRs with children has access to this monetary support while most do not. Lastly, with 73.8%, the possibility to work in home-office was mentioned most often as a way of supporting DRs with children.

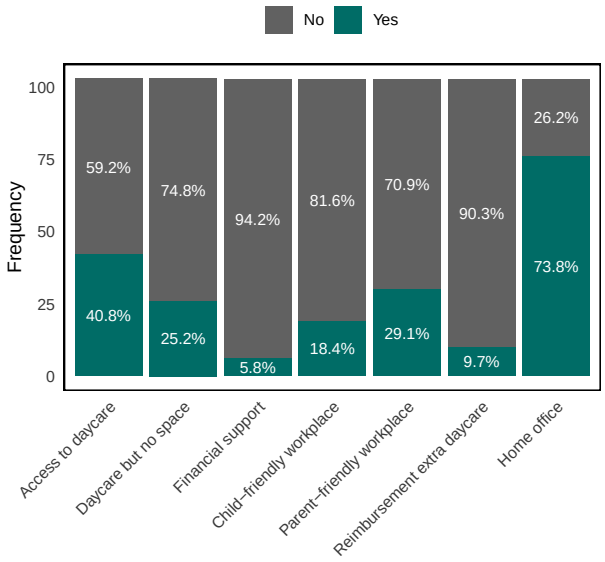

Figure 5.13: Support with childcare.

Chapter 6

Conflicts and Discrimination

6.1 Conflicts & Discrimination

A strong sense of community and supportive social interactions form the foundation of a positive work environment. Similarly, relationships riddled with conflicts or poor communication can create toxicity in the workplace. Although conflicts are a regular if not necessary element for professional and social growth, an inability to resolve prolonged conflicts, much of which could be exacerbated by power dynamics present in academia, can lead to long-term mental health issues and an unhealthy work environment even in the best equipped of workplaces. To counter these issues, MPS has resources in place to discuss and resolve conflicts (Ombuds, Works Council, student representatives, General Administration). It is important that DRs feel comfortable to report to these resources. Here we highlight the rise and resolution of conflicts and discrimination experienced by DRs within MPS for 2023.

264 DRs have reported encountering conflicts with their supervisors, with greater conflicts arising with direct supervisors (31%) than the formal supervisors (26%), potentially due to the fact that direct supervisors more frequently interact with the researchers. Less than 15% of participants

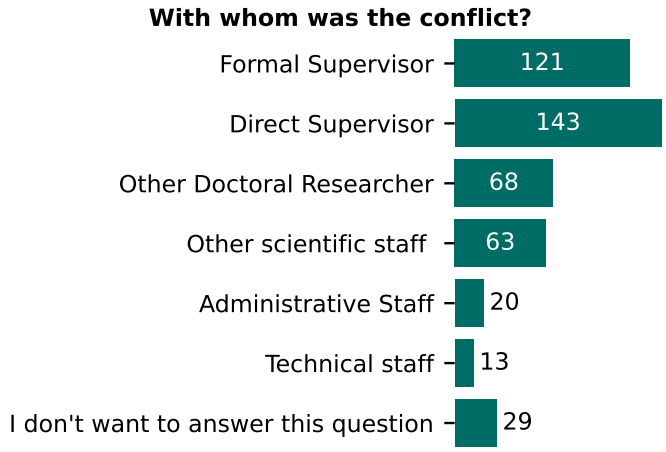

Figure 6.1: Opposing persons in conflicts reported by DRs.

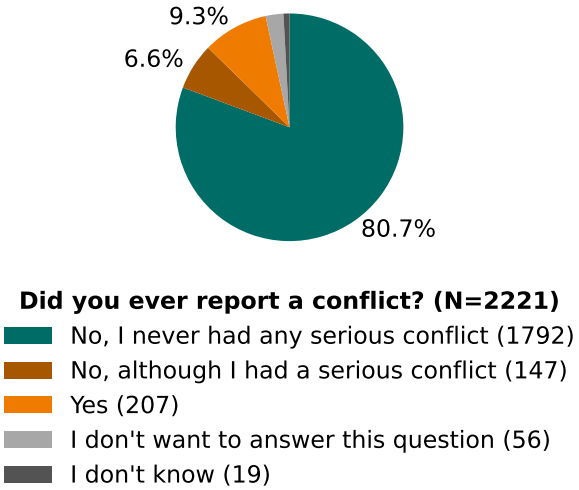

Figure 6.2: Reporting of conflicts by DRs at MPS.

report having conflicts with their doctorate peers, indicating that beyond the frequency of interaction, power dynamics could play a larger role in determining how DRs distinguish conflicts (Figure 6.1).

9.3% out of 2,221 respondents answered to having had reported their conflicts, while another 6.6% did not report a serious conflict, indicating that around 40% of serious conflicts (147 out of 354 serious conflicts) experienced by survey participants were either resolved privately or remain unresolved (Figure 6.2). However, this is a remarkable improvement over the years according to the 2019 PhDnet survey report [15], where over 60% of conflicts had remained unreported.

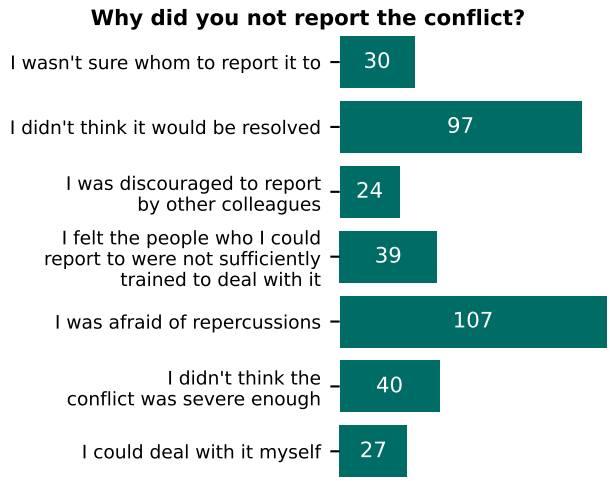

Figure 6.3: Reason for omitting reports of conflicts (absolute response numbers).

When asked why current DRs chose not to report serious conflicts, 107 respondents (~30%) expressed fear of retaliation, while another 97 (27%) felt that reporting would be ineffective for conflict resolution. These frequencies of answers indicate a lack of trust in the ability of our institutes to address conflicts especially when dealing with supervisors. Dramatically lower in numbers were the next most frequent responses stating they would (~11%) prefer to self-manage the conflict or that (10%) they did not feel the points of contact were trained to effectively resolve their situation (6.3).

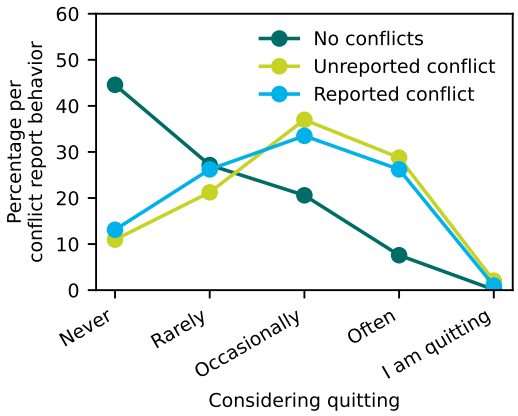

Figure 6.4: Trends between conflicts and the urge to quit.

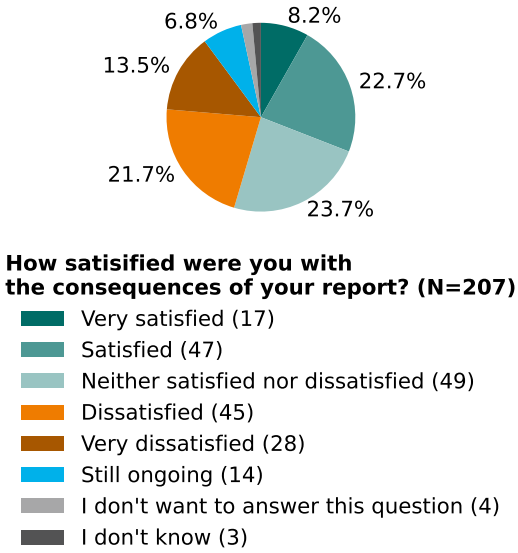

Figure 6.5: Satisfaction after reporting conflicts.

By plotting the conflict report rate with the corresponding responses to the question "how often have you considered quitting your PhD?" - we saw a trend where those that experienced serious conflicts were dramatically more likely to either occasionally or often consider quitting their PhD (approximately 30% of those that reported conflicts considered quitting often). Notably, there were very small differences in the urge to quit between those who reported

and those who did not report conflicts (Figure 6.4).

When prompted about their satisfaction after reporting a conflict, results were mixed: 31% of DRs that reported were satisfied or very satisfied, while 35.2% expressed mild to strong dissatisfaction. 23.7% felt neutral about the reporting results, while 7% are still in the process of being addressed (Figure 6.5). The lower satisfaction rates could be attributed to major causes of conflict that are difficult to address, such as systemic power abuse present in academic culture [16].

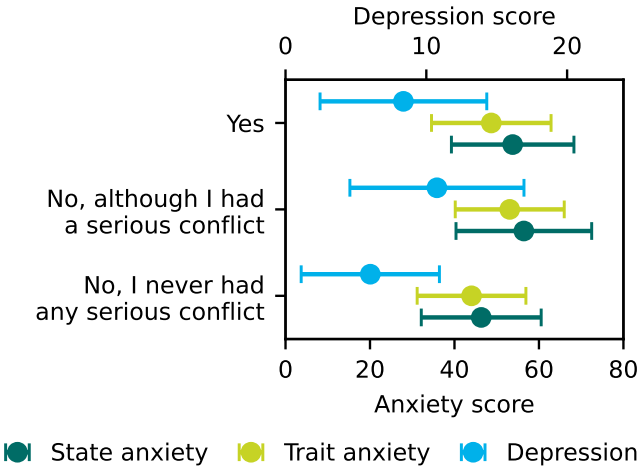

Figure 6.6: Trends between conflicts and mental health.

Responses to whether DRs reported conflicts or not were plotted alongside depression and anxiety scores (state anxiety indicating anxiety levels at the instance of the survey, while trait indicates long-term anxiety levels). Average depression level is marginally higher for DRs who had conflicts and did not report, compared to those who did report (11/20 and 9/20 respectively), while those who reported not experiencing serious conflicts had an even lower average depression rate of 6/20. The same relative trends held true for anxiety levels, where average state anxiety was consistently greater than trait anxiety (Figure 6.6).

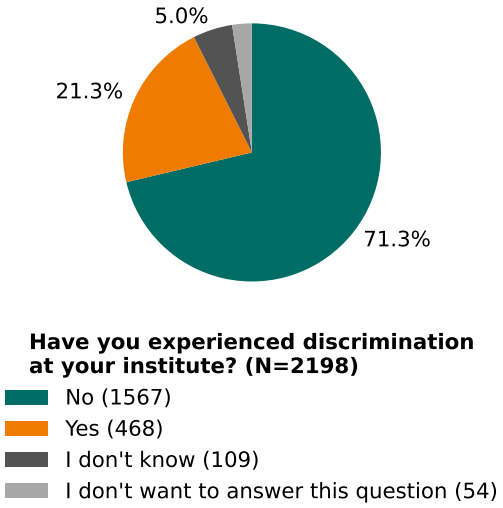

Figure 6.7: Have you experienced discrimination?

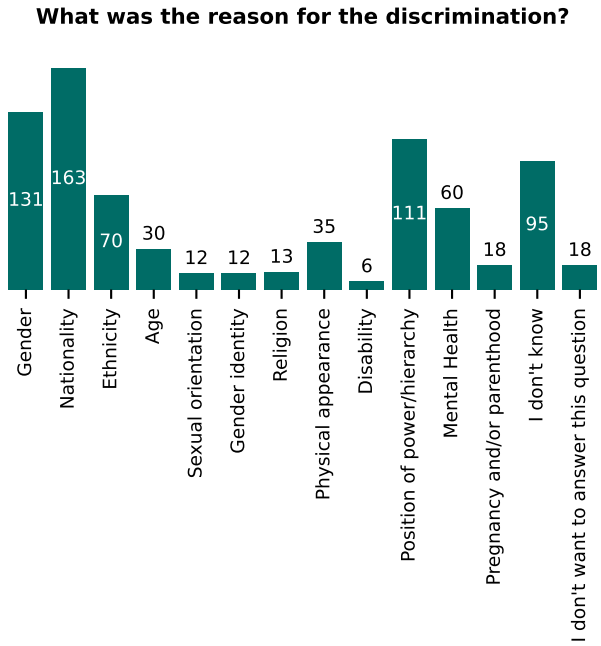

Figure 6.8: Perceived reasons of discrimination

Among the various catalysts of conflict within academia, discrimination seems to be among the larger sources. 468 (21%) out of 2,198 participants (the latter value accounting for partial responses) reported having been discriminated against in 2023 (Figure 6.7), with the top perceived reasons to be based on nationality (21%), gen-

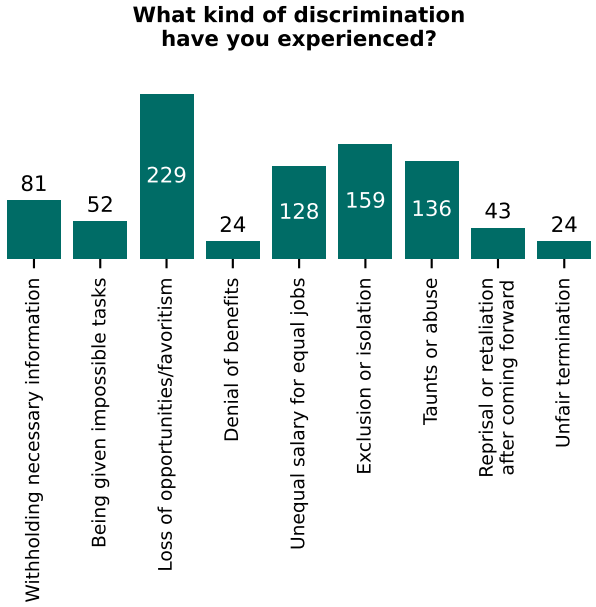

Figure 6.9: What kind of discrimination did you experience?

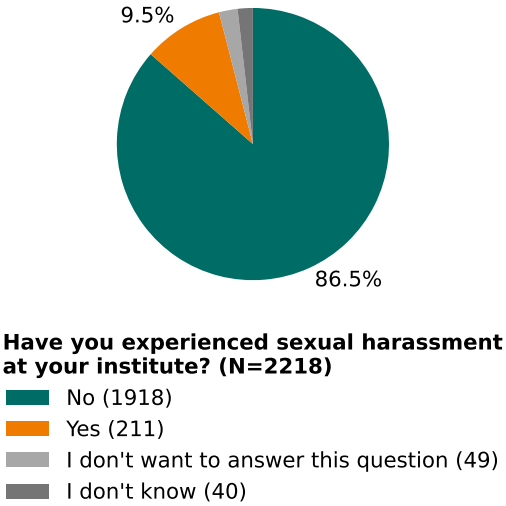

Figure 6.10: Sexual harassment among DRs of the MPS.

der (17%), and positions of hierarchy (14%) (Figure 6.8).

Forms of discrimination most commonly reported include loss of opportunities and pronounced favoritism (26%), social isolation (18%), and inappropriate comments (15%). Alarmingly, 13% (128 respondents) who were discriminated reported a notable difference in pay for similar roles as their peers, a claim that warrants further investigation by finance and HR (Figure 6.9).

6.2 Sexual harassment

In addition to the topics of general conflicts and forms of discrimination, sexual harassment was also considered a distinct category for analysis.

Out of 2218 respondents, 9.5% (211 DRs) responded that they have been sexually harassed at their institutes (Figure 6.10).

Figure 6.11 indicates that out of 209 DRs that report being sexually harassed, nearly 82% (171 DRs) are female-identifying. The inner ring of this figure displays the ratio of females to males (among respondents that answered the question whether they have been sexually harassed) comprising DRs at MPS; the contrast between the inner and outer rings serves to visually reveal the gender discrepancies in sexual harassment cases. This data is consistent with data from 2022, where approximately 84% of sexual harassment cases were reported by female DRs [3].

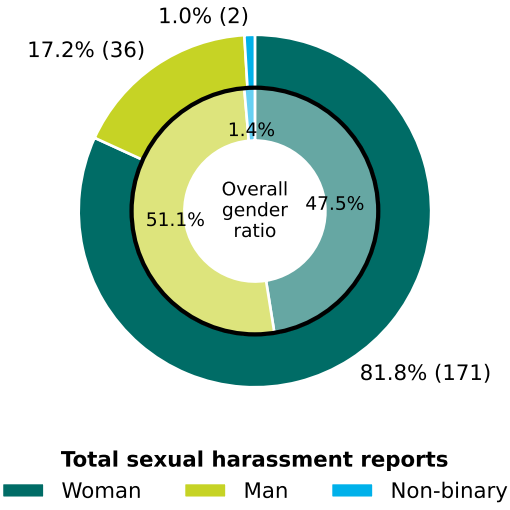

Figure 6.11: Sexual harassment cases - comparison between genders.*

Figure 6.12 further highlights that out of

all female DRs, 17% have reported cases of sexual harassment, compared to the 3% of all males and 7% of all non-binary individuals.

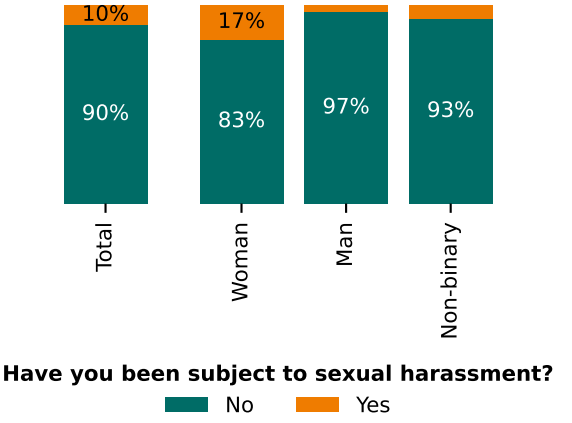

Figure 6.12: Sexual harassment cases - percentage of genders.

31% (113 DRs) of respondents received unwanted remarks or gestures of a sexual nature, and approximately 20% of DRs either experienced unwanted non-physical approaches (looks, catcalling, etc.) or unwanted physical contact. 13% (48 DRs) reported that there was a spreading of misinformation about themselves in a sexual context. 15 DRs reported experiencing physical acts of sexual assault, another 15 DRs reported receiving unwanted media of a sexual nature from members of the institute, 13 DRs felt the pressure to engage sexually with a member of their institute, and another 9 DRs were requested for sexual favors or received unwelcome sexual advances (Figure 6.13). Notably, 362 people responded in this section about types of harassment that they experienced while earlier in Figure 6.10 211 DRs considered themselves feeling sexually harassed. We suspect that the difference in numbers could be attributed to the difference in perception of the definition of sexual harassment.

Out of 211 respondents who chose to answer regarding the frequency of sexual ha-

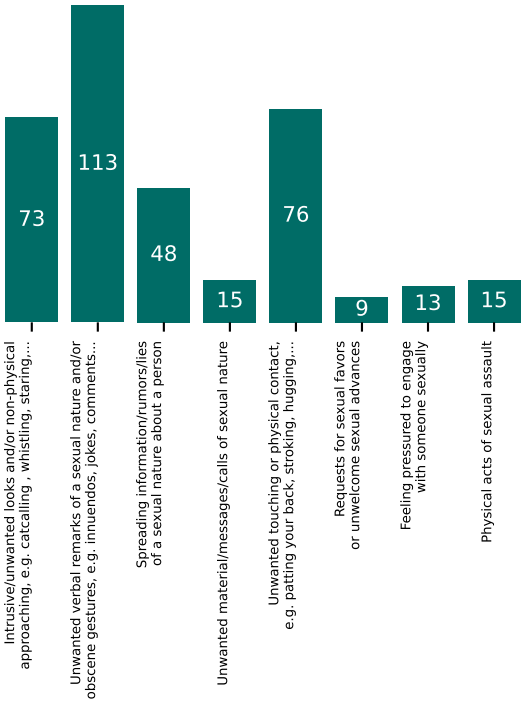

Figure 6.13: Details around sexual harassment experienced at the workplace.

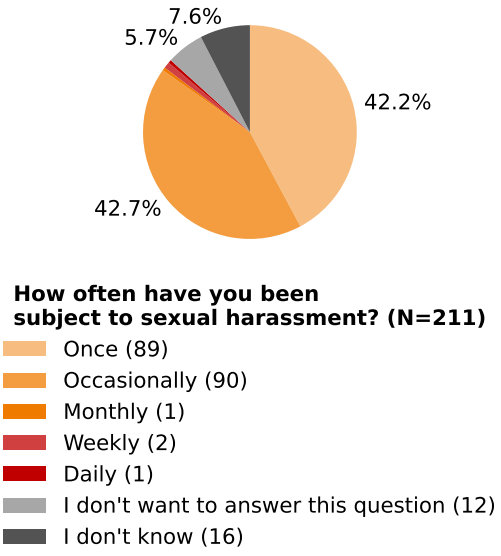

Figure 6.14: Frequency of sexual harassment experienced at the workplace.

rassment they experienced at their workplace (Figure 6.14), the majority (42.7%) reported being harassed on an occasional basis, while similar numbers expressed that they had one noteworthy instance. Very few (0.5%-1%) report being harassed on a monthly, weekly, or daily basis, however, there were a particularly large percentage that answered that they didn't know the frequency (7.6%) or simply did not want to answer the question (nearly 6%). Victims of sexual harassment often do not speak up due to elements such as shame and trauma. The results of this anonymous reporting in our survey stand as a strong reason to continue offering anonymous and immediate counseling services like EMAP (see Chapter 7.5 for more information about EMAP) and continue to advertise it as a readily available resource to the MPS community.

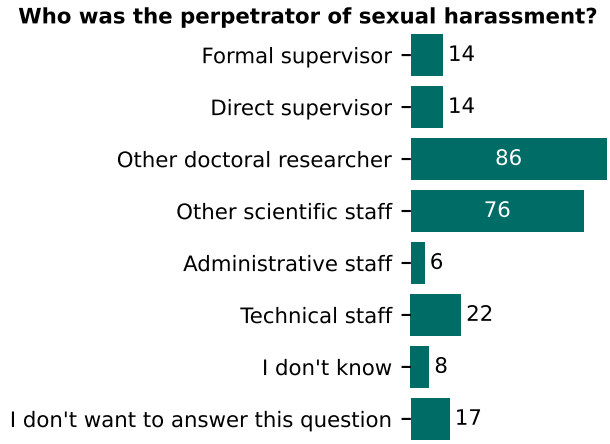

Figure 6.15: Perpetrators of sexual harassment on the DRs.

Figure 6.15 alludes to the perpetrators of sexual harassment reported by DRs, with the most common perpetrators being other DR peers. Scientific staff were accused as the second most common perpetrators. Implementation of a training around identifying and reporting sexual harassment may be of benefit to the MPS community.

Chapter 7

Mental and Physical Health

Mental health refers to a person's emotional, psychological, and social well-being and is closely linked to how individuals think, feel and behave in their daily lives. High external pressure due to the demanding research environment characterized by high work-loads, time constraints, and often financial insecurity can heavily affect DRs' daily lives and their overall functioning. Mental health issues adversely impact their physical health, academic performance, and interpersonal relationships. Thus, understanding and addressing mental health issues among DRs is crucial for preserving productivity and accomplishing academic success, as well as sustaining healthy social functioning.

For this year's survey, 1828 DRs (79.5% of the overall sample) agreed to answer questions related to their mental health. While we acknowledge that self-reported health data might be biased (e.g., survivorship bias), the results indicate that a concerning majority of DRs has been affected with mental health struggles.

7.1 State anxiety

State anxiety refers to the DR's currently experienced level of anxiety symptoms, such as feeling tense or worried. State anxiety is temporary and depends on the situation or environment at the moment.

We applied the Spielberger State-Trait Anxiety Inventory [17] to estimate the state anxiety score and the trait anxiety score (see Figure 7.1). Very few DRs were not feeling anxious at the time of taking the survey (2.8%) and almost all reported experiencing some levels of anxiety at the present moment (97.2%). Similar common levels of state anxiety were reported in the previous PhDnet survey (2.2%) [3]. More than half of the DRs (63.2%) experience moderate and high momentary anxiety. Interestingly, both state and trait anxiety follow similar patterns.

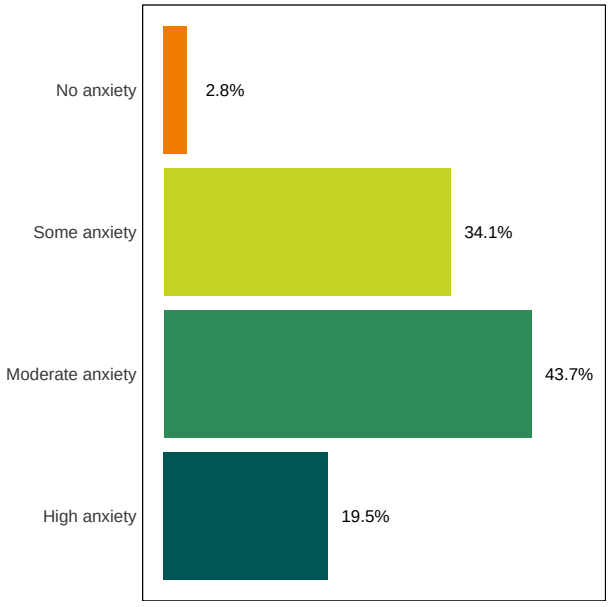

Figure 7.1: Levels of state anxiety among DRs.*

7.2 Trait anxiety

Trait anxiety describes DR's overall tendency to experience anxiety in various situations which is considered a stable personal characteristic. Participants' trait anxiety is captured by asking them how they *generally* feel.

Only a very small percentage of DRs reported no anxiety symptoms at all (1.3%). The majority of participants experience some (40.5%) or moderate (45.0%) anxiety symptoms. High anxiety was reported by 13.1% of the DRs (Figure 7.2). These numbers are very similar to those reported in the 2022 survey with a small decrease in the amount of DRs with high anxiety this year [3]. In 2022, 40.3% of DRs indicated to have some symptoms of anxiety, 46.7% reported moderate anxiety and 11.8% high anxiety. Previous research estimates that the proportion of DRs assessed as having anxiety was 17% (95% confidence interval (CI), 0.12-0.23) [18] which is much lower than the prevalence reported in this survey. However, recent empirical research suggests that describing the STAI-T as a measure of "trait anxiety" may be a misnomer [19]. It is proposed that the trait anxiety scale captures non-specific negative affectivity rather than trait anxiety per se.

Many global and societal issues, as well as personal factors, like lack of sleep (Figures 7.5 and 7.6), might contribute to the prevailing levels of anxiety and negative emotions.

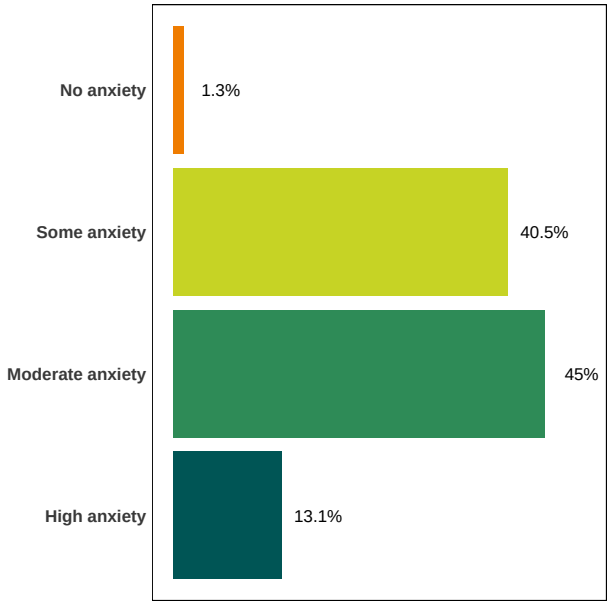

Figure 7.2: Levels of trait anxiety among DRs.*

7.3 Depression

Depression is a mental health disorder characterized by persistent feelings of sadness, hopelessness, and a loss of interest or pleasure in activities once enjoyed. DRs' severity of depressive symptoms is determined by the frequency of depressive symptoms over the last few weeks.

Overall, more than half of the DRs (57.4%) reported symptoms of depression analogous to a level of at least mild depression which indicates a slight increase from the level reported in 2022 (55.8%) [3]. Correspondingly, there was an increase in the relative amount of DRs suffering from moderately severe to severe levels of depression (9.9%) (Figure 7.3). The proportions for moderate, moderately severe and severe depression symptoms add up to 25.3 %, showing that about every fourth DR is likely to suffer from clinically significant symptoms of depression. The results are in line with a recent meta-analysis where the estimated proportion of DRs with similar levels of depression was 24% (95% CI, 0.18-0.31) [18]. Notably, the prevalence of depressive symptoms in the general German population is much lower at 9.2% and yet still above the European average of 6.6% [20] . This stark difference indicates that increased attention should be paid to the mental health of DRs and that more (awareness of) access to mental health support may be needed.

Figure 7.4 depicts the increasing prevalence of depressive symptoms over the past five years. The reports from 2019 and 2020 suggested that mental health issues might have increased for this period of time due to the COVID-19 pandemic. However, the prevalence of severe depression still increased for the past three years which implies that circumstances of DRs have not improved and supporting measures have not been sufficient.

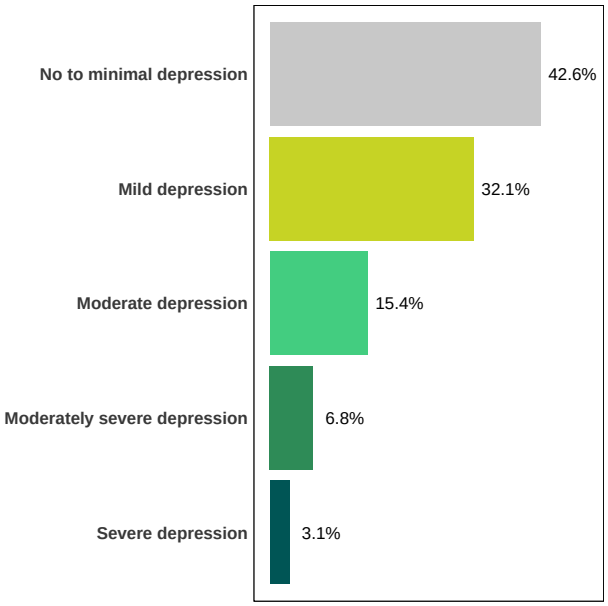

Figure 7.3: Levels of depression among DRs.

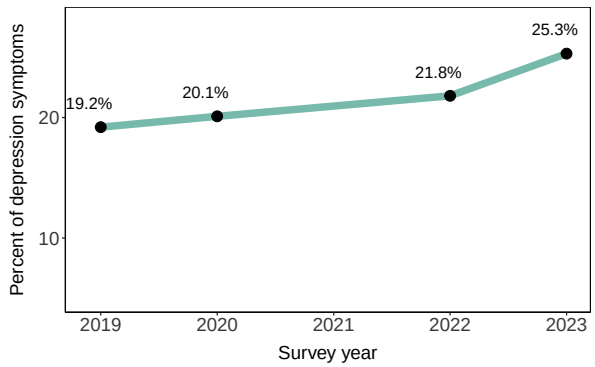

Figure 7.4: Prevalence of moderate to severe depressive symptoms among DRs.

We investigated whether there is a relationship between DRs gender and working conditions and their experience of depressive symptoms. To this end, we used statistical analyses of variance (ANOVAs) to compare levels of symptoms among DRs who contemplate quitting their PhD and who regularly work more than their contracted hours. We did not find any significant differences (Supplementary Figures B.1, B.2 and B.3). However, this may be due to the way questions were phrased and more in depth analysis is needed to better understand the potential relationship between DRs working conditions and their mental health.

7.4 Physical health

Physical health pertains to the well-being of a person's body and its ability to perform physiological processes accurately. It involves aspects like fitness level, dietary habits, sleep patterns, and absence or management of (chronic) diseases. Physical health is intrinsically connected to stress which manifests as bodily reaction in response to situations that are perceived as threatening or challenging. Thus, stress can have a profound impact on a person's physical health and can lead to symptoms such as impacted immune function, digestive issues, headaches, or other serious conditions.

We assessed DRs' physical health using the Patient Health Questionnaire-15 (PHQ-15) [21], a widely used tool which is comprised of 15 items measuring somatic symptoms such as back pain, fatigue, and headaches, among others. Overall, results suggest that assessed physical health was much better compared to mental health, since a vast majority of DRs (79.6%) reported no or only mild levels of somatic symptoms (Figure 7.5). However, the proportion of DRs reporting no or only mild physical symptoms substantially decreased compared to

the proportion estimated in last year's survey (91.1%) [3]. 5% of DRs reported severe physical symptoms and 15.5% reported moderate somatic symptoms (see Figure 7.5). Most commonly reported physical symptoms were sleep problems, back pain and headaches (see Figure 7.6). There was a high proportion of DRs who were very bothered by their disturbed sleep (43.1%) and only a small proportion who were not (16.2%) (Figure 7.6).

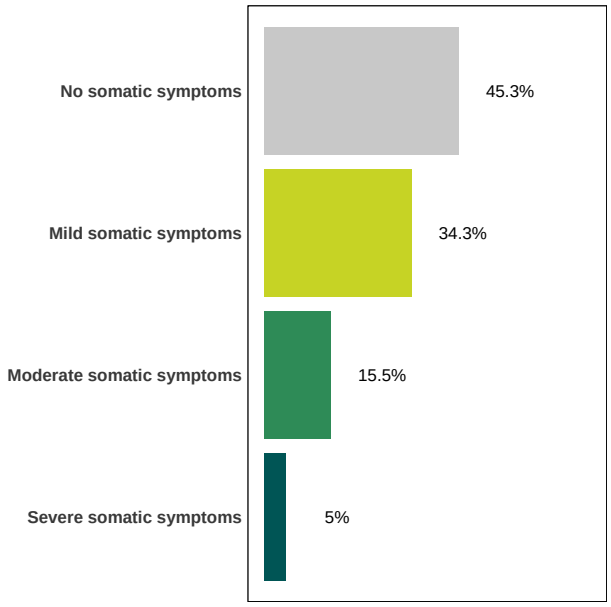

Figure 7.5: Levels of somatic symptoms among DRs.*

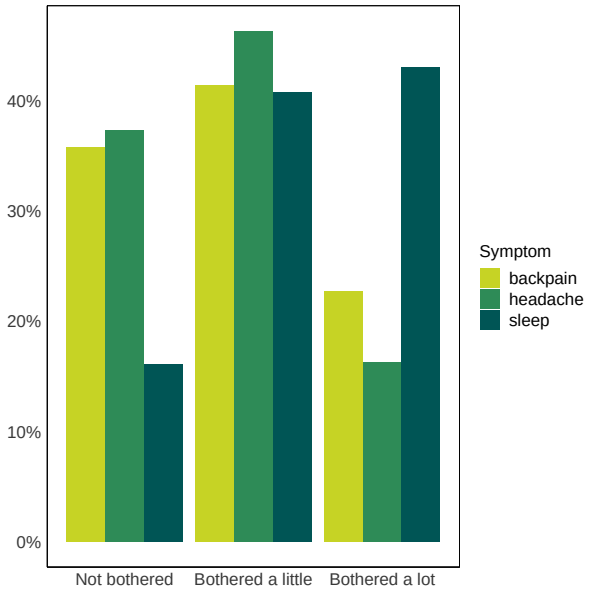

Figure 7.6: Most commonly reported symptoms and their degree of distress.

7.5 Employee and Manager Assistance Program

The Max Planck Society offers free health support through the Employee and Manager Assistance Program (EMAP). Any affiliate of the Max Planck society can make use of this counseling service to review personal and professional issues. For more information see https://www.mpg.de/16344036/counselling-and-mental-health. Providing these services is essential to mitigate

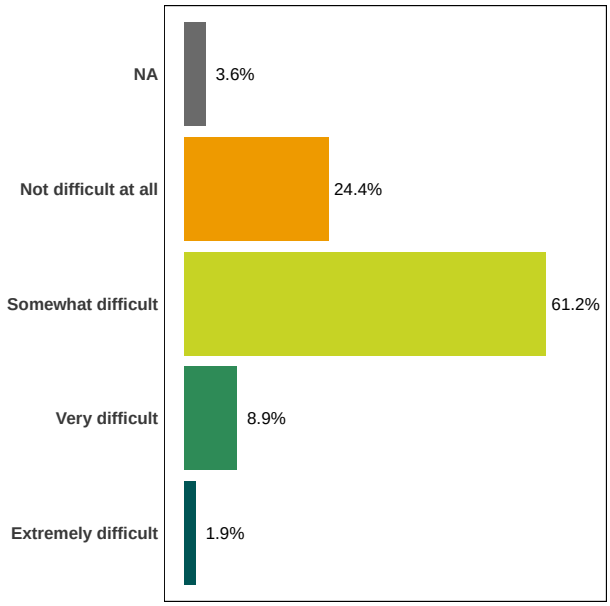

Figure 7.7: Proportion of DRs indicating how difficult it is to work while suffering from physical symptoms

the potential impact of health issues on DRs' work and overall well-being. Figure 7.7 shows that over 60% of participants reported that physical health issues made it somewhat difficult to work and around 11% (10.8%) found that it is very or extremely difficult to work due to physical health issues. Moreover, many DRs wished that psychological support within an institute or research center could be supported either "to some extent" (40.3%) or even "very much" (32.9%) (Figure 7.8). Interestingly, Figure 7.9 shows that the majority of DRs (65.4%) were aware of the EMAP but only a small minority used it and were satisfied (5.4%) or respectively not satisfied (6.2%). While there was still a substantial proportion (23.0%) of DRs who were not aware of the counselling services, this number represents significant improvement compared to our findings in the 2022 survey [3]. In 2022, a large majority of 65.7% of respondents had not heard of the the EMAP. This marks and important increase in awareness and further promotion of the EMAP among DRs or affiliates, in general, could be an important step toward providing the support and resources needed.

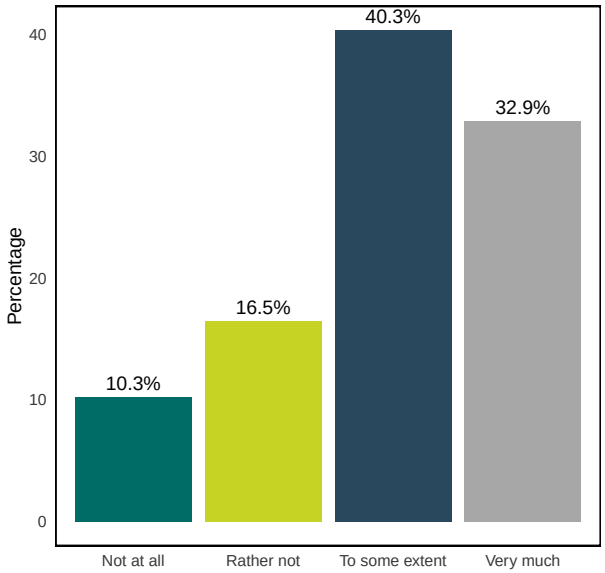

Figure 7.8: Proportion of DRs indicating whether psychological support offered within an institute should be improved.

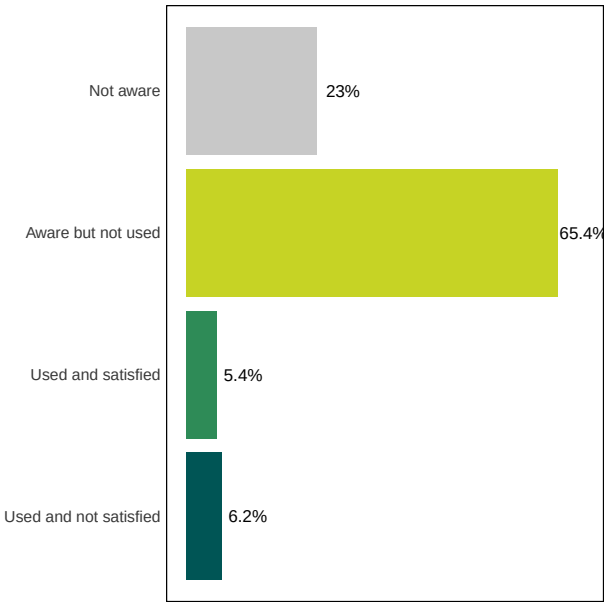

Figure 7.9: Proportion of DRs who were aware about the mental health resources.

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Appendix A

Supplementary Figures: Working Conditions

A.1 Unpaid DRs

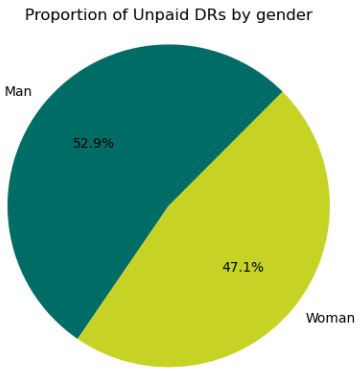

Figure A.1: Gender distribution of unpaid DRs.

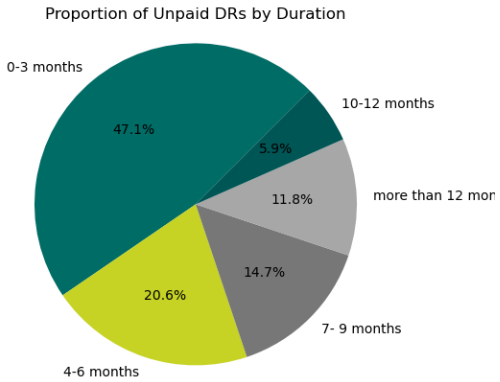

Figure A.2: Duration of unpaid period.

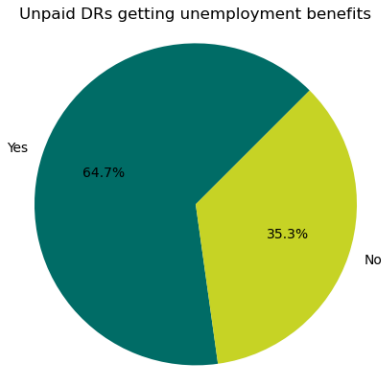

Figure A.3: Do unpaid DRs get unemployment benefits?

A.2 Working hours and paid leave

A.2.1 Working hours

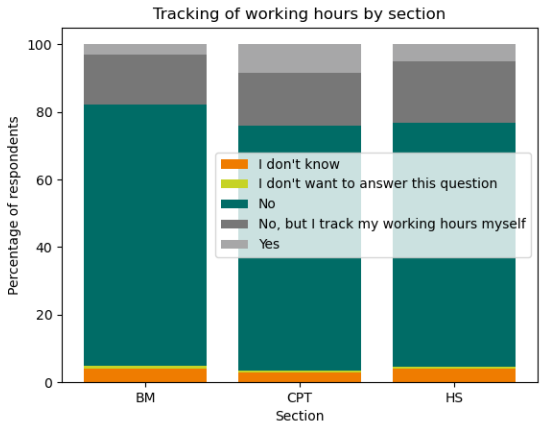

Figure A.4: Tracking of working hours by the DRs, divided per section.

A.2.2 Paid leave

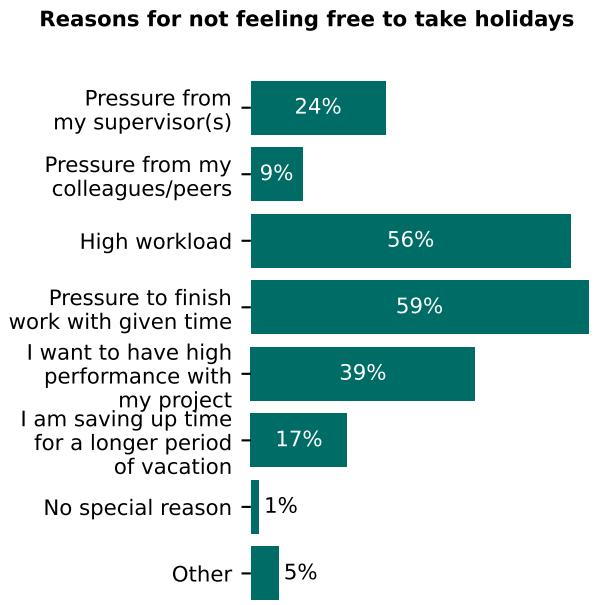

Figure A.5: Reasons for not feeling free to take holidays.

A.3 Desire to quit

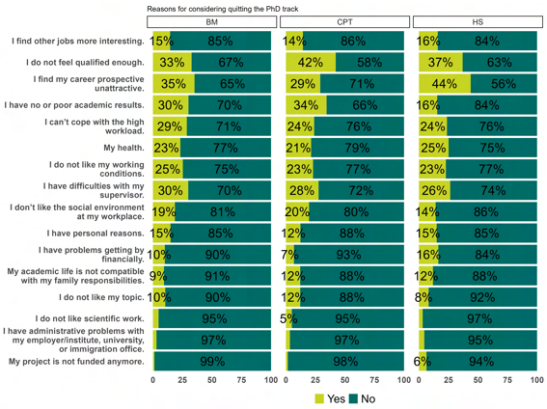

Figure A.6: Reasons for desiring quitting the PhD for each section.

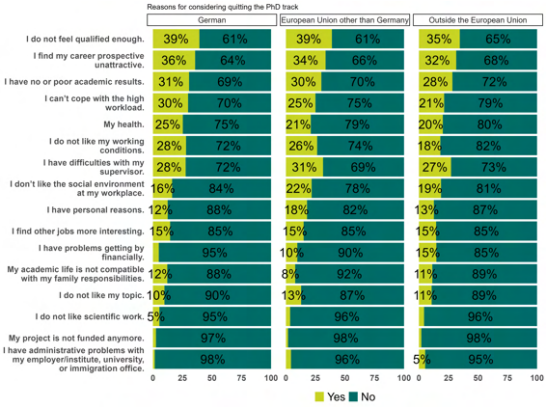

Figure A.7: Reasons for desiring quitting the PhD for each citizenship.

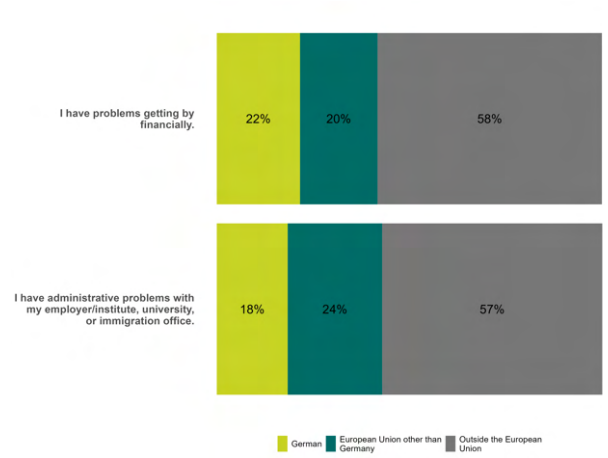

Figure A.8: Citizenship distribution of positive answer of desire to quit due to administrative or financial problems*

Appendix B

Supplementary Figures: Mental and Physical Health

B.1 Depression

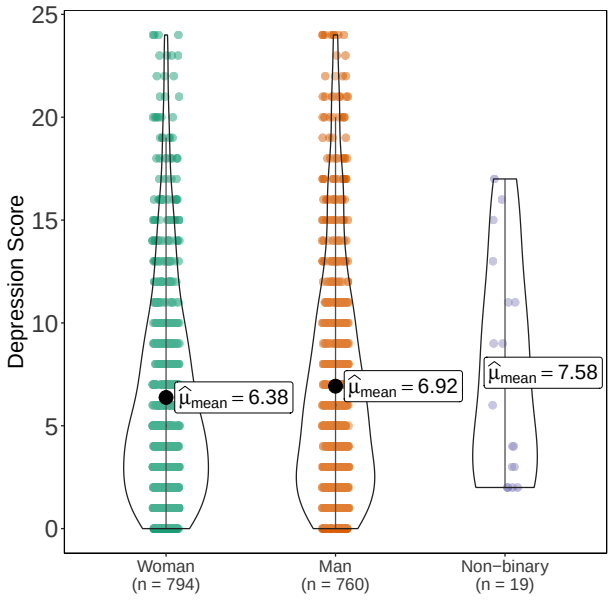

Figure B.1: Depressive symptoms by gender.

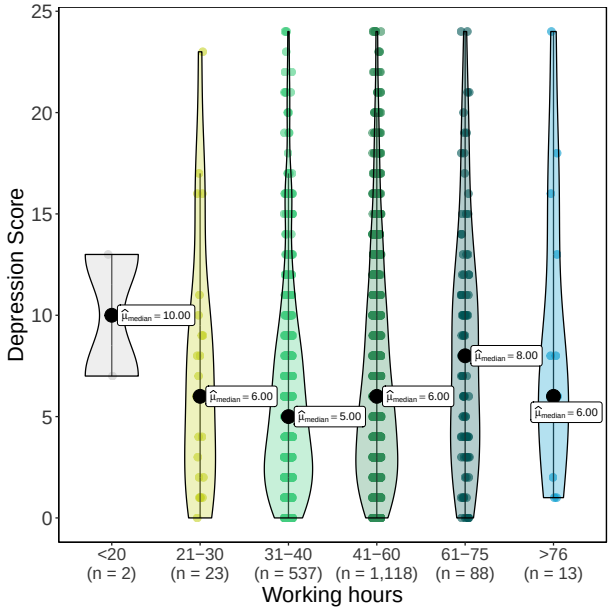

Figure B.2: Depressive symptoms and working hours.

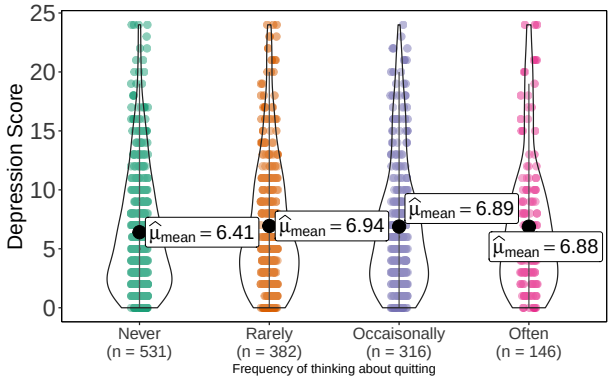

Figure B.3: Depressive symptoms and desire to quit.

Appendix C

Methods

C.1 General Analysis

Chapters 2, 3 and 6 were analysed with python and matplotlib, apart from Figures 3.4, A.6, A.7 and A.8. These Figures and all the other chapters, were analysed with R [22], and figures plotted with ggplot2 [23].

C.1.1 Data cleanup

For the 2023 PhDnet survey, 2135 valid responses were collected, out of 4965 eligible participants.

Each DRs was attributed to one section per their associated institute/center/unit name. Institute names that were given through the free-text option were manually curated and attributed to their respective section whenever possible. In total, 178 responses could not be associated with a given institute and are therefore missing from all section-related analyses.

DRs were also given the option of whether they agreed to being asked sensitive questions. 5% (140 in numbers) of the DRs opted not to be shown sensitive questions and were not considered for the following questions:

- *Question A7*: Which sexual orientation do you identify most with?
- *Question A10*: What are your ethnic origins or ancestry?
- *Question A12a*: Were your parents born in Germany?
- *Question A12b*: Were you born in Germany?
- *Question A13*: Do you consider yourself to have a disability?
- *Question E4*: My direct supervisor is (a)?
- *Question E5*: My direct supervisor presents/identifies/read (a)?
- *Question E6*: My formal supervisor is (a)?
- *Question E7*: My formal supervisor presents/identifies/read (a)?
- *Question J1*: Do you have or are you currently expecting children?
- *Question J1b*: Your youngest child is...
- *Question J2*: Are you considering having (more) children during your doctoral research project?
- *Question J3*: Does your center/institute/unit offer support childcare services?
- *Question J4*: Do you feel there is sufficient support (financial and organizational) from your center/institute for raising/caring for a child?

The answers "I don't know" and "I don't want to answer" were removed for some specific questions. This can be seen for example, in the income section of the working conditions section (chapter 3)

Underrepresented categories, with a percentage of less than 5%, were not annotated in the stacked bar plots figures for an ease of visualization.

C.2 Re-categorization of variables

1. *PhD Year*: Based on question A8 ("When did you start your doctorate?"). This is the difference between the month and year of start date, and the submission date of the survey response. DRs who started their project in 2023 were considered to be first years. DRs who started their PhD more than 7 years ago were grouped together in the "≥8" category.
2. *Question A6* ("To which gender do you identify most?"): the answers "Gender diverse, "Non-binary" and "Other" were grouped in the category "Non-binary".

Most of the analyses on this report were done by directly correlating one or two variables of interest and calculating their percentage.

C.3 Demographics

The age of the DRs at the start of their project, was calculated as the difference between the year the PhD was started and their year of birth.

C.4 Working Conditions

This section pertains to the different sections present in the working conditions (Chapter 3).

C.4.1 Contract type and duration

DRs were asked to describe all contracts they had received and other employment situations they experienced, as well as their and duration, in chronological order, up to a maximum of 10. For each DRs we counted the total number of described contracts. Due to low case numbers for more than 5 contracts the higher order contracts where combined for the graphs into the categories 5+ contracts (that is 5 to 10 contracts) for the contract duration plot (Figure 3.6) and 8+ contracts (that is 8 to 10 contracts) for the contracts by year of PhD plot (Figure 3.5).

The expected duration from start of a PhD until the submission of a thesis was calculated as the difference between the start date (Question: "When did you start your PhD?"), and that of expected submission (Question: When do you expect to submit your PhD thesis?). This difference was then divided by 365.25 to account for leap years.

The survival curve of the expected duration per section is a Kaplan-Meier curve, calculated with survival and survminer [24, 25]. It estimates the number of DRs who expect to finish their PhD at a given time in comparison to the population of DRs for their section.

C.4.2 Income

To calculate the average income, we transform the answers into a numeric scale, by taking the midpoint of the inquired range of values. Data from the two extremes ("<1000" and ">3000") were assigned as salary values of "950" and "3050", respectively. Additionally, all answers that pertain to "I don't want to answer" and "I don't know" were removed.

C.4.3 Working hours and holidays

For an easier visualisation the number of hours each DR is expected to work, according to their current work agreement, was grouped in bins of 5.

For computing the difference between the actual and expected working hours, the actual working hours were taken to be the middle of the range (for eg. 41-50 replaced by 45.5)

C.5 Supervision and available support structures

For the supervision and available support chapters, no analysis was conducted beyond the plotting of descriptive statistics. To make visualization of the data easier, we omitted the "I don't know" and "I prefer not to answer" response options from the plots where these options do not add important information. For all cases in which these options were omitted they had a very small number of respondents. As for the other chapters, frequencies below 5% are not displayed in most plots to increase readability.

To display differences between the frequency of actual and desired meetings with the formal and direct supervisor (Figures 4.4, 4.5), responses to the items on actual and desired meeting frequency with the respective supervisors were merged and shown side-by-side for an easier comparison.

C.6 Mental and physical health

The mental and physical health questions were presented as an optional module which means that only participants who agreed to answer these questions were included for further analysis. Hence, sample sizes for this part of the data varied between 1,810 and 1,854 which correspond to at least 55% of the total sample (N= 2780).
The mental health module has been part of the survey since 2019, while the physical health module was recently introduced in 2022 [3], [8]. Below we specify how data was collected on aspects of mental health (depression; state and trait anxiety) as well as somatic symptoms and how these data were analysed.

C.6.1 Depression score

Levels of depression were assessed using the Patient health questionnaire (PHQ) [26] which is a validated tool to screen, diagnose and measure the severity of depressive symptoms. Items incorporate diagnostic criteria based on the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), as well as other major depressive symptoms. The overall depression score corresponds to the sum score of the eight different items. For this, eight statements were presented (Table C.1), and the DRs were asked to rate how frequently they had occurred in the past two weeks. The statements were valued according to their frequency. The more frequently a given statement occurred, the higher the score, and vice-versa. If one or more statements from a given DRs had a null score ("I don't want to answer this question"), then the entry was not considered (Table C.2).

Thresholds for the levels of depression are reported in Table C.3. To group responses into the corresponding levels of depression as accuratly as possible, we removed participants who did not respond to all of the eight PHQ items. This was done because we suspected that this data was not missing at random.

We applied analysis of variance (ANOVA) to compare mean depression scores across multiple groups (e.g., depression score by gender, amount of working hours).

Table C.1: Statements shown for question D3: "Over the last two weeks, how often have you been bothered by any of the following problems?". From module PhQ-9.

N°	Statement
1.	Little interest or pleasure in doing things
2.	Feeling down, depressed, or hopeless
3.	Trouble falling or staying asleep, or sleeping too much
4.	Feeling tired or having little energy
5.	Poor appetite or overeating
6.	Feeling bad about yourself - or that you are a failure or have let yourself or your family down
7.	Trouble concentrating on things such as reading the newspaper or watching television
8.	Moving or speaking so slowly that other people could have noticed? Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual

Table C.2: Score chart for depression levels (PhQ-9 module statements).

Answer	Score
Nearly every day	3
More than half the days	2
Several days	1
Not at all	0
I don't want to answer this question	-

Table C.3: Depression levels calculated with the PhQ-9 module score.

Sum score	Category
0-4	No to minimal depression
5-9	Mild depression
10-14	Moderate depression
15-19	Moderately severe depression
20-24	Severe depression

C.6.2 Trait and state anxiety

Both the trait and state anxiety were based on the short form of the Spielberger State-Trait Anxiety Inventory (STAI) [17]. State anxiety describes a temporal emotional condition that fluctuates over time and is a response to a specific situation. Trait anxiety refers to a more stable and general tendency to experience anxiety across various situations and is not tied to a specific moment.
To measure state anxiety, we asked the DRs to describe how they feel in that specific moment (*Question D1*: "Please read each statement below and then indicate how you feel right now, at this moment.")(Table C.4). To capture state anxiety, we asked DRs to reflect on their general state of mind (*Question D2:"Please read each statement below and then indicate how you generally feel."* (Table C.5). The sum score of the items captures the level of anxiety for state and trait anxiety.

The original scale for state and trait anxiety consists of 20 items each. Because we

Table C.4: Statements for state anxiety (STAI)

N°	Statement
1.	I feel calm*
2.	I feel tense
3.	I feel upset
4.	I feel relaxed*
5.	I feel content*
6.	I feel worried

* Reverse scored statements. Where agreeing has a score of 1 and disagreeing a score of 4.

Table C.5: Statements for trait anxiety (STAI)

N°	Statement
1.	I am "calm, cool and collected"*
2.	I feel that difficulties are piling up so that I cannot overcome them
3.	I worry too much over something that really doesn't matter
4.	I am happy*
5.	I have disturbing thoughts
6.	I lack self-confidence
7.	I feel secure*
8.	I take disappointments so keenly that I can't put them out of my mind

* Reverse scored statements. Where agreeing has a score of 1 and disagreeing a score of 4.

Table C.6: Score chart for state and trait anxiety (STAI).

Answer	Score
Very much	4
Moderately	3
Somewhat	2
Not at all	1
I don't want to answer this question	-

applied a short version of the scale, 6 and 8 items respectively, a weighted score was applied.

Each statement of the state anxiety had a weighted value of $\frac{20}{6}$, while the statements for the trait anxiety had an applied weight of $\frac{20}{8}$.

Finally, the anxiety scores were split into 4 categories according to their total. With the minimum score being 20 for "No anxiety" and the maximum being 80 for "High anxiety" (Table C.7)

Table C.7: State and trait anxiety levels, based on the short STAI questionaire.

Sum score	Category
20	No anxiety
21-40	Some anxiety
41-60	Moderate anxiety
61-80	High anxiety

C.6.3 Physical health

Physical health was investigated according to module PHQ-15, a somatic symptoms scale to quickly evaluate and assess the effects of mental health on physical symptoms. The 15 questions and their score evaluation were calculated according to Kroenke (2010)[21]. Symptom severity was calculated according to the answers given for each statement, where symptoms that "bothered a lot" had a score of 2, symptoms that "bother a little" had a score of 1, and symptoms that "do not bother" had a score of 0. If at least one statement had a null score ("I don't want to answer" or "I don't know"), the entry was not considered (Table C.8).

Table C.8: Score chart for physical pain symptoms

Answer	Score
Bother a lot	2
Bother a little	1
Not bothered	0
I don't want to answer this question	-
I don't know	-

Appendix D

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We are grateful for the help of the secretary group led at the time the survey was run by Franziska Schulz, to exchange their email-address lists with us, allowing us to reach most of the DRs of the MPS.

We express our big gratitude to Morgane Peirolo, a DR at the Max Planck Institute for Psycholinguistics in Nijmegen (Netherlands), for creating the magnificent cover art for this year's report. The back cover was done by Elisabeth Bobkova.

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We would also like to express our sincere gratitude to all the DRs who participated in the PhDnet survey of 2023. Your valuable insights, experience, comments and contributions have been instrumental in shaping this report.

Appendix E

About the authors

Davy S. Lin*

I am a doctoral researcher at the Max Planck Institute für Kohlenforschung in Mülheim an der Ruhr. As an organic chemist, my goal is to synthesize a family of marine natural product from simple chemical precursors. Those natural products may exhibit interesting biological activity.
Speaking up the voices of my peers, improving their overall lives, bringing more diversity and safety to their working environment are very important to me. I am deeply convinced that the publicly available PhDnet Survey Report, by shedding lights on general issues, but also reflecting on the positive changes triggered by the policy changes in the MPS, is of a general interest in order to improve the working environment of the DRs in the MPS and beyond. These are the reasons why I joined the survey group two years ago and I coordinated it this year. In this years's report, I have been interested and have written the working conditions chapter, participated to the design of the survey questions, and conducted the survey.
Outside of a lab, you can find me on hiking trails, board-game clubs, libraries, perfumeries and craft breweries.

*These authors contributed equally to this report

Ellen H. Rumley*

I am a doctoral researcher at the Max Planck Institute for Intelligent Systems in Stuttgart, Germany. My work revolves around developing soft artificial muscles for developing life-like robots and wearable devices.
I am the PhDnet CPT section representative for MPS, as well as the external PhD representative for my institute. I care deeply about developing a positive working environment for the doctorate research community, and feel it is important to receive feedback from our peers regarding the support they receive from MPS. I am excited to contribute to a publicly available survey report that, together with data from other academic institutes, can provide invaluable information about the state of academic support structures at large.
Outside of MPS, I am a flute player in a Persian 70s pop band and a enthusiastic partaker of teatime with friends.

Julia Teufel*

I am a doctoral researcher at the Max Planck Institute for the Study of Crime, Security and Law in Freiburg and my research is focused on interpersonal dynamics in relationships that involve labour exploitation. With a background in psychology and my research interest in topics around fair labour standards and equal opportunities, it was a great experience to join the survey group. I feel that the data the survey group collects every year is extremely important and I am impressed by the positive changes that happened so far based on the survey reports.
In my free time, I like to knit and cuddle my dog and am always on the hunt for the best coffee in town.

*These authors contributed equally to this report

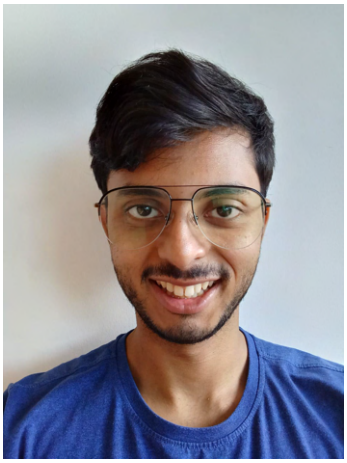
Manuel Herschel*

I'm a doctoral researcher at the Max Planck Institute for Plasma Physics in Garching near Munich. My work revolves around experimental plasma physics, measurement techniques and data analysis of plasma devices for nuclear fusion research. I'm interested not only in the many different physical and technical details of my work, but also in the political and practical framework around the life of doctoral researchers. Consequently, I started as an internal DR representative at my institute and then joined the survey group and switched to being the external representative for the following term.
To me, the PhDnet survey is one of the best examples of how open science can work to benefit the lifes of DRs: An annual, comprehensive, and publicly accessible study to be the basis for a fact-based discussion on how to improve the academic environment.
Outside of work, you can find me going camping with my bike, playing indie video games and tinkering around with software and electronics.

Natalie Popov*

I'm a doctoral researcher at the Max Planck Institute for the Study of Crime, Security and Law in Freiburg. My research focuses on understanding how the interaction between personality and situational factors ultimately results in prosocial behaviour. I have a passion for data, particularly when it reveals individual differences among people, and enjoy turning data into insights. The PhDnet survey is a fantastic example of how abstract data can be used to identify systematic shortcomings and ultimately improve the work environment for DRs. I'm excited to support the survey group and appreciate that they welcomed me as I joined them in the final stages of the project. When I'm not buried in data and research, you can find me dancing contemporary and ballet and trying my hand at stand-up comedy.

*These authors contributed equally to this report



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I am a doctoral researcher at the Max Planck Institute for Solar System Research in Göttingen. My research focuses on studying the dynamics of the solar interior and refining our models of the Sun through observational data. Analyzing and assimilating data is a significant part of my work, and I find it truly fascinating.

I joined the PhDnet survey working group because I believe that uncovering patterns in data is one of the most valuable aspects of science. I am thrilled to continue uncovering patterns outside of regular PhD work as well.

When I'm not working, you can find me learning new musical instruments, hiking, playing badminton, or looking for other new skills to pick up.

Jessica Donzowa

I'm a doctoral researcher at the Max Planck Institute for Demographic Research in Rostock and at the University of Bielefeld. My research focuses on data quality in online surveys using social media recruitment and new survey reporting approaches for estimating demographic outcomes in low- and middle-income countries. Thus, the work of the survey group fits perfectly with my research interests and I was happy to join them in the final phase of data analysis to contribute some of the graphs. I think the PhD survey is crucial for giving doctoral researchers a voice and advocating for improvements in the academic environment. Outside of work I'm an enthusiastic jigsaw puzzler and enjoy spending time by the Baltic Sea.

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Elisabeth Bobkova

I am a doctoral researcher at the Max Planck Institute for Terrestrial Microbiology in Marburg, Germany. My project focuses on engineering protein-based nanopores to functionalize synthetic membranes.
Since the beginning of my PhD, I have been committed to amplifying PhD voices at all levels of science policy and ensuring fairness in our working conditions. In my current role as the spokesperson of PhDnet, I rely on the data from the PhDnet survey a lot. As one of the few open-access publications concerning the working conditions of doctoral researchers in Germany, this survey provides an important benchmark, advocates for our community and influences science policy decisions within and outside of Max Planck Society. This is why I am excited to be part of the survey team and contribute to this report - from question design to report writing.
When I am not in the lab or the Deutsche Bahn, you can find me dancing, illustrating scientific articles, playing the flute or screaming my heart out at metal festivals.

Aybuge Altay

I am a doctoral researcher at the Max Planck Institute for Molecular Genetics in Berlin. As a computational biologist, my PhD focuses on developing new computational methods to improve the annotation of cell types in single-cell studies.
Throughout my PhD, I have been interested in the PhDnet surveys, finding them to be invaluable tools for supporting the well-being of doctoral researchers and amplifying their voices within the Max Planck Society. This year, I had the privilege of contributing in the final phase of data analysis in this survey.
In my personal time, I enjoy attending live concerts, indoor cycling, and discovering new cuisines.

Thank you for conducting this survey. It made me ask myself some difficult questions that I now realise I should have asked beforehand.

Thanks for advocating for doctoral researchers :)

Thank you for everything you do. I really hope, this survey can help to shed light on what is going wrong so institute directors and administration finally change things.

Having the section about how you feel emotionally was very important for me.

Thanks for taking care of us!

Thanks a lot for doing this! I very much appreciate all the support PhDnet provides, and all the negotiations for a benefit of PhD students that were achieved!