



20 SURVEY 20 REPORT



The doctoral network of the Max Planck Society

PhDnet Report 2020

PhDnet Survey Group

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Chapter 1

Introduction

The Max Planck Society (MPS) has built a reputation of excellence for its innovative research and contribution to Science, both across Germany and internationally. Such groundbreaking research was honoured in 2020, with not one, but two Nobel Prizes' in Chemistry and Physics, an exemplary feat even for the MPS. Such feats would not be possible without the steam that keeps this powerhouse of scientific research running, it's doctoral researchers (DRs). As of 2020 DRs number over 4900 working in 86 Max Planck Institutes (MPIs). To have a common voice for all DRs in the MPS, the Max Planck PhDNet was founded in 2003. Since its inception, the Max Planck PhDNet, has bridged communication between DRs and the MPS administration, strengthened academic solidarity, and improved working conditions of DRs. Initiated in 2006, the PhDnet survey has served as a crucial tool employed by the PhDNet to collect the voices of DRs. To further amplify our collective voices the PhDNet has collaborated 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 since 2019, forming what is known as N2.

The aims of this survey:

- By collecting precious feedback from DRs, we are able to reflect on the status quo. The anonymous and comprehensive analysis helps us to address the most urgent concerns. In the past years, those

included topics like power abuse, satisfaction with holidays, salary, and mental health. The collected data became a pillar to the advocacy of the PhDnet steering group, and further encouraged the collaborative efforts with the General Administration of the MPS and to improve the DRs' working conditions.

- Crucially, the survey is not only focused on the most pressing issues, but additionally allows us to investigate the "stumbling blocks". It unveiled hidden issues faced by DRs, such as pay gaps, difficulties in the supervisory relationship, and this year also instances of discrimination and microaggression, lack of compatibility with family plans, and dissatisfaction with the amount of permanent contracts in academia.
- Specific reports for individual institutes were distributed without harming the anonymity of participants. They have been helping many institutes spot the local shortcomings, which offered space for adjusting the institute policies, and grounding better local support for employees.
- Through the years, the surveys were designed to retain the continuity of some critical issues. They well indicated how policies can change the DRs' situation, and tracked development of satisfaction

of DRs in the MPS, such as through the abolishment of stipends in 2015, the increase of holidays in 2019, or the establishment of the PlanckAcademy in 2020.

This year, the survey has been designed to include six chapters, namely:

- **Demographics** presents the overview of our respondents this year, and ensures the validity of this survey.
- **Mental Health** brings one of the most important topics to the front, using three measures: state anxiety, trait anxiety, and depression. The mental health indicators in demographic characteristics sound the alarm: who could be potentially more endangered? Or who is exposed to more factors impacting one's mental health? In consideration that there are multitudinous causes of mental health problems, the correlation with other conditions are thoroughly discussed in the following chapters.
- **Working conditions** provides a comprehensive view of the core of the survey: the composition of funding sources, pay gaps, working hours and holidays, opportunities to work from home, duration of contracts and how information is distributed, satisfaction with various aspects, considerations of quitting, and relations with mental health impairments.
- **Support Structures & Scientific Environment** discusses the necessary support system to DRs besides working conditions. Doctoral research is not solely a work, but also an educational process. A cornerstone of the education and personal development offered by doctoral research is the relationships

that DRs have with their direct and formal supervisors. Here we describe the occurring pitfalls of these supervisory relationships, what support is needed by DRs when they look for career opportunities, as well as what is still lacking for international students. As the previous one, this section elucidates how all of these factors relate to DRs' mental health.

- **Discrimination & Conflict** emerge given the great diversity in the MPS. The new topic from this year's survey raises awareness of microaggressions and discrimination on various basis, which potentially hinder a positive work place culture, and could build up mental health risks for employees affected.
- **Cluster Analysis** applies cutting-edge analysis on the whole survey data. It identifies the most important characteristics of this years survey. This analysis confirmed findings of earlier chapters and, furthermore, it spots several new discoveries providing prospects on the improvement of DRs' satisfaction.

As illustrated on the survey 2019 cover [23], doctoral research is a tortuous path. A path, in which DRs learn, institutes learn, and the MPS as a whole learns, how to build a sustainable and supportive environment, and nourish the growth of science. Despite all the struggles we hear, we see and we experience, many positive changes are on the way, as the new contract system in 2015, the increase to 30 holidays days in 2019, and the milestone of 65% base contract starting from January 2021. Quoted from one of our respondents this year:

MPS is leading the path to humane PhD work – let's grow that model.
(Anonymous respondent)

Chapter 2

Demographics

Key Points:

- This year 2378 DRs across the MPS participated in the survey, representing all the sections at almost equal ratios
- Women DRs are overall under-represented in the MPS; vastly under-represented in the CPT section but over-represented in the BM and HS sections
- Almost half of all respondents hold German citizenship
- Roughly 71% of respondents identify as being of European descent
- Only 7% of respondents are (expecting) parents

In the survey period of 2020, a total number of 4911 eligible DRs were asked to respond to our questions. The 2378 (48.4%)

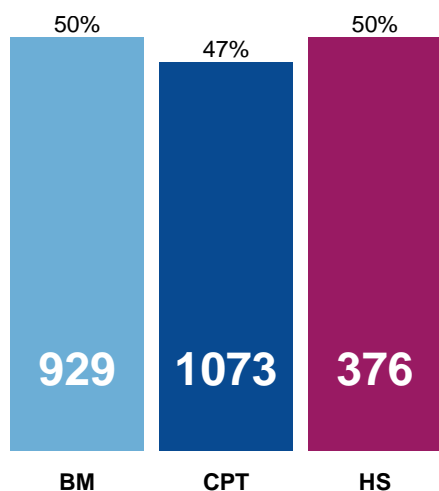


Figure 2.1: Survey Participation Rate per Section (total number of participants per section in bold white font)

complete and valid responses we received,

provide us with an invaluable resource to assess the positive aspects of being a DR in the MPS but also point to the areas where improvements are still needed, important, and necessary. The voices raised in this survey are not coming from a monolithic group of people, but from diverse DRs working in various fields under many different conditions and circumstances.

As shown in Figure 2.1, the participants in this years survey come from all three sections of the MPS, Biomedical (BM), Chemistry, Physics and Technology (CPT) and Humanities (HS).

On average, DRs are 26.2 years old at the beginning of their PhD with only slight age differences between gender identities (see Supplementary Figure A.2).

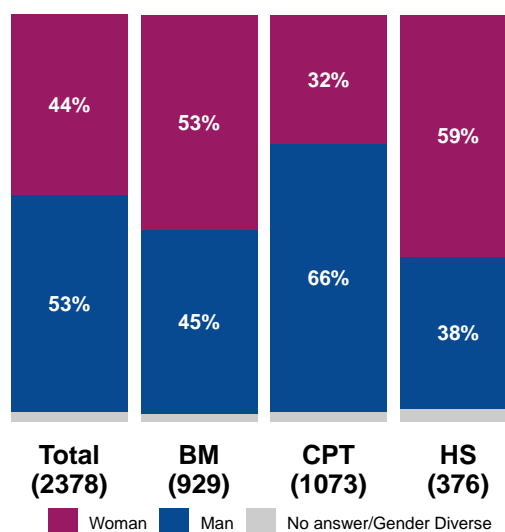


Figure 2.2: Gender Distribution per Section

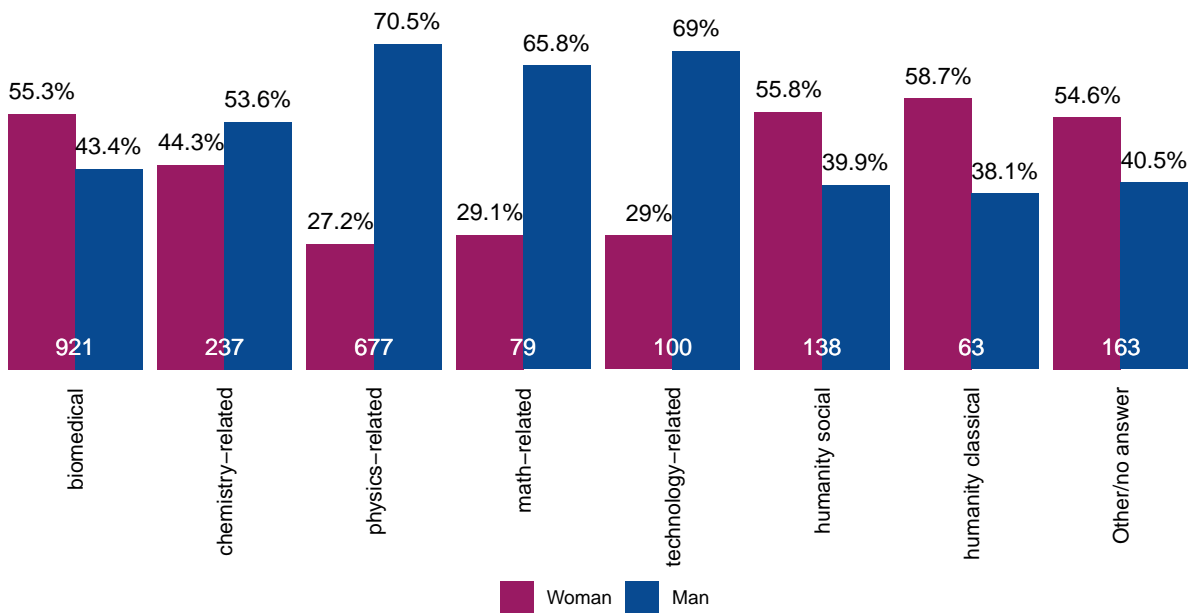


Figure 2.3: Gender Distribution per field of study. Diverse gender identities and missing answers are not shown.

Of all respondents, a total of 44% (1053 participants) identified as women, 53% (1270 participants) as men and 2% (55) either identified as gender diverse (8) or did not feel comfortable in providing their gender identity at all (47).

Importantly, the proportion of gender identities are vastly different between the three sections of the MPS as shown in Figure 2.2, with the CPT section having the lowest proportion of DRs identifying as woman compared to the BM and HS sections.

Dramatically different are also the proportions of men and women working in different fields, as shown in Figure 2.3, with more women than men working in biomedical and humanity fields. These gender gaps are extreme in fields like physics (circa 70% men vs. 27% women), technology (69% men vs. 29% women) and mathematics (66% men vs. 29% women).

While a majority of DRs hold either German citizenship (44%) or citizenship of another country in the European Union (20%), the MPS is able to attract roughly 35% of its DRs from outside of the EU (see Figure 2.4).

As shown in Supplementary Figure A.1,

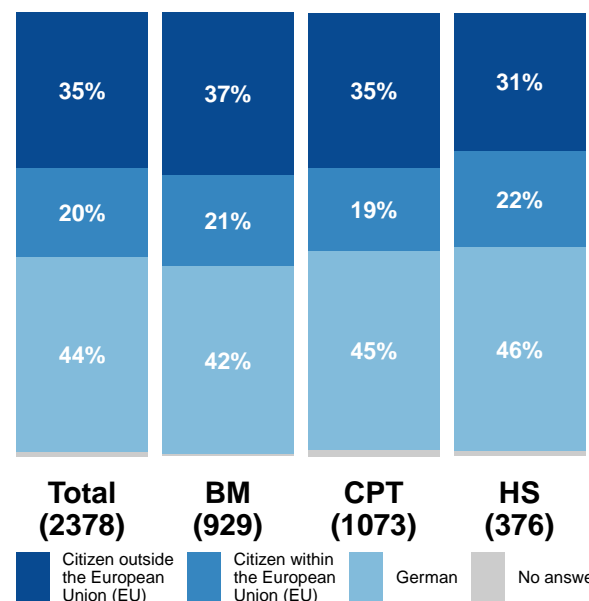


Figure 2.4: Citizenship of DRs per Section. Responses given less than 2% are not labelled.

across all sections, 71% of participants identify with being of European descent, followed by 10% of Southeast Asian and 7% of South Asian descent. The remaining 12% of participants are split among the other six response options provided in the survey, including being of mixed descent. Across the entire MPS only 16 DRs report being of African and 2 of Caribbean descent.

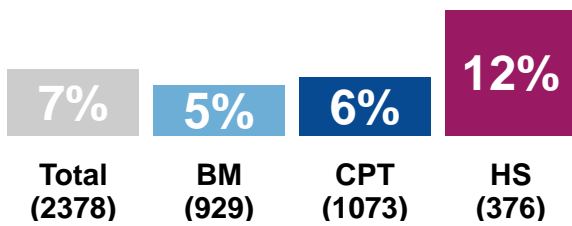


Figure 2.5: Parenthood of DRs per Section

In this Survey, 61% of respondents have partners which they are in long-term relationships with (Supplementary Figure A.3). Roughly 7% of all Participants are (expecting) parents with the HS section reaching more than double the percentages of the other sections at 12% (see Figure 2.5).

Overall, there are slight changes in the reported demographics compared to last years survey. The overall response rate of 48% is slightly lower than last years 51%. On the other hand, for many questions in this chapter, which contain sensitive personal information, the willingness of participants to respond was higher ($\geq 98\%$) than last year ($\geq 96\%$), which we hope is due to increasing trust in our yearly survey procedures.

Chapter 3

Mental Health

Key Points:

- *Mental health seems to be compromised in this year's cohort (slightly more so than in 2019)*
- *DRs' demographic characteristics, such as their gender, nationality, and disability, relate to the degree of reported mental health symptoms*
- *Reporting mental health issues is also directly related to DRs' perceived difficulties in doing their work as well as considering to quit the PhD*

In recent years, the issue of mental health symptoms in Doctoral Researchers (DRs) has received increasing attention (for a meta-analysis of depression and anxiety symptoms in DRs as compared with the general public, see [26]). This confirms the need for continued focus on the mental health status of DRs within the Max Planck Society (MPS). Similar to last year's report, we will introduce the three indicators of mental health used in our survey. Specifically, we will describe their prevalence in this year's cohort of DRs and compare it to the results of the 2019 survey (for the 2019 survey results, see [23]). Moreover, we will address how these indicators relate to other variables assessed in our survey at the end of each chapter of this report.

3.1 Mental Health Classifications

To allow for comparability with last year's survey, we used the same three measures of

mental health symptoms:

- **State anxiety:** the current level of anxiety symptoms is determined by investigating how anxious people feel at the moment
- **Trait anxiety:** the overall level of anxiety symptoms is determined by investigating how anxious people feel in general
- **Depression:** the level of depression symptoms is determined by investigating which problems have bothered people in the last weeks

In accordance with last year's survey, state and trait anxiety scores were collected by using a short version of the Spielberger State-Trait Anxiety Inventory (STAI; [19]), while depression scores were obtained using the Patient Health Questionnaire module PHQ-9 ([15]). Both questionnaires are established diagnostic instruments of anxiety and depression, respectively. In general, lower scores imply fewer or less severe self-reported symptoms of state and trait anxiety and depression. For state and trait anxiety, scores range from 20-80, and depression scores range from 0-24. Since there is an ongoing debate regarding the exact categorical classification of mental health issues, we only use the continuous scores of state and trait anxiety as well as depression in our statistical analyses. If desired, these results can still be understood from a categorical perspective by looking at the Appendix F.2.1, where the score-boundaries per category are listed.

The statistical analyses we report are based

on simple or generalized linear regression models (e.g., binomial regression) with either numerical independent variables or categorical ones, depending on the type of data, therefore allowing for correlation analyses or group comparisons (it will be specified in footnotes if this is not the case). For visualization, the data usually will be presented in the form of classical box plots. This is done as they help to display various properties of the distribution and are thus more informative than simple displays of the mean. The central line in each box plot represents the median, and a black square has been added to show the mean. For ease of understanding, and to match the conducted analyses, we will additionally specify the respective means in the examples provided in the text.

3.2 Mental Health Overview

Similar to 2019, we observed alarming levels of mental health symptoms among the MPS' DRs in the 2020 survey (see Figures 3.1,3.2,3.3). More than half of all DRs responding to the 2020 survey show at least mild depression symptoms (~52%). In ~19.5% of the respondents we even find an indication of at least moderate depression. In comparison, only between ~7.9% and ~9.9% of the general population report symptoms of at least moderate depression [4].

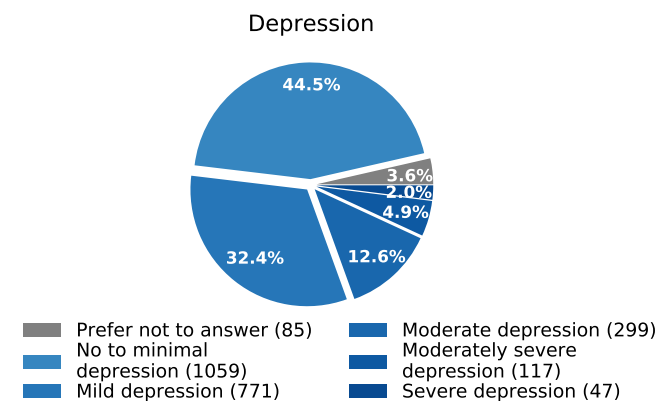


Figure 3.1: Prevalence of Depressive Symptoms among MPS DRs in 2020

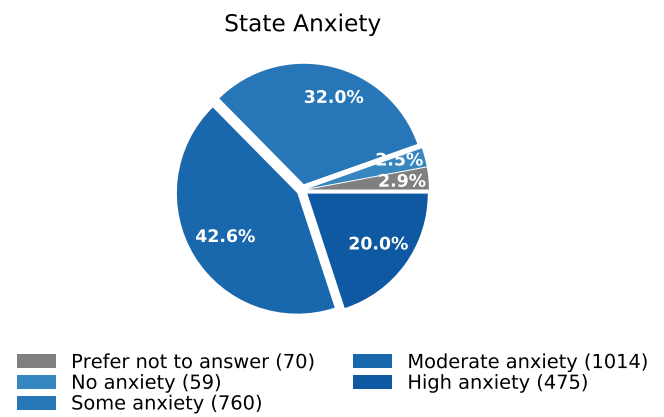


Figure 3.2: Prevalence of State Anxiety Symptoms among MPS DRs in 2020

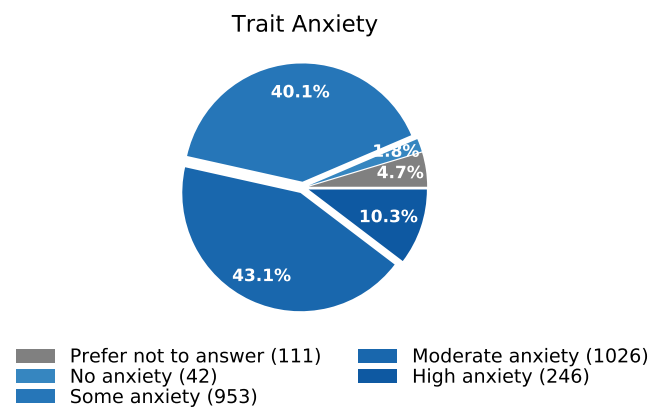


Figure 3.3: Prevalence of Trait Anxiety Symptoms among MPS DRs in 2020

Almost two thirds (~62%) of all DRs reported moderate to high degrees of current (i.e. state) anxiety symptoms at the time of the survey (autumn 2020), and more than half (~53%) reported moderate to high degrees of general (i.e. trait) anxiety symptoms. As categorical values from the general population are not available for the STAI, we are unable to compare these values with the general population.

3.3 Mental Health Indicator Interrelation

Unsurprisingly, matching last year's results (see [23]), our three mental health indicators highly correlated with each other (see Figures A.4). It should be noted that, anxiety dis-

orders typically precede the diagnosis of depression [13]. This highlights the importance of treating mental health generally, creating an environment which mitigates the initial causes of anxiety and depression, especially within the population of doctoral researchers.

In all analyses of the following sections related to mental health, we will consider this strong interrelation of the three indicators of mental health. Specifically, we will abstain from using several indicators in one model when looking at the relationship between mental health and other variables assessed in our survey.

3.4 Mental Health in 2019 & in 2020

We are aware of the possibility that, especially in a year like this, mental health symptoms may be quickly attributed to the societal challenges imposed by the COVID-19 pandemic. Of course, the nature of our data does not allow for clear attributions to this circumstance, but we indeed observe slight, yet significant increases in trait anxiety and depression scores (t-tests, both $p < .05$) from 2019 to 2020. So, for example, while in 2019 the mean trait anxiety score was 43.5, this increased to a mean score of 44.3 in 2020 (each out of 80 points; see Figure 3.4). Moreover, while the mean depression score was 5.7, this increased to a mean score of 6.1 in 2020 (each out of 24 points). As already stressed in last year’s survey, the observed degrees of mental health symptoms become even more worrisome when comparing them with those of an age-related group of the general population. Interestingly, this remains true even when taking into account the special situation created by COVID-19 (for current mental health issues in comparable groups regarding age and gender, see [4]).

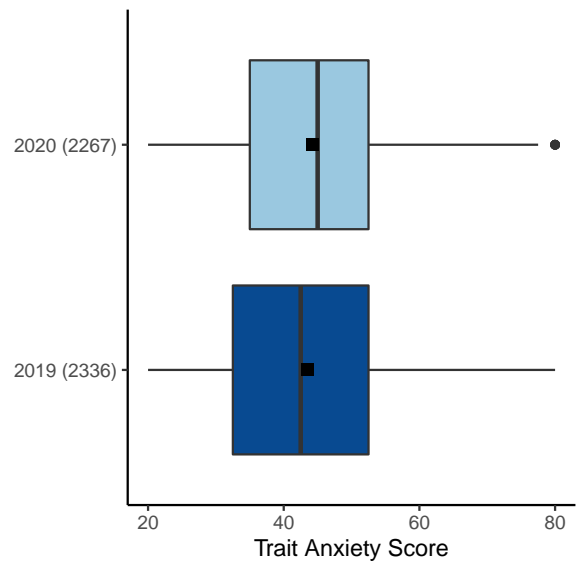


Figure 3.4: Comparison of Trait Anxiety Scores among MPS DRs in 2019 and 2020 (black squares represent group means)

3.5 Mental Health & Downstream Consequences

We find that impaired mental health directly relates to perceived difficulties in doing one’s work (which we consider at least an indirect measure of DRs productivity; see Figure 3.5). Specifically, higher depression, state and trait anxiety scores all go along with increased self-reported difficulties in doing one’s work (coefficients of a glm, all $p < .001$).

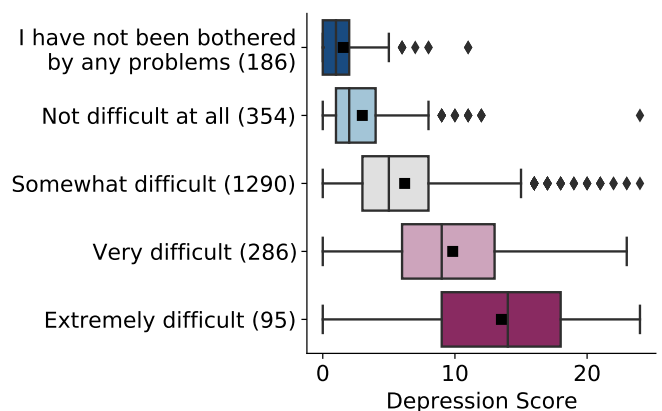


Figure 3.5: Difficulties to Work Due to Depression Symptoms (black squares represent group means)

Poor mental health is also related to the thought of quitting one’s PhD. For example,

we find that DRs who have considered quitting their PhD “rarely”, “occasionally” or “often” have higher depression scores than those who have never considered quitting (see Figure 3.6). To quantify the relationship between mental health and the odds of considering to quit one’s PhD, we first categorised the latter in “Did not consider to quit” and “Considered to quit at least once” and then we ran three logistic regression models with the mental health scores as independent variables (see Appendix F.2.2). We find that an increase by just 1 point in either of the mental impairment indicators corresponds to statistically significant higher odds of considering to quit one’s PhD (depression: 20% higher odds of considering to quit; state anxiety: 6% higher odds; trait anxiety: 7% higher odds of considering to quit; all odds-ratios $p < .001$;

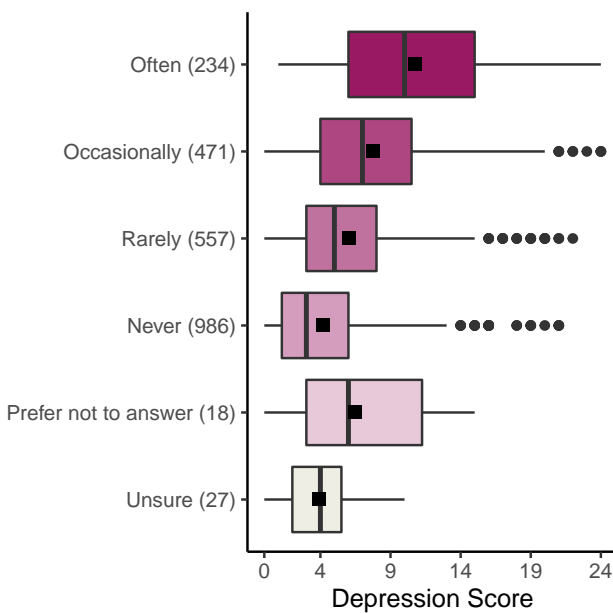


Figure 3.6: Depressive Symptoms & Consideration to Quit One’s PhD (black squares represent group means)

Of course, ensuring mental well-being should be an (ethical) goal in and of itself. However, our results show that disregarding mental health issues and their antecedents could have negative downstream consequences, which can have a direct impact on scientific performance.

In the following chapters, we will relate the mental health scores to the other variables assessed in this year’s survey. The relationship between mental health and demographics will be outlined in the next paragraph. For all other variables, their relationship with mental health will be highlighted at the end of each respective chapter.

3.6 Mental Health & Demographics

When focusing on differences based on gender, we find that women report higher levels of all three indicators of compromised mental health than men (t-tests for comparison of groups, all p -values $< .001$). For example, in Figure 3.7, we can see that men have a mean state anxiety score of 46.4 out of 80, while women’s mean score for state anxiety symptoms is 50.2. The mean state anxiety score for those identifying as gender diverse is 57.1, but only 8 people are in the gender-diverse category, so this was not further analyzed. Such gender differences in mental health indicators align with persistent structural inequalities in the treatment and opportunities of women compared to men within the MPS. These inequalities will be highlighted in subsequent chapters.

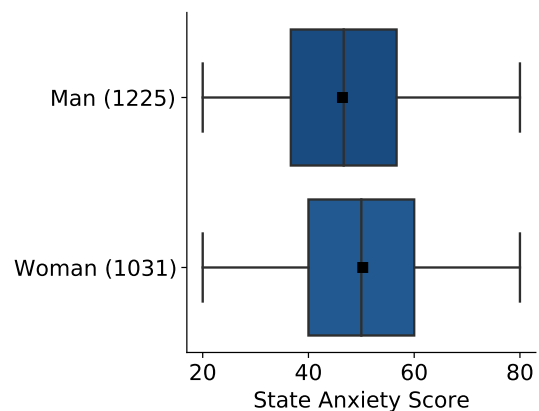


Figure 3.7: State Anxiety Score by Gender (black squares represent group means)

Beyond gender, inequalities persist in other facets such as nationality and disability.

Sadly, we found that these two factors also relate to mental health symptoms. Specifically, when compared to having German citizenship, both being a Non-German EU-Citizen or a Non-EU-Citizen significantly relate to increased state and trait anxiety as well as depression scores (t-tests for comparison of groups, all p -values $<.001$). For example, while DRs with German citizenship have a mean trait anxiety score of 43.1, Non-German DRs from within and outside the EU have a mean trait anxiety score of 45.6 and 45, respectively (out of maximum 80) (see 3.8).

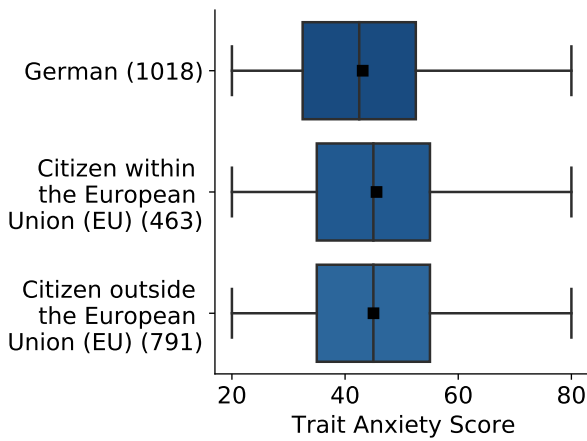


Figure 3.8: Trait Anxiety Score by Nationality (black squares represent group means)

Moreover, those, who consider themselves to have a disability, report significantly elevated levels of all indicators of compromised mental health (t-tests for comparison of groups, all p -values $<.001$). For example, the mean depression score for those reporting a disability (mean depression score: 10.3 out of 24) is almost twice as high as for those reporting to have no disability (mean depression score: 5.9 out of 24; see Figure 3.9).

When we group responses by section (HS, BM and CPT), we see that DRs of the BM disciplines have significantly higher depression (about .76 higher score, p -value $<.001$), trait (about 1.7 points higher, p -value $<.004$), and state anxiety (about 1.9 points higher, p -value $<.004$) scores than DRs of the CPT disciplines. But this difference might be due

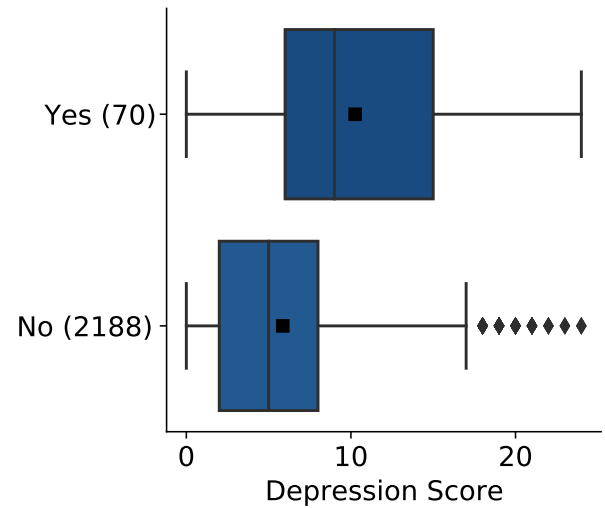


Figure 3.9: Depression Score by Disability (black squares represent group means)

to the higher scores in women and relatively more woman DRs in BM section. After correcting for gender factor, the difference between two sections became insignificant. No statistically significant difference has been found between the CPT and the HS section. For example, in Figure 3.10, we can see that the mean state anxiety score is 49 in the BM section compared to a mean score of 47.45 for those in the CPT section.

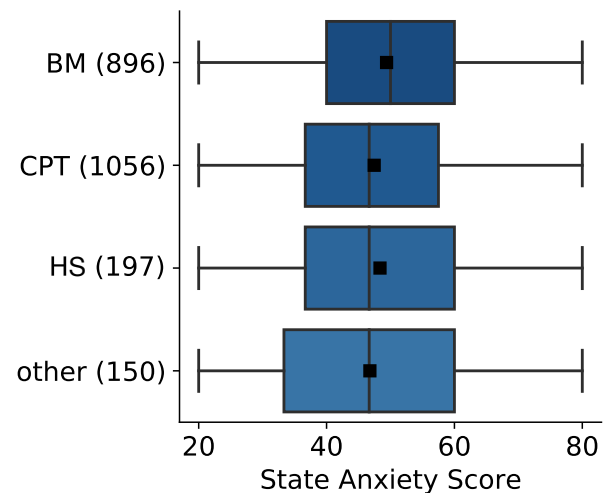


Figure 3.10: State Anxiety Score by Section (black squares represent group means)

Lastly, we observe that the estimated time remaining until submission of one’s doctoral thesis significantly relates to DRs state anxiety scores, meaning the less time DRs esti-

mate to have until the end of their PhD, the higher their state anxiety scores (Pearson's correlation coefficient, $p < .001$; see Supplementary Figure A.5). For example, those expecting to submit their thesis this October (2021) had a mean state anxiety score of 52.5, while those expecting to submit only in October 2022 had a mean anxiety score of 47.1 (each out of 80 points).

Surely, some degree of anxiety when being close to the finishing line may be normal, and our results do not allow to clearly relate such increased anxiety to insufficient time for doing the PhD. However, as we will discuss in the next section, many DRs are given contracts with durations not properly encompassing the actual duration of a PhD. In the sections after that, we will also highlight the relevance of supervision quality and other key factors of the scientific environment for DRs' mental health. Additionally, we will elucidate the role of experiencing conflicts and discrimination as it relates to mental health. Solving these issues can potentially help to alleviate some of the anxiety or depression symptoms we observed in this year's DR's cohort.

3.7 Selected Voices

"I am super tired because I didn't have holidays this year, and my supervisor expects me to publish in a month the first paper of my PhD, even though I know I can't make it in 1 month. Besides, my supervisor keeps asking me to do extra things at the same time. I feel I will collapse any moment soon. "

(Anonymous respondent)

"I feel this is very much related to us international students, especially the ones who came from a country that if we go back because of visa long-time problem, it would be really difficult to come back to the academia. People here won't easily

understand such fear, even international people from countries with fewer problems. I guess there is not enough help in the life of an international PhD to create their career and have a safe transition to the next job until they get a secure residence permit. I guess this is the deepest and longest scar on my brain preventing me from working freely and fully. "

(Anonymous respondent)

"There is a lot of stress in my life currently both professionally and personally, which is further exasperated by the pandemic and having older parents overseas. However, I am sure that there is a light at the end of the tunnel, it is just a matter of figuring out how long the tunnel is...."

(Anonymous respondent)

Chapter 4

Working Conditions

Key Points:

- *There are significant pay gaps between gender identities, section memberships and citizenship*
- *3 year contracts do not cover the duration of most PhD projects*
- *Most DRs work more hours than they have to and take fewer holidays than they are entitled*
- *Overwork of DRs is mostly due to a highly demanding work environment and high workload*
- *While most DRs are satisfied with their working conditions, 31% of all DRs think about quitting their position at least occasionally*
- *Improved working conditions directly correlate with improved mental health indicators in DRs*

Doctoral researchers can be considered as one of the drivers for scientific advances made by the MPS as a whole. Their research contributes large portions of the work that solidifies the position of the Max Planck Society as one of the top research institutions in the world. It is therefore imperative to create supportive and enticing working conditions for the DRs in order to help them focus on their research and keep their productivity at a high level throughout their time as DRs within the MPS.

In this chapter we take a closer look at the working hours, salary, contract types and work environment of DRs in the MPS and how

these factors influence their work satisfaction.

4.1 Funding & Salary

One of the major concerns of DRs in recent years has been how their positions are financed, how much income they receive, and the security this income affords them. Last year's survey reported a positive development towards more DRs being financed through contracts rather than stipends, with 90% of DRs reportedly financed through contracts. Positively, this trend seems to persist in this year's survey across all sections, as overall 91% of all DRs in the survey are employed through contracts, although distinct variation between the sections remain (see Figure 4.1).

When looking at the same data separated by the year DRs began their PhDs (Supplementary Figure B.3), it becomes clear that this trend is driven by new DRs receiving contracts, but many DRs that started work on their PhDs in 2018 and before still rely on stipends or are even unpaid. Low but consistent numbers of roughly 1% of DRs are not paid at all for their work, with the HS section reaching 2% of unpaid DRs. Doctoral researchers with non-European citizenship are also more likely to rely on stipends for their work (8% for non-European DRs as compared to less than 3% in the other groups, see Supplementary Figure B.10).

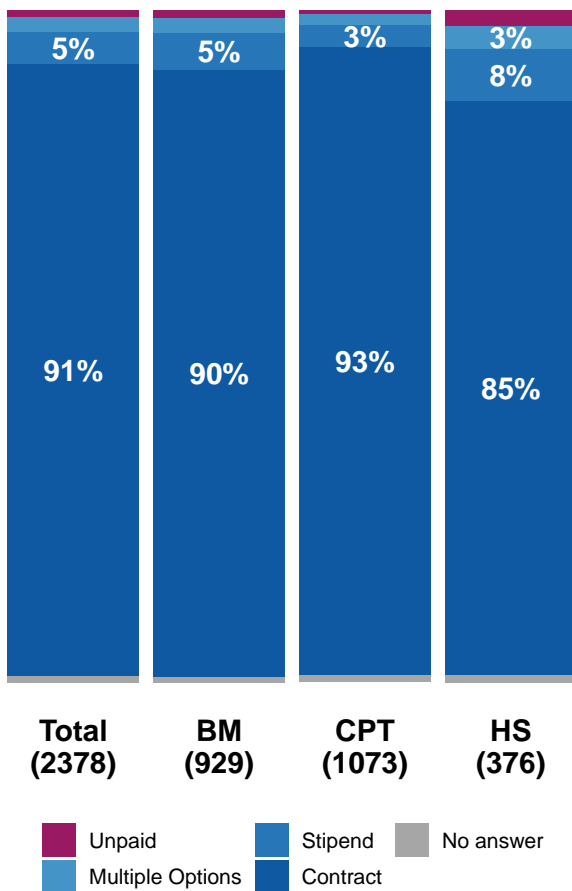


Figure 4.1: "What kind of contract do you have?" by Section (Responses given less than 2% are not labelled).

Gender differences in the type of funding are not big, with slightly more women than men receiving a stipend (6% women vs. 4% men, see Supplementary Figure B.11.)

While all of these factors create inequalities in the contract situations of DRs in the MPS, it should be positively noted that all have continuously improved over recent years, albeit only slightly. Providing contracts over stipends should not only be encouraged because they typically provide better pay to the DRs, but also better access to healthcare and social benefits.

As in previous years, DRs in the different sections have significantly different (net) incomes compared to each other (Figure 4.2). The proportions of DRs earning a net

monthly income higher than 1900 euro are significantly higher (two proportions z-test, p -value < 0.001) for DRs in the CPT section than for DRs in both the BM and the HS sections. The proportions of DRs in the HS earning net monthly incomes between 500 and 1100 euros, is significantly higher than the same proportions among students in the CPT section (two proportions z-test, p -value < 0.05) but not among students in the BM section. Doctoral researchers working in different fields have different net incomes, as shown by Supplementary Figure B.4, with technology-related, math-related and chemistry-related fields being the best paid ones.

We investigate differences in net-income by simultaneously accounting for several demographic and contract related characteristics of the participants, by means of a regression analysis, after converting categorical responses into numbers by taking the mid-point of each interval. We model the net income through a multiple linear regression model where the following covariates are included: gender, section, the field of study, the type of work, the ethnicity, the type of contract, the type of employment and whether the student is in their first year of employment or not. Details of the model can be found in the appendix (see Appendix F.5).

Consistent with results from previous years, there is a statistically significant gender pay gap, with women DRs earning on average less per month than men. The average net-income across all DRs of the MPS, as predicted by the model, is higher for men than women by about 26€ (See also Supplementary table B.1). Both men and women earn the highest net incomes in the CPT section, followed by the BM section and lastly the HS section (Figure 4.4). By means of the regression model, we controlled for differences in net-income between people under different contract and employment

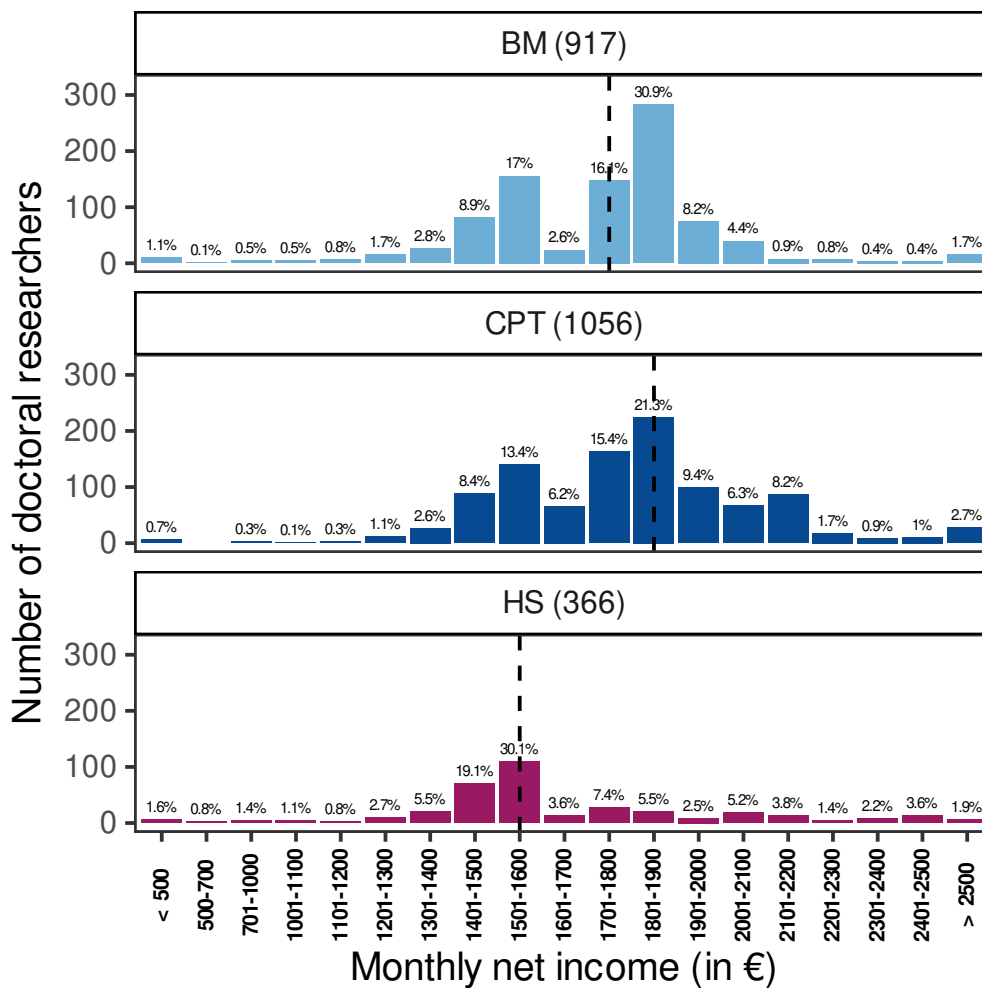


Figure 4.2: Net income by Section (Empty responses were excluded, median marked by dotted line)

situations. Therefore, the differences in predicted net income of DRs in the different sections and among men and women, do not depend on the different contract and employment situations. Similar results are observed for the predicted gender pay gap by field of work and type of work (see Supplementary figures B.5 and B.6). For all estimates of the model coefficients see Supplementary Table B.1.

Not only is there a discrepancy between men and women DRs, a striking difference is also found between Non-European DRs and European/German DRs. Non-European DRs earn 54.37€ less per month compared to German DRs and 44.10€ less compared to European DRs, while no significant differ-

ences are found between German DRs and European DRs. This difference is partially explained by the fact that a higher percentage of Non-European DRs are on stipends (see Supplementary Figure B.10, but even when DRs receiving stipends are excluded from the analysis, a smaller but still significant difference is found. Equal treatment independent of gender and nationality should be aimed for in the future.

In 2020, the increase in pay for Doktorandenfördervertrag holders from 50% TVöD/TVL level 13 to 65% was implemented, after years of encouragement from the PhDnet. This is an important step forward in providing better and equal pay to as many DRs in the MPS as possible and raises the

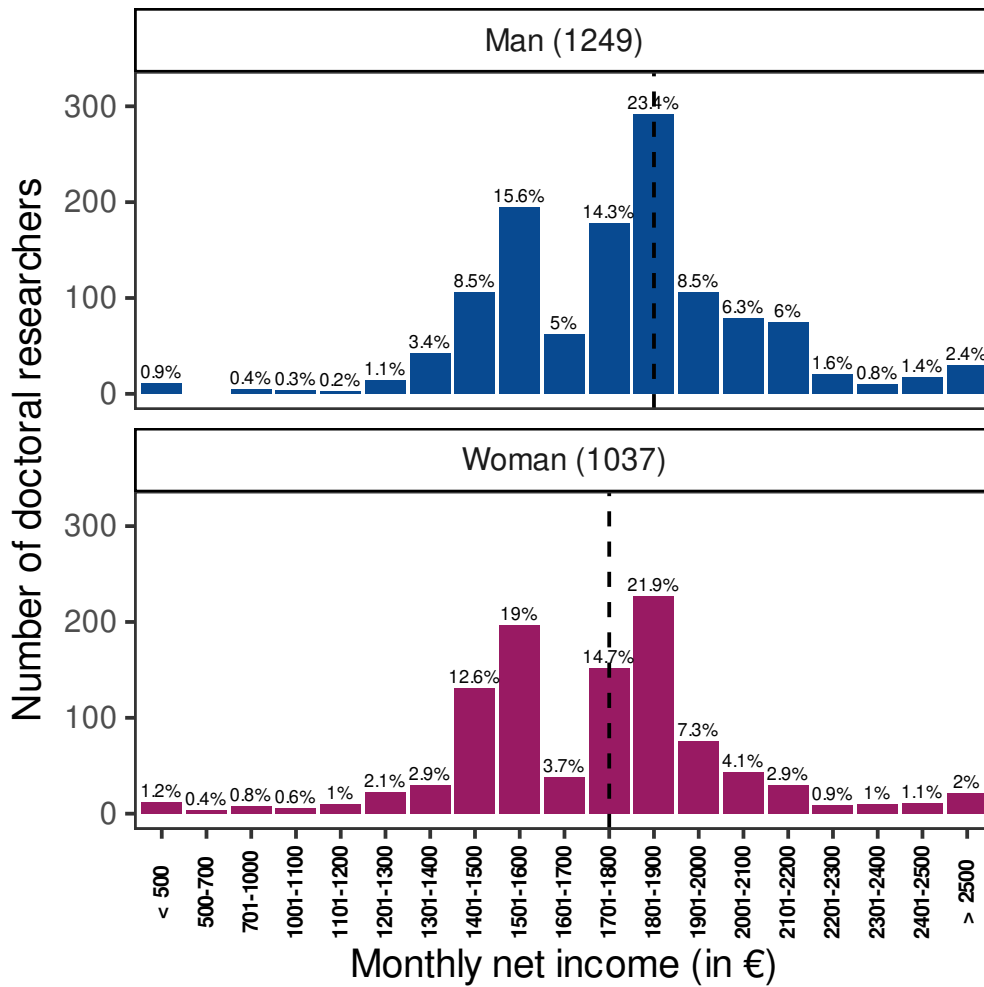


Figure 4.3: Net income by Gender Identity (No answer/Gender Diverse responses were excluded, median marked by dotted line)

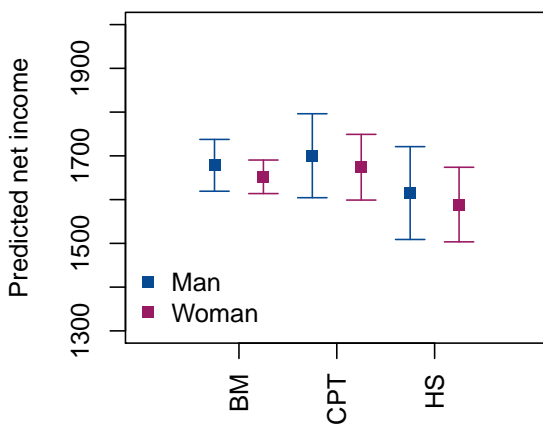


Figure 4.4: Predicted average net income by gender and section.

percentage of DRs on this pay level from around 22% in this survey to roughly 57% of DRs. This improvement should be visible in future surveys in the reported net pay and decrease the now prominent pay difference between sections (see Supplementary Figure B.2). The magnitude of the impact of this development on the various pay gaps within the MPS remains to be seen.

4.1.1 External Funding & Financial Support

A contract by the MPS does not have to be the (only) source of income for doctoral researchers. While gaining external research

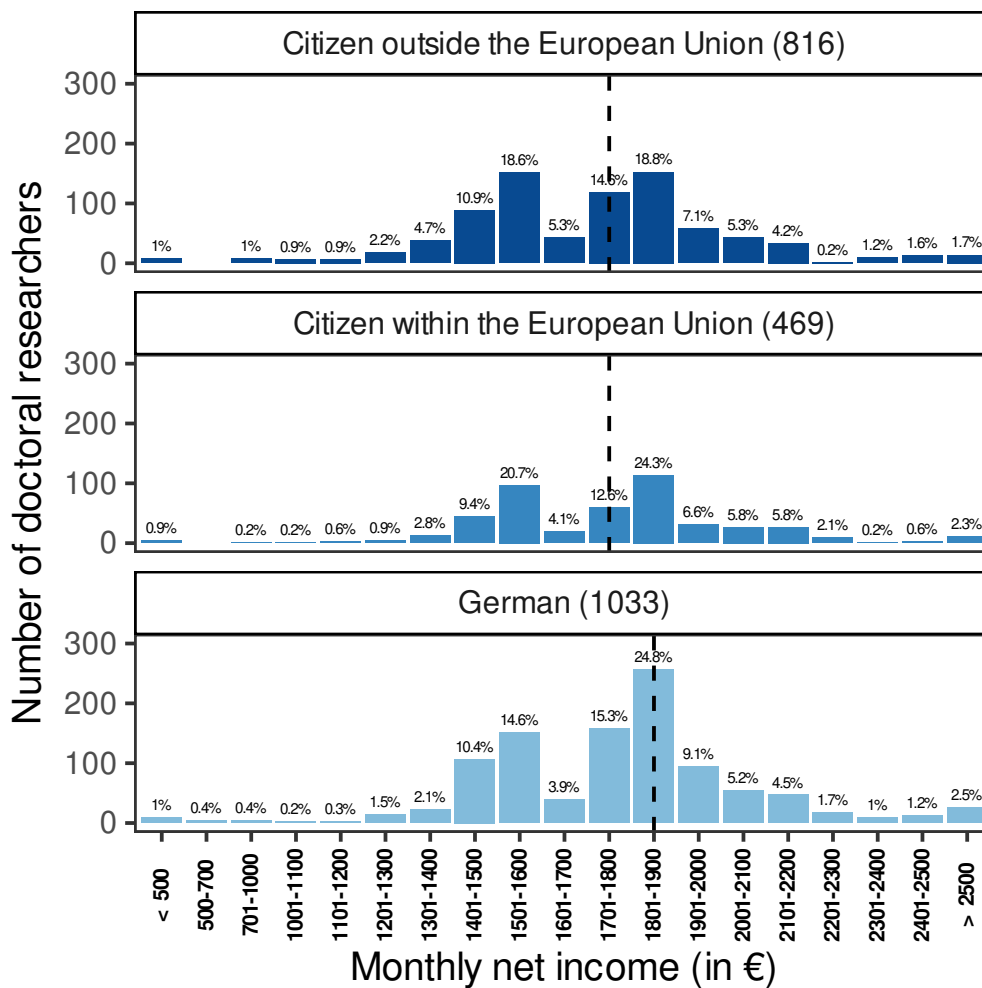


Figure 4.5: Net income by Citizenship (empty responses were excluded, median marked by dotted line)

grants can be an empowering situation, external funding, stipends in particular, can also lead to less job security, stability, and net pay compared with a stable contract from the MPS.

Therefore, we asked the participants whether they are currently, or have been in the past, recipients of external funding as their main source of income. All together, 89% of DRs do not currently depend on external funding, 83% have never and 6% have in the past. The remaining 8% are either on external contracts, stipends or both (see Supplementary Figure B.9).

Aside from external funding, DRs might also rely on direct financial support from

relatives, partners and parents. Within the MPS, this affects a minority, but still substantial fraction of DRs (18%), with parents and partners being the most common sources of external financial support (see Supplementary Figure B.7). Within the group of DRs relying on external financial support, members of the HS section seem to be over-represented (see Supplementary Figure B.8),

4.2 Working Hours & Holidays

Extended periods of work-free relaxation are crucial for long-term happiness, productivity and resilience (compare thematically related publications [27] and [29]). It is

therefore a very positive development, that most full-time contracts within the MPS now provide 30 holidays, which is also reflected in the survey results (Supplementary Figure B.16). Most contracts also stipulate working hours to be between 38–41 hours per week, which should leave ample room for personal development, socialising, and refreshing free time. So we wondered to what degree the DRs in the Max Planck Society take the holidays that they earn and how much free time they allow themselves. In cases where DRs overwork, we further asked what the reasons are for doing so.

Surprisingly, only a slim majority of 51% of DRs took half or more of the holidays they are entitled to (Figure 4.6), while generally most respondents feel free to take holidays (Supplementary Figure B.17).

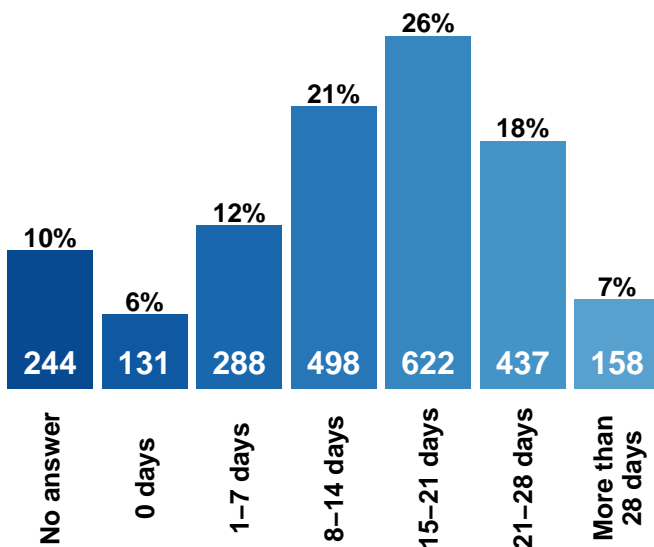


Figure 4.6: Number of Holidays taken by DRs per year

As for weekly working hours, we see that more than half of all DRs report to work more than 38–41 hours on average (Figure 4.7), with a Median of 41–45. Previous studies have found such self-reports to correlate well with objectively measured working hours [11]. The numbers reported here are therefore concerning as this is merely the average of working hours, the maximum reached in crunch times is likely much

higher. The responses show, that there is no difference in the median working hours between Men and Women. Between sections however, we find distinct differences (Supplementary Figure B.14), with DRs in the BM section working longer hours than CPT or HS. This is largely similar for DRs employed by most contract types (Supplementary Figure B.15), but TVÖD/TVL 65% holders seem to work slightly more than DRs employed by other contracts. This might be related to a larger proportion of DRs in the BM section being employed via TVÖD/TVL 65% contracts, compared to other sections.

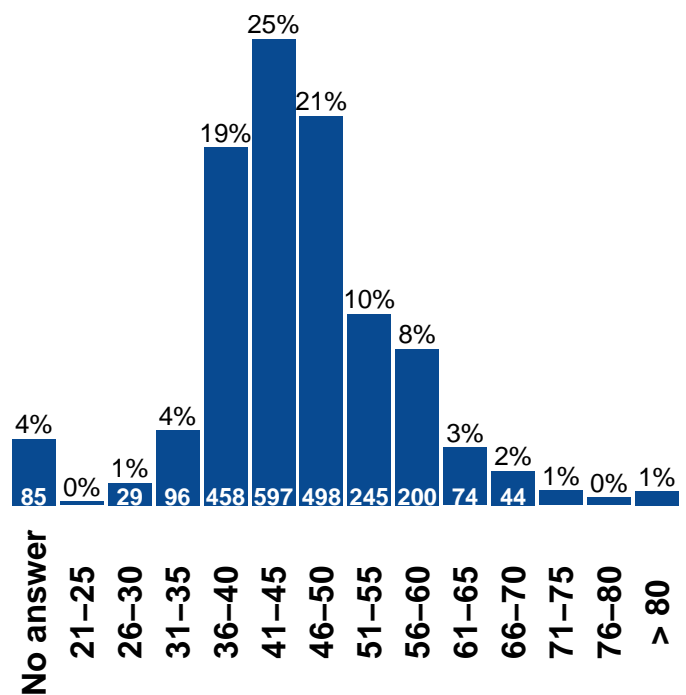


Figure 4.7: De facto Working Hours per Week of DR

Furthermore, 55% of DRs report to regularly work more than once per month on the weekends and public holidays, with roughly 30% of DRs having less than half of their weekends completely free of work (see Figure 4.8).

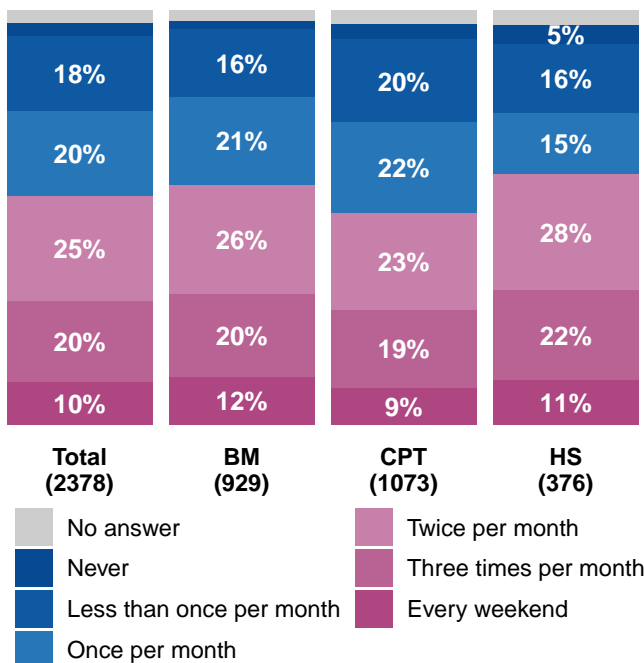


Figure 4.8: Percentages of DRs working on the weekend. (Responses given less than 5% are not labelled)

It is understandable that in a scientific environment with experiments running for several days and sometimes involving live animals and/or fragile equipment that needs constant care, work-free weekends can not always be ensured. It is, however, a very concerning observation, that weekend work does not seem to be the exception for DRs in the MPS, but rather the norm. This holds true across sections, not only the experiment heavy BM and CPT sections (see Figure 4.8). Taken together with the longer working hours, this can be an unhealthy and often unsustainable situation (compare e.g. [8], [21]). This is made clear by the increase in all mental health measures with increase in workload and weekend work (see Section 4.5)

When assessing why DRs work longer hours than their contracts expect them to and on the weekends, the participants mention their own expectations as the main reason, followed by high workload and the (implied) expectations of their supervisors (Supplementary Figure B.18).

It seems fair to assume, that the expectations of the respondents are also at least partially shaped by the work environment they are exposed to and by comparing themselves to their colleagues. The percentage of DRs in our survey feeling directly pressured by their supervisors to work longer hours is 27% .

4.2.1 Working from Home

The pandemic has brought to the forefront a subject that is of increasing relevance, namely working from home. Working from home can have multiple beneficial, but also detrimental effects related to being separated from the main place of work, other people working there and the blending of work and private time.

We wondered whether DRs in the MPS were allowed to work from home before the pandemic, whether this changed during it and whether DRs would prefer to have the option to work from home after the pandemic is eventually over.

As Supplementary Figure B.19 shows, before the pandemic, less people were working from home at least sometimes (20%), than would have been allowed (46%). During the pandemic, nearly 94% of DRs were allowed to work from home (75% actually did). However, only 36% of DRs are certain they will have the option to work from home once the pandemic is over. This number is lower than the number of people who were allowed to work from home before the pandemic, which is due to uncertainty about how this will be handled in the future, with 53% of DRs not knowing whether they will be allowed to work from home after the pandemic. It should be made more transparent what the perspective for working from home will be, as 61% of DRs would like to be allowed to work from home at least sometimes even after the pandemic is over.

4.3 Contract Duration and Contract Information

In academia, short term contracts are ubiquitous and can be the source of insecurity, which has been shown to negatively impact productivity and mental health [5]. As it currently stands, the MPS recommends that DRs are provided with a contract for 36 months [20] which is perceived as the standard length of a PhD.

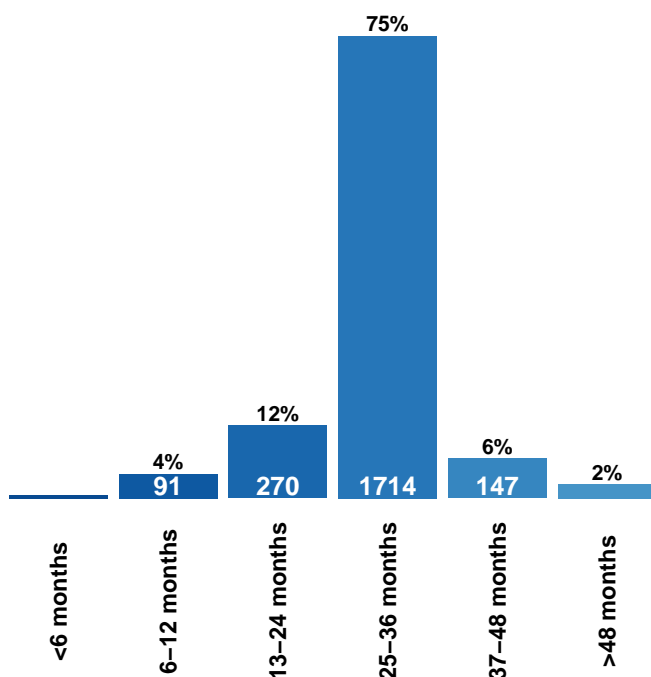


Figure 4.9: Duration of longest Contract received by DRs (Responses given less than 2% are not labelled)

Currently 83% of DRs have received a contract that is 25–36 months or longer (see Figure 4.9). This is a welcomed improvement from the 73% reported in the 2019 survey [23]. However, this still leaves 16% of DRs on short term contracts, not ever having received a contract with a duration longer than two years. Short term contracts can have an especially negative impact on non European DRs whose stay in Germany depends on their contract length.

To have a more in depth look at how predicted PhD length compares to contract length, we employed the use of a Kaplan-Meir curve. To do this, we asked the doctoral

students about the estimated date of submission for their PhD thesis. If we optimistically consider this date as the date of completion of the PhD project, it is possible to analyse the amount of time doctoral students spent working on their thesis. In Figure 4.10, the

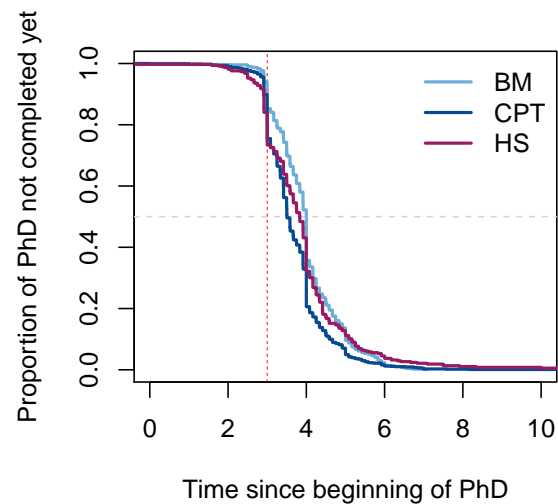


Figure 4.10: Kaplan-Meir curve for the expected time to completion of PhD project by section. The dotted vertical line marks 3 years.

horizontal axis measures the time from the beginning of a PhD project until the time of expected PhD thesis submission. The vertical axis represents the proportions of DRs, 1 representing all DRs. At the beginning of the horizontal axis (Time since beginning of PhD = 0) no PhD thesis is being submitted, therefore the curve starts at 1. Then, whenever an event happens, that is a PhD thesis is submitted (or expected to be submitted in our case), the Kaplan-Meir curve drops vertically by an amount proportional to the percentages of PhD thesis submitted after that fixed amount of time.

The vast majority of contracts for doctoral students within the Max Planck Society have a duration of up to 2–3 years (see Figure 4.9). However, when we look at the expected time to completion of PhD project, it is immediately clear that 3 years is not enough

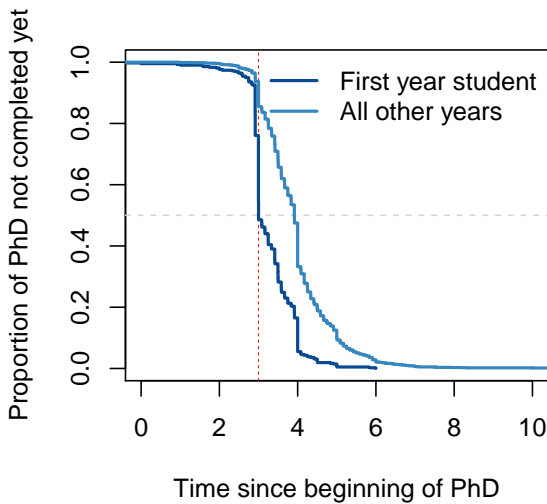


Figure 4.11: Kaplan-Meier curve for the expected time to completion of PhD project by year of PhD (first vs all others). The dotted vertical line marks 3 years.

time (the red vertical line indicates the 3 years mark). By then, only 15 % of all DRs expect to have their thesis submitted 4.10. While there is some degree of variability among the three sections, less than 50% of the students expect to submit their PhD thesis within 4 years (see horizontal grey line). Doctoral researchers in the BM section, in particular, expect to submit their PhD thesis later than their colleagues in the HS and CPT sections, up to 6 years after starting the project (Figure 4.10).

The picture is even more dramatic when we differentiate between the responses from first year DRs and DRs who are at least in their second year, most likely having gained a more realistic perspective on the duration of their PhD (Figure 4.11). All these results strongly suggest that the duration of contracts provided by the MPS to DRs should be adapted to the actual duration of most PhD projects and should be at least 4 rather than 3 years. This would also provide more stability and less stress for the DRs as they do not have to worry about getting an extension at the height of their PhD Project.

As stated above, the length of PhDs are currently longer than the average contract length, leading to many DRs, currently over 40%, requiring extension contracts (Supplementary Figure B.21). Almost all DRs currently in their 4th year or greater (34% of all Participants) have had at least 1 extension (Supplementary Figure B.20). This furthers the point that 3 year contracts are not enough to span the length of a DRs time as a PhD at the MPS.

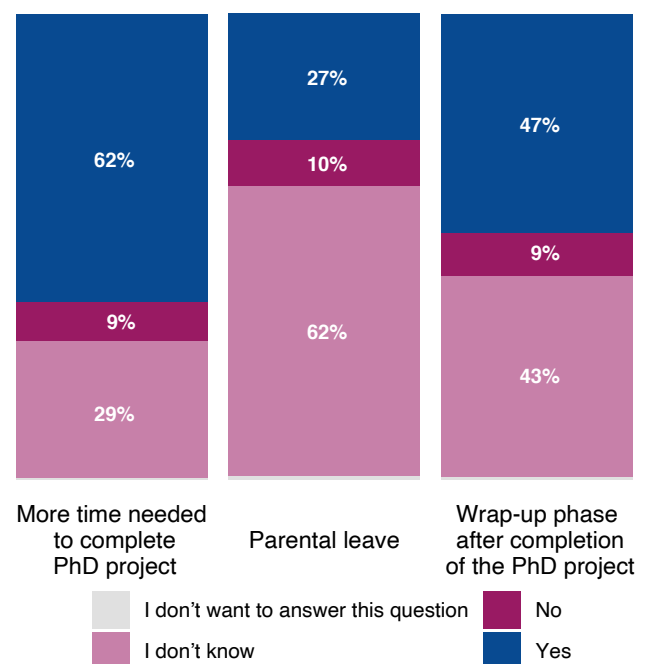


Figure 4.12: "Would it be possible for you to extend your current contract/stipend for the following reasons?"

High proportions of DRs are not aware of the possibility of extending the contract because of more time needed to complete the project (29%), parental leave (62%) or wrap-up phase after completion of the PhD project (43%). Roughly 9% are sure they cannot get an extensions of their contracts for any of the reasons (see Figure 4.12).

The information of working conditions and contract details are the part of decision making on the acceptance of a working positions. While talking about contract type, income, working hours, and contract duration, we

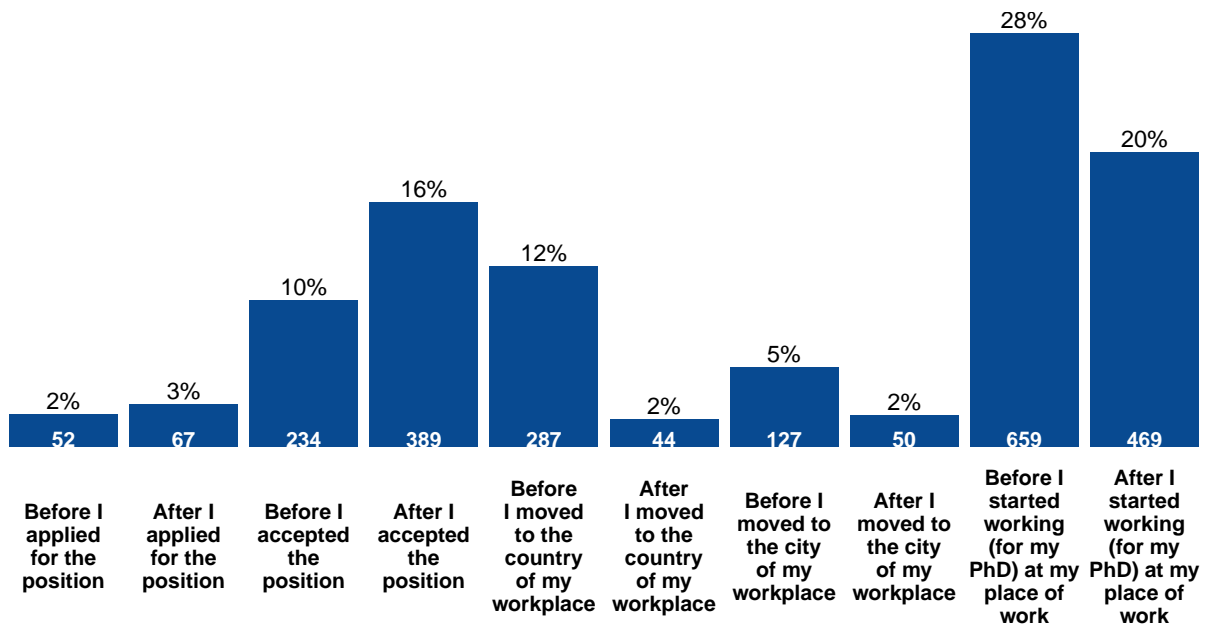


Figure 4.13: "When did you get your contract?" Responses represent the earliest of the chronologically ordered time points at which the contract was received.

noticed those information were not all shared to DRs before they started working.

Quite a large proportion of DRs received the information of their contracts after accepting the position (11%), or even only after starting working at the institute (22%) (Figure B.12). Comparable numbers are even reported for the time point when DRs received the contract itself (Figure 4.13).

slightly more satisfied than women (Supplementary Figure B.26).

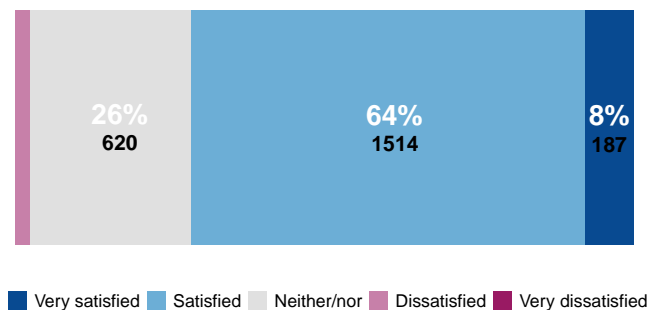


Figure 4.14: Overall satisfaction of DRs.

4.4 Satisfaction & Quitting

DRs of the Max Planck Society are generally very satisfied with their situation as doctoral researchers (Figure 4.14). Differences in the overall satisfaction levels among the different sections are minimal, with DRs in the CPT section being the most satisfied, followed by students in the BM section and lastly DRs in the HS section (Supplementary Figure B.24). Interestingly, DRs in their first year are the most satisfied, while DRs in their second or more year have lower levels of satisfaction (Supplementary Figure B.25). Differences in the level of satisfaction between men and women are also minimal, with men being

DRs are mostly satisfied with laboratory (89%) and office equipment (87%), vacation days (84%), and scientific (81%) and technical support (80%). 76% percent of DRs are satisfied and very satisfied with the handling of Covid-19 situation at their institute, with 66% of them being satisfied with supervision specifically during Covid-19 pandemic. (Figure B.13). DRs are mostly dissatisfied with psychological support (28%), health management facilities/physical health courses/physical health activities (20%), career development as well as science communication and outreach (both 17%) (Figure

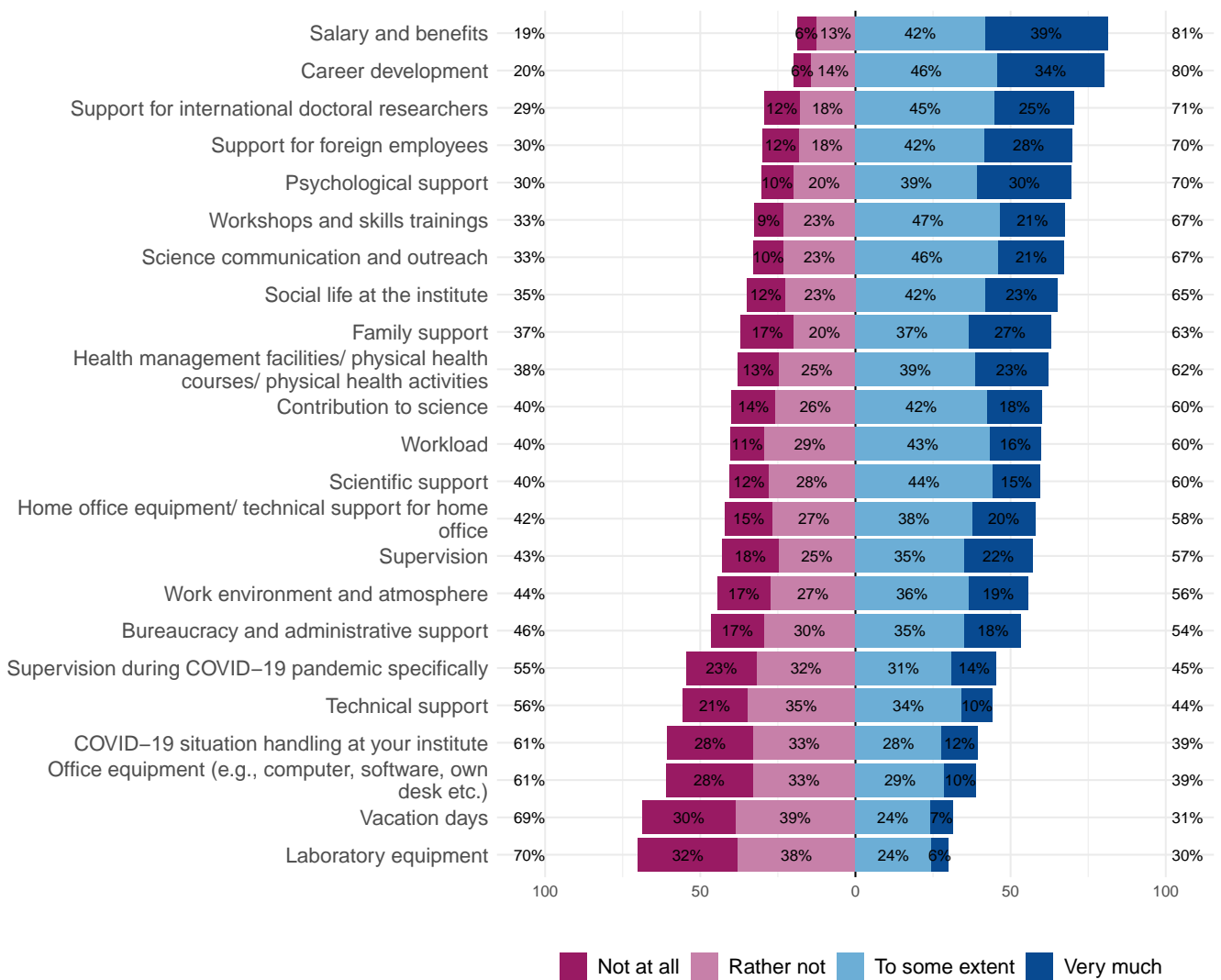


Figure 4.15: Which of the following aspects of your work as a doctoral researcher would you like to be improved?

B.13).

This is also supported by the aspects that DRs would like to improve, in primis their salary and benefits (81%), the career development (80%), support for international DRs (71%) and foreign employees (70%), and psychological support (70%) (Figure 4.15).

Sadly, there are roughly 31% of DRs that even think about quitting their PhD either occasionally or even often (Supplementary Figure B.23). For these 727 DRs, the major reasons for considering to quit are mental health issues (for further Details see Section 4.5), a feeling of not being qualified enough

for their job, unattractive career prospects, high workload and poor academic results (Supplementary Figure B.22).

4.5 Working Conditions and Mental Health

So far, we have not directly connected the working conditions of DRs in the MPS to our indicators of mental health introduced in Chapter 3 . When doing so, we find that many of them are strongly related to the reported symptoms of depression, state and trait anxiety. This does not come as

a surprise. For example, we already know from assessments in the general public that financial safety matters for mental health (e.g. [2]), and we observe similar effects in our survey. Specifically, we find that state anxiety scores significantly decrease with increasing pay category (simple linear model, $p < .01$, see Figure 4.16).

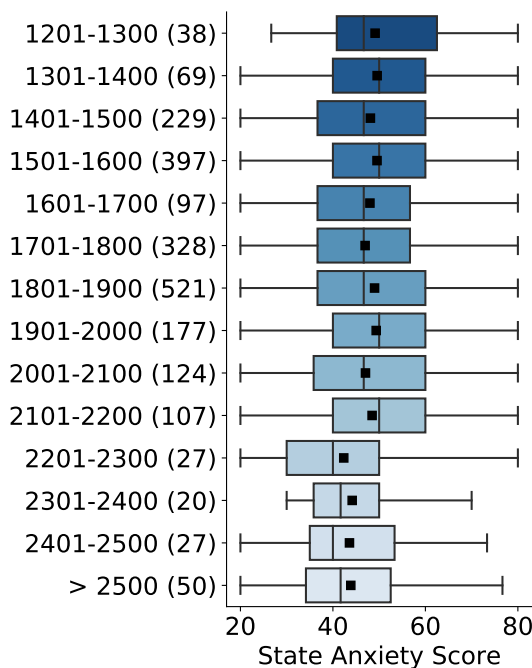


Figure 4.16: State Anxiety by Monthly Net Income (black squares represent group means)

Looking deeper into this, we subtracted DRs monthly expenses from their reported net income, creating a variable representative of financial safety (for more details on how this was calculated, see Appendix F.2.3). Results of simple linear regression models show that increasing levels of financial safety are significantly related to lower state anxiety scores (p -value $< .01$), as well as to lower trait anxiety and depression scores (both p -value $< .05$). For a visualization of this relationship in the case of state anxiety, see Figure 4.17). Thankfully, the MPS raised payments for those on a Doktorandenfördervertrag from 50% to 65% of the salary granted in TVöD-13 at the beginning of 2021. We can only test whether this also had a positive ef-

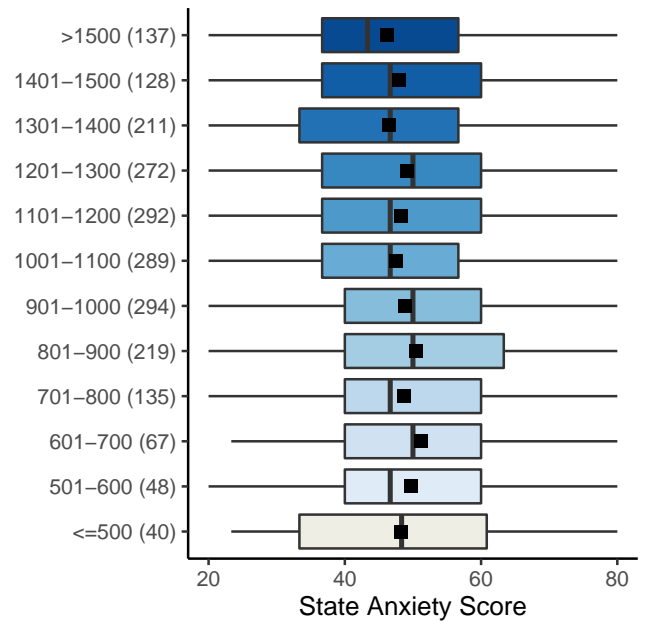


Figure 4.17: State Anxiety by Financial Safety (black squares represent group means)

fect on DRs mental health in the next (2021) survey.

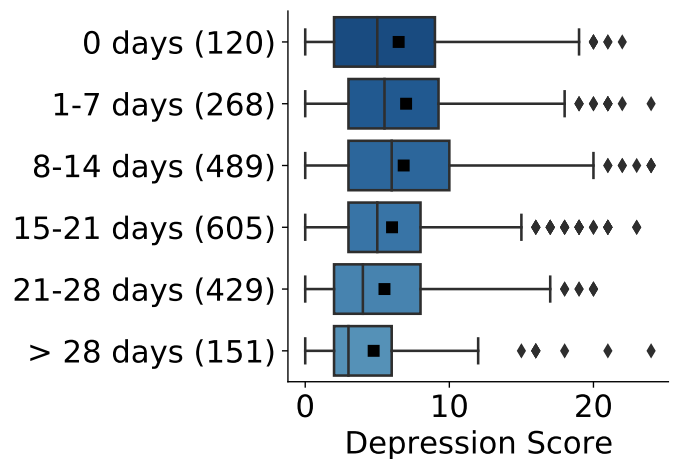


Figure 4.18: Depression by Number of Holidays Taken (black squares represent group means)

Apart from one’s salary, a good work–life–balance is also known to increase mental well-being ([7]). We know from previous years’ surveys that the number of granted vacation days improves mental health. However, since most DRs are by now officially granted 30 days of holidays per year, this variable is relatively uninformative for relating it to mental health. Moreover, selected

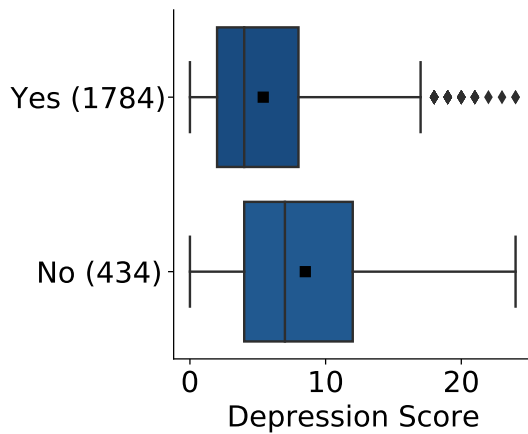


Figure 4.19: Depression by Comfort Taking Holidays (black squares represent group means)

DRs voices in last year’s survey suggested that one should focus on whether DRs actually feel free to take these days off. Indeed, we observe that the number of holidays actually taken in the last year as well as the perceived freedom to take days off both significantly decrease depression, state and trait anxiety scores (coefficients from linear models, all p -values $<.001$; see Figures 4.18 and 4.19).

So, for example, the mean depression score in the group reporting not feeling free to take days off is almost twice as large (mean score: 8.5 out of 24) as the score of those who report that they do feel free to take days off (mean score: 5.4 out of 24).

In the same vein, all three indicators of mental health issues increased with the number of working hours per week (coefficients from linear models, all p -values $<.05$, e.g. see Figure 4.20). For example, the mean trait anxiety score increases from 42.5 to 44.4 (of 80 points) when comparing those who work between 36 and 40 hours per week to those who overwork by 7 to 11 hours per week (i.e. 46–50 hours; note that this further increases to a mean score of 47.2 and higher when people report working 61 or more hours per week; also note that overworking seems to be the rule instead of the exception among the DRs in this survey).

Similar to the total hours worked, work-

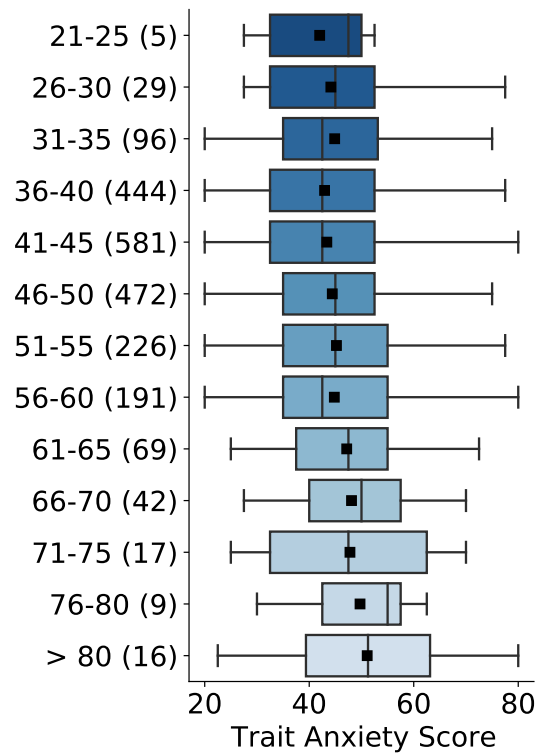


Figure 4.20: Trait Anxiety by Working Hours/Week (black squares represent group means)

ing on the weekends or holidays is also an important indicator of work-life-balance. Matching the results mentioned in the previous paragraph, we find that working on the weekends significantly increases depression, state anxiety and trait anxiety scores. While the effects for depression seem to be attributable to working weekends three or more times per month ¹, working on weekends just twice (or more) per month is already sufficient to increase state and trait anxiety ². For example, the mean state anxiety score steadily increases from 43.2 (when reporting never to work on weekends) to 47.2 (when reporting to work only one weekend per month), to 52.2 when working every weekend per month; see Figure 4.21).

Not only payment and working hours predict one’s satisfaction with the PhD – in fact, most people may not pursue a PhD because of

¹corresponding coefficients from linear regression model, p -value $<.01$

²corresponding coefficients from linear regression models, both p -value $<.01$

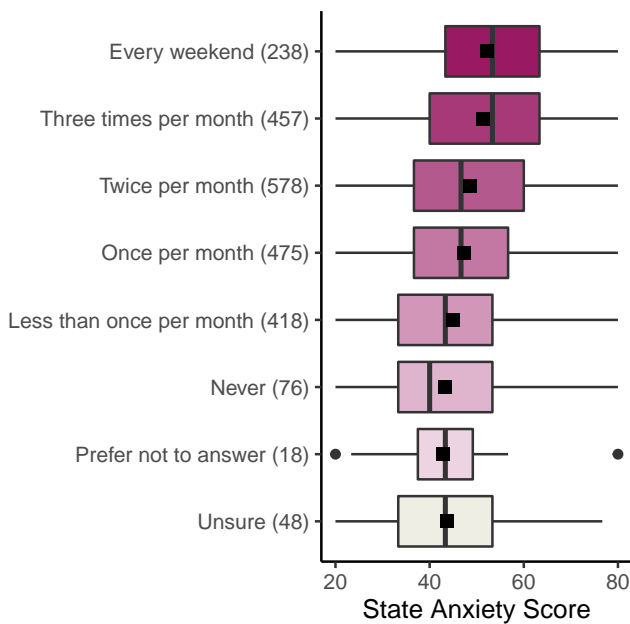


Figure 4.21: State Anxiety by Holidays/Weekend Work (black squares represent group means)

these two factors. Thus, as visible in Figure 4.14, we also looked into reported satisfaction with various factors important for successful doctoral research. For relating DRs’ satisfaction to mental health, we will focus on satisfaction with supervision.

General satisfaction with one’s supervision is strongly and significantly associated with reduced scores of state and trait anxiety as well as depression (corresponding coefficients from linear models, all p -values $<.001$). For example, the mean depression score of those, who reported to be very dissatisfied with their supervision (mean depression score: 8.7 out of 24) was almost twice the size of the mean depression score of those who reported to be very satisfied (mean depression score: 4.9 out of 24, see Figure 4.22).

We also specifically asked people about their satisfaction with supervision during COVID-19. Results from linear regression models suggest that all mental health metrics significantly decrease with higher satisfaction scores (all corresponding coefficients’ p -values $<.001$); for an example visualization

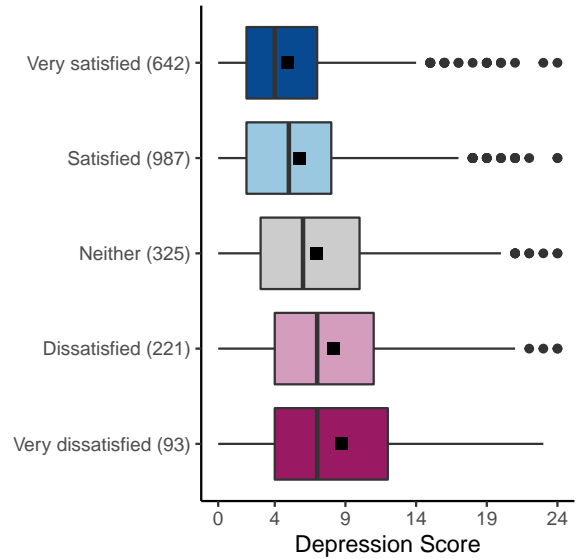


Figure 4.22: Depression by Satisfaction With Supervision (black squares represent group means)

with depression scores, see Figure 4.23).

We want to highlight, that, although descriptively general satisfaction with supervision (71% satisfied or very satisfied) seemed to be higher than satisfaction with supervision during COVID-19 (64% satisfied or very satisfied), the latter was strongly predicted by the former ($b = .80, p < .001$, linear model). Even if we cannot explicitly test for it, this result lets us assume that satisfaction with one’s supervision was not majorly influenced by the pandemic. When comparing DRs’ reported satisfaction with their supervision in 2019 and 2020, we do observe a significant increase in satisfaction ($b = 0.17, p < .001$). Specifically, while 9.2% of DRs reported to be dissatisfied or very dissatisfied with their supervision in 2019, only 6.7% reported this in 2020. Conversely, while only 33.7% of DRs reported being satisfied or very satisfied with their supervision in 2019, 34.8% reported this in 2020. However, these results may also be due to the fact that a different sample of DRs responded to the 2019 and 2020 survey.

In sum, we can argue that objective financial safety, the different facets of DRs’ work-life-balance, and their satisfaction with their work situation closely relate to all three in-

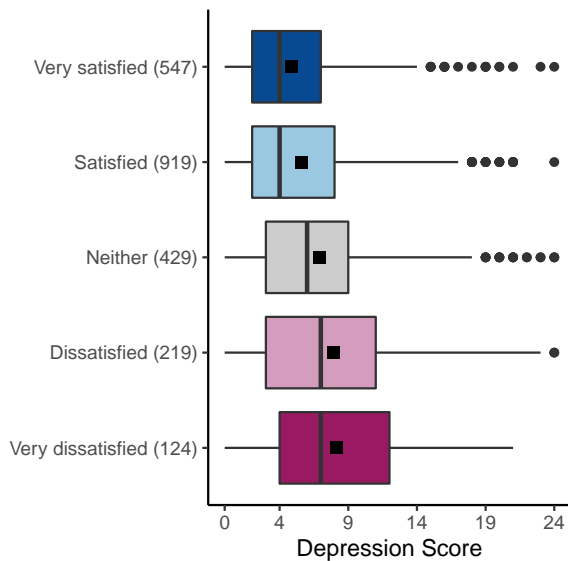


Figure 4.23: Depression by Satisfaction With Supervision during COVID-19 (black squares represent group means)

dicators of mental health.

At the end of the next chapter, we will take a closer look at how existing support structures and the general scientific environment are associated with DRs’ mental health.

4.6 Selected Voices

"Currently we have a 2 years + 1 year + 6 months + 6 months, etc. scheme for PhD. I would be more happy if this would be instead 3 years + 1 year or shorter extensions, since in any case one should consider that 3 years is a reasonable minimum expected period of time for completing a PhD work. Coming from outside the European Union, I find it inconvenient that we have to apply for many short extensions as this implies some extra paper work and paying the corresponding fee for the renewal of the residence permit. "

(Anonymous respondent)

"My monthly living costs are very low on purpose. I’m living in a shared flat, because living in my own would not allow me to have any money left-over by the end of

the month. But I need to save money for my future (if academia allows me to have a family and children, that is)."

(Anonymous respondent)

"I come from a country outside the EU. Would have liked to have received my contract before moving to Germany. But I did not see my contract, even the German version, until a few days before I started, despite asking for it multiple times. Had no idea about very important things such as pay or benefits until the contract was in front of me to be signed."

(Anonymous respondent)

"I don’t know, when I will see my mother again (she lives outside EU and is not allowed to come to visit her granddaughter), whether the KiTA will close tomorrow because of a positive test of a caretaker, whether I will get an extension. Doing a Phd and being a parent of a toddler together are challenging, but doing a Phd, being a parent and a pandemic are not manageable at all. No therapy for my diagnosed postpartum depression would help."

(Anonymous respondent)

"It is a bit tough for me to apply for leave although I am entitled to it, as my boss/supervisor does not really encourage taking leave. There are several instances where the workload is overwhelming and I fall sick. My general practitioner has pointed out that it obviously not healthy and there is a law on working hours for employees."

(Anonymous respondent)

Chapter 5

Support Structures & Scientific Environment

Key Points:

- only 60% of DRs have a TAC, supervision agreement, or project outline, respectively.
- 46% of DRs have less communication with their formal supervisors than they would like.
- DRs are less satisfied with directors as supervisors, who are less informed and available.
- DRs who will leave academia are less satisfied with their career development and contribution to science in the local institute. In the aspect of scientific career, they also have lower satisfaction with availability of permanent positions and compatibility of own career plans with family plans.
- 45% of DRs who will leave academia do not feel prepared. They are less supported by institutes in many measures.
- International DRs would need more support with the enrollment to universities, finding accommodations, and the translation of working contract and related document into a language they understand.
- Clear guidelines and proper communication with supervisors are associated with lower anxiety. Better supervision quality also shows a correlation with lower depression scores.

5.1 General Support

Within the MPS there are different measures to provide guidance for doctoral training,

for instance: PhD guidelines, International Max Planck Research Schools (IMPRS), and Thesis Advisory Committees (TAC). Furthermore, supervision agreements and personalized training plans are tools used by some DRs and their supervisors to guarantee a successful education of the DR and completion of the doctoral project.

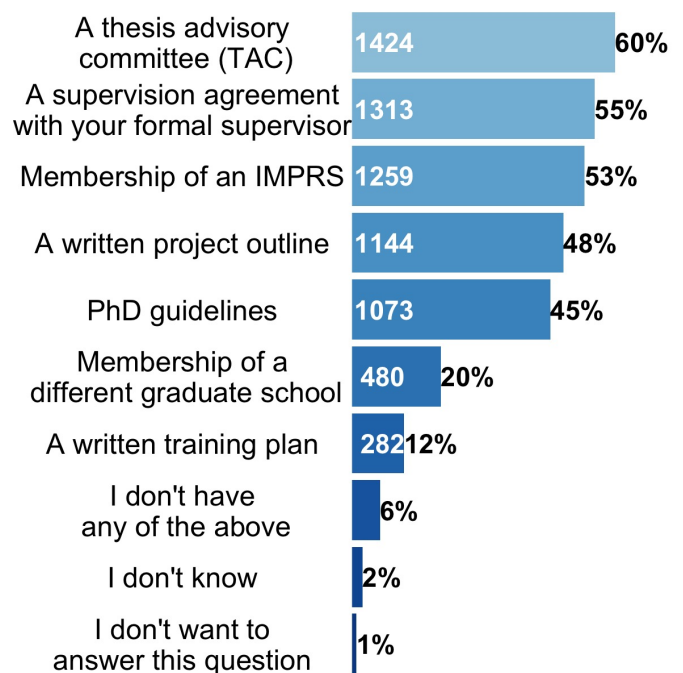


Figure 5.1: "Do you have one of the following (multiple answers possible)?" participants with answer "yes".

Even though a supervision agreement and training plan are recommended according to the Guidelines on the Training of Doctoral Students at the Max Planck Society [12], we found only 60% of doctoral researchers cur-

rently have a TAC, 55% a supervision agreement and 45% a written project outline (Figure 5.1). Furthermore, among those who have a TAC, around 15% are not fulfilling the annual meeting frequency (See supplementary Figure C.3). Notably, 6% and 2% of participants reported that they do not have or even do not know about these documents. Interesting, among those who have a written project outline, 33% reported that they are progressing according to the plan, while 60% are behind the plan (Figure 5.2).

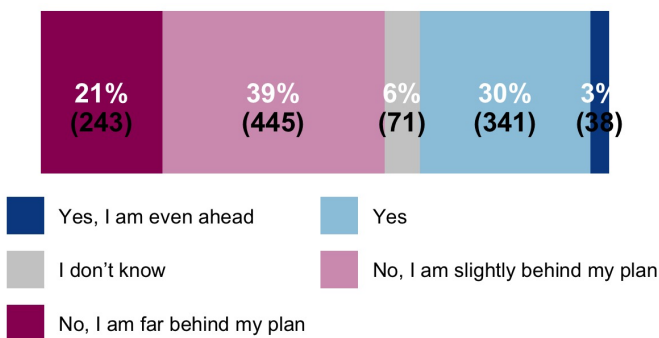


Figure 5.2: "Is your project progress according to your (reviewed) project plan?" among those who have a written project outline.

5.2 Supervisory Relationship

Supervision is one of the key obligations of scientists in relation to doctoral education which ensures proper and sufficient scientific training. There are many forms of supervision. To evaluate the impact of different supervision structures on doctoral researcher's general satisfaction, we investigated the effect of having guidelines and training documents, a thesis advisory committee (TAC), as well as the effect of supervisor demographics and communication. In line with questions from other sections, we aimed to record the status quo of supervision in the MPS, find key factors for improving supervision structure, and areas to improve the satisfaction of doctoral researchers.

In this survey, we refer to the direct supervisor as the person whom doctoral researchers actually consult and discuss the

projects with on a more regular basis, and to the formal supervisor as the main advisor of the thesis as present in the thesis committee. To monitor if the communication frequency between doctoral researchers and supervisors meets DRs needs and expectations, we explicitly asked how often doctoral researchers meet their supervisors and whether this is more or less than they would like. 68.5% and 52.2% of participants are satisfied with the communication with their direct supervisors and formal supervisors respectively, but 44.4% reported that the communication with their formal supervisors is less frequent than they would desire, whereas this number is 23.3% with direct supervisors (Figure 5.3).

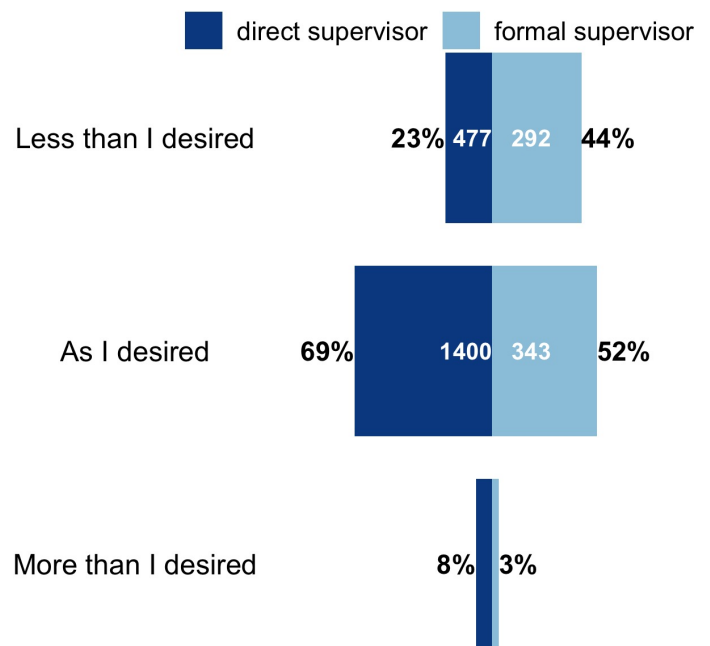


Figure 5.3: Percentage of DRs with real communication frequency with supervisors matching with the desired communication.

In accordance with reported communication frequency, when DRs were asked what problems they encounter with their supervision, around 30% reported that meetings with their formal supervisors are not frequent enough, and around 20% reported meetings are not regular enough. Moreover, a certain proportion of DRs are facing supervision problems such as insufficient encour-

agement, lack of feedback, and inadequate scientific discussion (Figure 5.4).

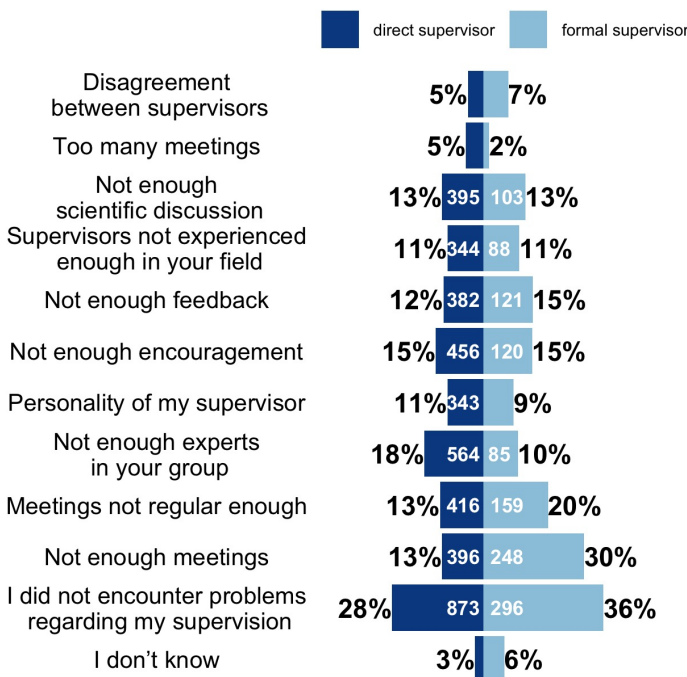


Figure 5.4: "Did you ever encounter problems regarding your supervision?" left: with direct supervisors, right: with formal supervisors.

To assess if supervisor demographics have an influence on supervision satisfaction, we specified the demographics of both, the direct and formal supervisor, such as gender, citizenship, parenthood, career stage, and their affiliation with universities or other research institutes.

Noticeably, when gauging the supervision quality of direct supervisors based on their current position, it appears that institutes' directors are less well informed about the DRs' project and field of study, less available when DRs need advice, give less constructive feedback, and have less clear and strict requirement for DRs (Figure 5.5). We noticed a similar situation with supervisors in the late stage of their current career path (see supplementary Figure C.1). However, we do not observe a substantial impact on direct supervision quality by the supervisor's gender, citizenship, or whether they have children or not (see supplementary Figure C.1).

For formal supervision, a similar pattern of

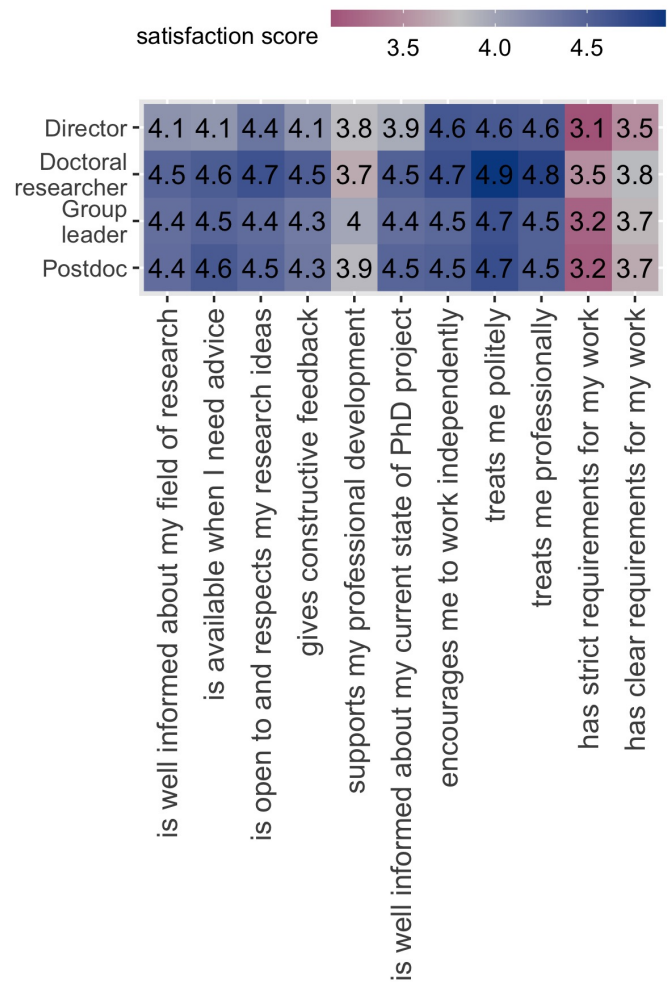


Figure 5.5: "My direct supervisor..." Scores showing the satisfaction to direct supervisor behaviour according to their positions. Score: very dissatisfied: 1, dissatisfied: 2, neither/nor:3, satisfied: 4, very satisfied: 5

results emerged: directors seem to be less well informed about the details of the DRs work and less available for discussion (Figure 5.6). Interestingly we observed that formal supervisors from Germany have a lower supervision quality score than those who come from EU countries (outside Germany) and non-EU countries (see supplementary Figure C.2), probably due to the fact that most supervisors holding German citizenship are also directors (see supplementary Figure C.4). We also assessed 180 DRs whose formal supervisor only serves bureaucratic purposes. The lower satisfactions scores of DRs whose formal supervisors only serve bureaucratic pur-

poses might indicate that having a more active role is an important factor for overall satisfaction with the supervisors (Figure 5.7).

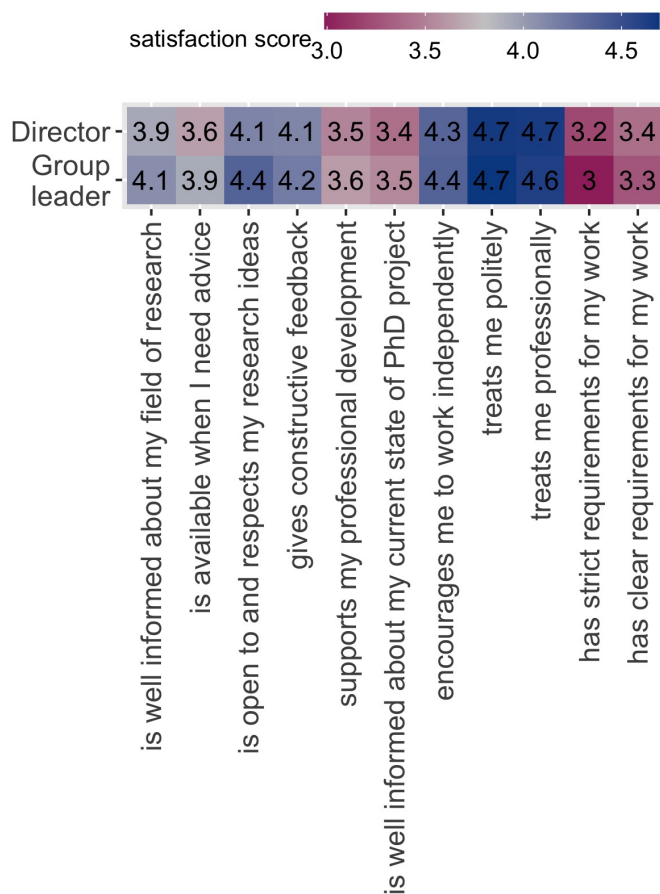


Figure 5.6: "My formal supervisor..." Scores showing the satisfaction to formal supervisor behaviour according to their positions. Score: very dissatisfied: 1, dissatisfied: 2, neither/nor:3, satisfied: 4, very satisfied: 5

5.3 Career Development

A majority of PhD degree holders will not continue their career in academia, though many of them wish to remain in academia in some form [16], [30], [31]. Therefore, career development is an essential part of higher education to guide graduates towards future jobs, whether or not in academia. In this survey we asked DRs about their pre-

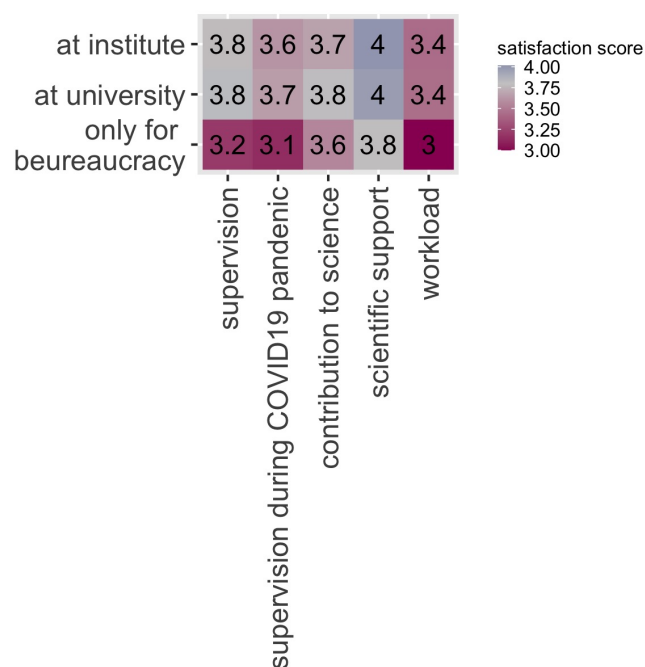


Figure 5.7: Scores showing the satisfaction to supervision, supervision to COVID-19 situation specifically, contribution to science, scientific support, and workload, grouped by the affiliation of formal supervisors. Satisfaction score: very dissatisfied: 1, dissatisfied: 2, neither/nor:3, satisfied: 4, very satisfied: 5

ferred field of work and position after graduation, and where they think in reality they will end up. We observed that 538 out of 1401 (around 38%) participants would like to stay in academia think they will eventually work in non-academic jobs (Figure 5.8).

When asked about satisfaction with the PhD, we see that those who want to and also expect to stay in science generally report higher satisfaction than those who want to but do not expect to stay in science (Figure 5.9). When asked about satisfaction with an academic research career in general, those expecting to stay in science again report higher satisfaction with various factors (see Figure 5.10). Notably, DRs' satisfaction with the availability of permanent positions in academia is very low regardless of the DRs' career choice. When we correlate the career choice (stay in science or leave science) with gender and relationship status, more women plan to leave science compared to men, more DRs in a partnership (either relationship or

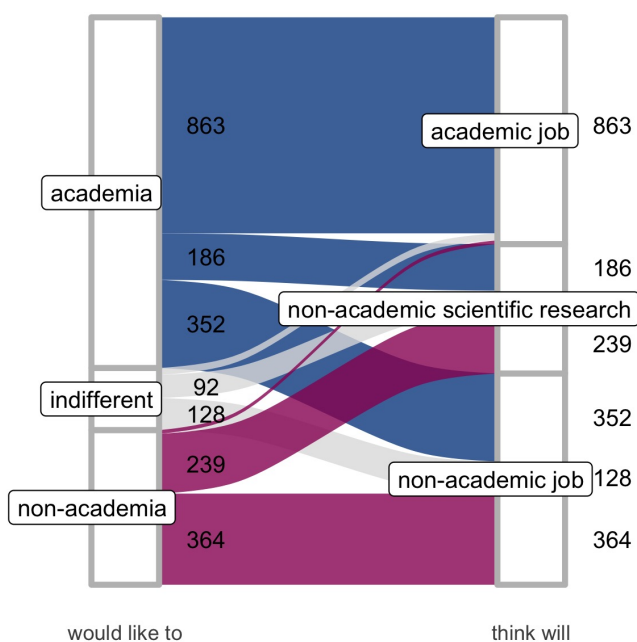


Figure 5.8: Amount of DRs separated by the positions they would like to work after graduation and the positions they think they will actually occupy. Left stratum: "Which field would you like to work in after completing your PhD?", Right stratum: "Which field do you think you will work in after your PhD?"

marriage) plan to leave science compared to singles, and more DRs planning to have kids plan to leave science compared to DRs not planning to have children(see supplementary Figure C.5, C.6, C.7). It indicates that academic positions are often not very compatible with family plans. (Find more details on the analysis in Appendix F.3.1).

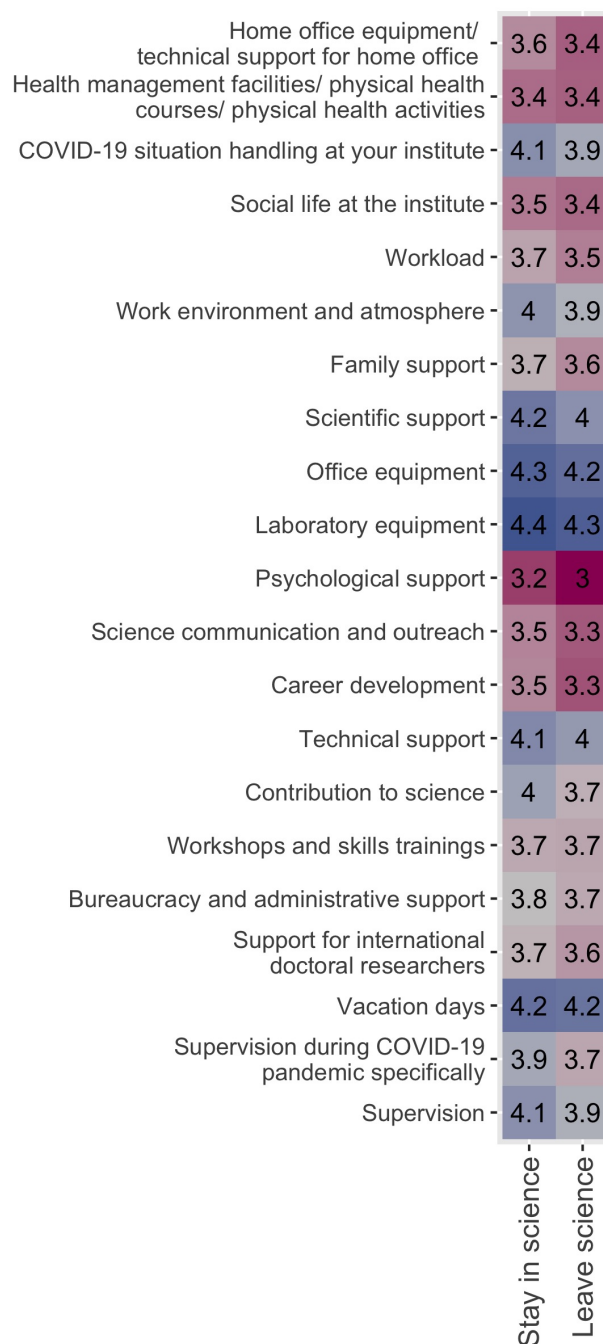


Figure 5.9: Satisfaction score of DRs who would like to work in academia, but think will either stay in scientific jobs or leave for non-scientific jobs. Satisfaction score: very dissatisfied: 1, dissatisfied: 2, neither/nor:3, satisfied: 4, very satisfied: 5.

Among the DRs responding to this survey, 907 out 2378 (38%) think they will not land a job related to scientific research (no matter whether in academia or industry). When being asked if they feel prepared for a job outside of science, around 45% responded that they do not feel prepared (Figure 5.11).

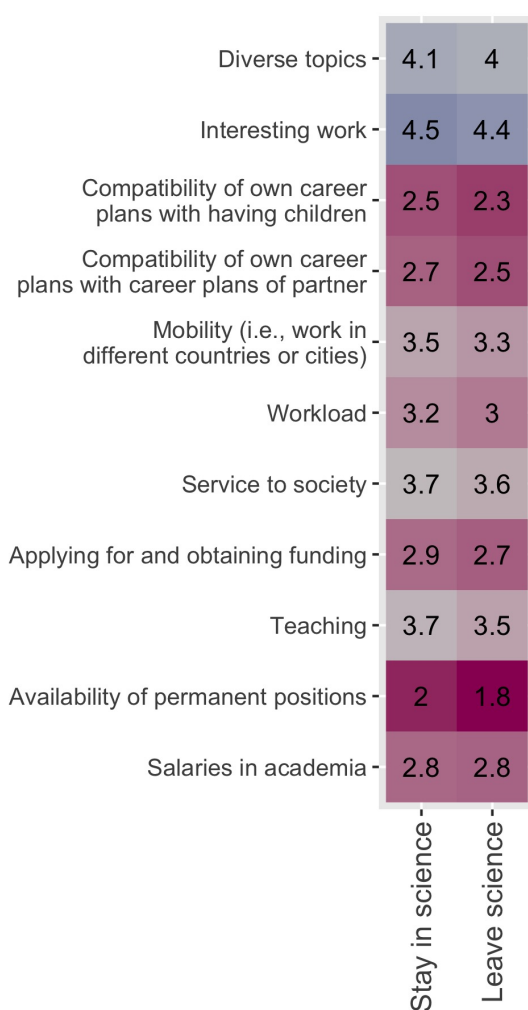


Figure 5.10: Perspective of academic career from DRs who would like to work in academia, but think will either stay in scientific jobs or leave for non-scientific jobs. Satisfaction score: very dissatisfied: 1, dissatisfied: 2, neither/nor:3, satisfied: 4, very satisfied: 5.

To decipher which support measures would help DRs to prepare well for changing their career path, we designed questions asking about support from local institutes. Additionally, we ask if DRs know about the recently implemented support from the MPS, such as the Planck Academy and the seminar series Science2Industry. To score the support offered by institutes, we converted the answer "no support" to 0, "yes, to some extent" to 1, and "yes, to great extent" to 2. We observe dramatic differences in scores between those who feel very prepared and those who feel less or not prepared at all, which appears to be attributable to support in the

form of a career development office, mentoring, and help in transitioning to a non-academic career (e.g. career fairs, career talks, networking possibilities)(Figure 5.12). On the other hand, we observed no difference in knowledge about offers from the MPS between the prepared and unprepared populations (see supplementary Figure C.11). This indicates that not feeling prepared is not the result of a lack of knowledge about existing support structures from the MPS. Instead, it seems to result from a lack of support structures within the individual institutes.

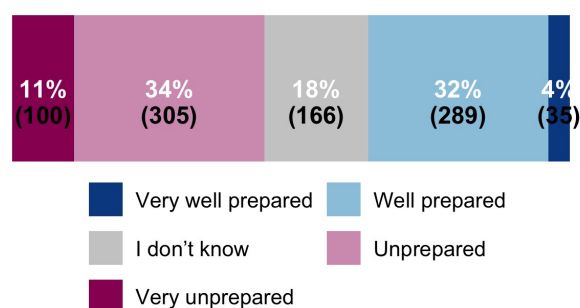


Figure 5.11: The situation of feeling prepared for jobs outside of scientific research among DRs who think will work in non-scientific area after graduation.

5.4 Support of International Doctoral Researchers

More than half of all DRs working for the Max Planck Society are coming from countries outside of Germany, which implies the importance of offering necessary support to international DRs regarding work-related information, support with legal documents such as applications for residence permits and the bureaucracy surrounding the enrollment to Universities or graduate schools. Despite the effort to establish many international offices at MPis, we still observe a general lack of support in many aspects. For instance, among the non-German DRs, there is the need for more support with the enrollment at universities, with finding accommodations and with the translation of working contracts and related documents (Fig-

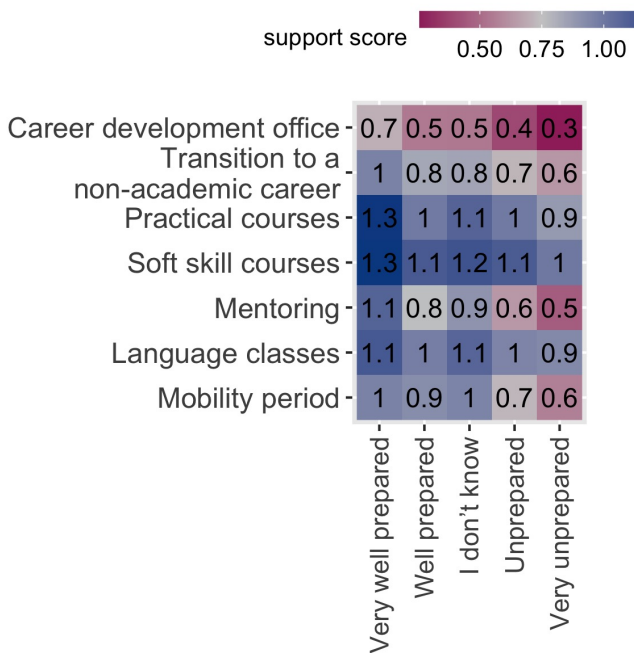


Figure 5.12: The career development support measures from institutes related to DRs’ feeling of preparation for jobs outside of science. Examples for mobility period are internships, research stays, etc, Examples for transition to a non-academic career are career fairs, career talks, networking possibilities, etc) Support score: no support: 0, to some extent: 1, to great extent: 2

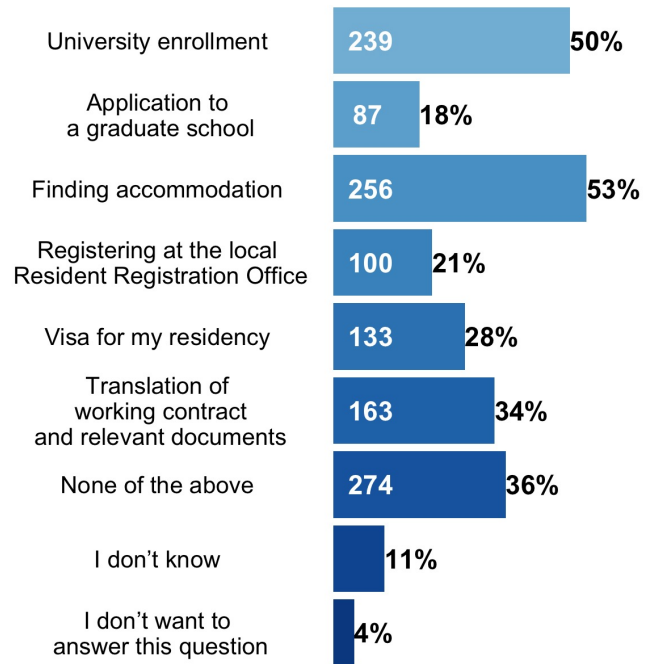


Figure 5.13: Percentage of international DRs (from non-EU countries) would have needed more support from institutes

ure 5.13, supplementary Figure C.12, C.13, C.14). In accordance, we found that around 38% of international DRs reported that not all important information, such as group internal information, administrative information, and contract/stipend are provided in a language they understand, and 24% found that the German language is an obstacle for communication with people at their institutes/centers/units (Figure 5.14, supplementary Figure C.15).

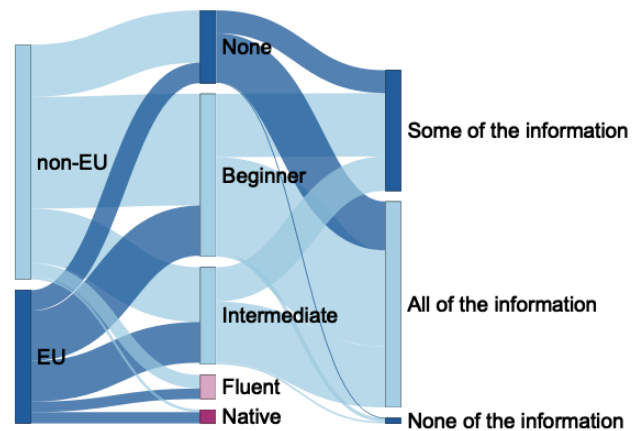


Figure 5.14: "Is all the important information (group internal, administrative, your contract/stipend) available in a language you understand?" Sankey plot showing the DRs’ citizenship, German language proficiency, and if all the important information (group internal, administrative, contract/stipend) available in a language they understand

5.5 Relations to Mental Health

In the previous chapter, we already talked about the relevance of DRs’ satisfaction with

their supervision for their mental health and for their consideration of quitting their PhD. In this chapter, we want to understand which specific aspects of supervision relate to improved or impaired mental health.

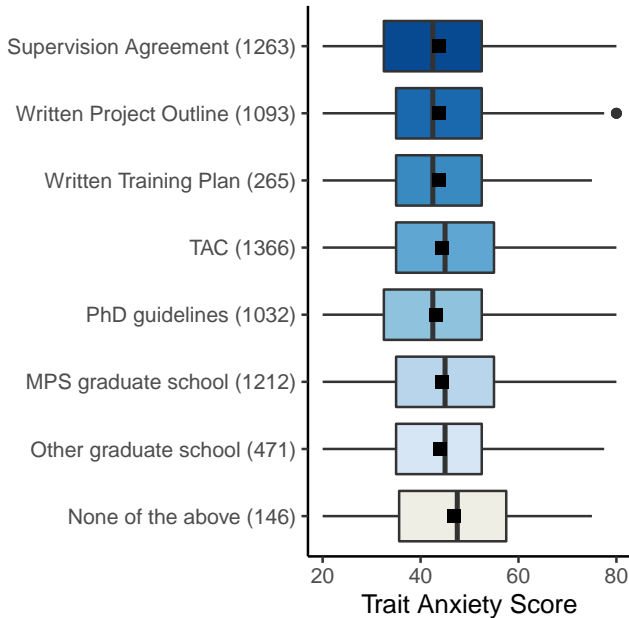


Figure 5.15: Trait Anxiety by Supervision Structure (black squares represent group means)

There have been attempts at improving DRs’ onboarding and ideas about which supervision structures are essential for successful doctoral studies. Interestingly, the only significant impact on mental health we observed was a reduction in trait anxiety scores in case a DR had PhD guidelines, a supervision agreement, and/or a written project outline (coefficients from a linear model, all p -values < 0.01 ¹; see Figures 5.15). For example, having a supervision agreement and/or a written project outline was each associated with a mean trait anxiety score of 43.7, while this increased to 44.9 and 44.6 respectively (out of 80) in case of not having such supervision structure.

We next turned to the question of how the frequency of communication with one’s direct supervisor affects DRs’ mental health. From a first look at the responses, it seemed

¹we used the Bonferroni-adjusted alpha level

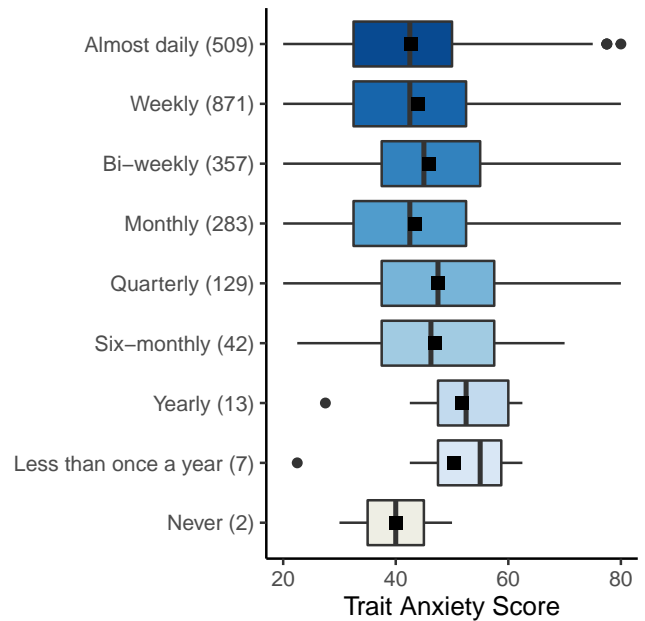


Figure 5.16: Trait Anxiety by Actual Communication With Direct Supervisor (black squares represent group means)

as if there was no clear pattern regarding an ideal communication frequency (supplementary Figure 5.16).

This may result from different needs of different DRs. Therefore, we checked how the disparity between the actual and desired communication frequency affected the three mental health indicators. Indeed, we find that a disparity in either direction (i.e. having more or less communication than desired) significantly increases all three mental impairment indicators (coefficients from linear models, all p -values $< .001$). For example, both less and more communication than desired were associated with increased mean trait anxiety scores (mean score of 47 and 47.2 respectively, compared to a mean score of 42.9 when communication was as desired; see Figure 5.17).

Adequate supervisor availability is also one of many items we used to assess perceived supervision quality (here we report results for a sum-score of supervision quality, please turn to Appendix F.3.2) for a full list of items). Matching the results on communica-

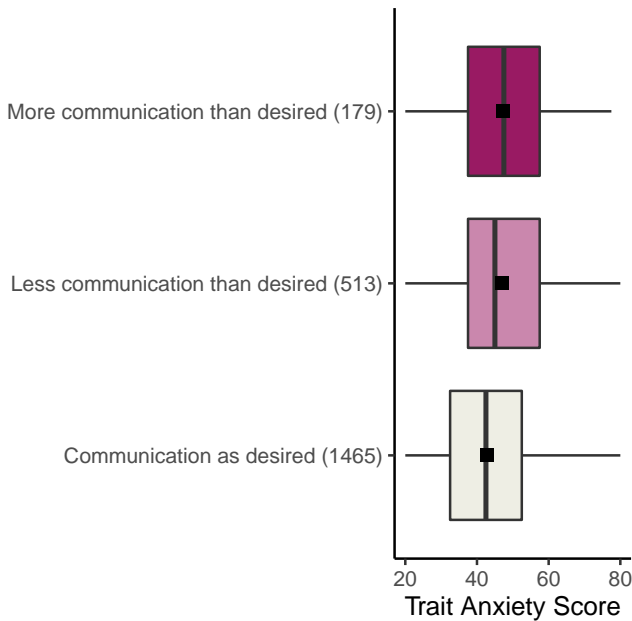


Figure 5.17: Trait Anxiety by Disparity in Actual and Desired Communication With Supervisor (black squares represent group means)

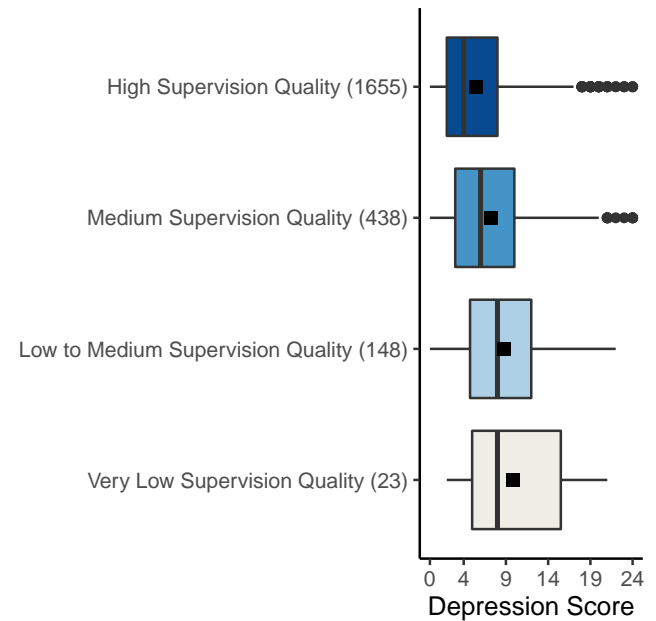


Figure 5.18: Depression by Overall Supervision Quality (black squares represent group means)

tion frequency and supervision satisfaction, we find that increasing supervision quality significantly decreases depression, state and trait anxiety scores (coefficients from linear models, all p -values $<.001$; e.g. see Figure 5.18).

For example, the highest supervision quality score (40) was associated with a mean depression score of 4.9 out of 24. In contrast, DRs who rated their supervision quality as rather low (e.g. quality score of 15 or lower) had a mean depression score of 11 (or higher).

When specifically asking about problems with one’s supervision, it seems that having any problem with one’s supervision significantly increases depression, state anxiety and trait anxiety scores (coefficients from linear models, all p -values $<.001$; e.g. for state anxiety, see Figures C.16).

At the end of the next chapter, we will go a step further, and ask how experiencing actual conflicts as well as feeling discriminated relates to mental health.

5.6 Selected Voices

"During the [many] years of my PhD research, a formal structure for effective supervision was never reached despite frequent requests from my side. I also pointed out at numerous occasions that the lack of structural support was wearing me down mentally and affecting my academic achievements."

(Anonymous respondent)

"We already tried to explicitly tell our group leader what the problems are and how we can solve them as a group, but he did not listen and nothing changed on his side. Now half of the PhD students in our group just gave up on trying, we are waiting to finish the PhD and never work in academia again. Some group leaders are great scientists but bad managers and even worse leaders. Please make some training for them and teach them how to lead."

(Anonymous respondent)

"I ask you to please instate a minimum contract length for PhD students. I am not from [Germany] and my supervisor only gives me 6 month to 1 year contracts. This has caused a great deal of stress because I can only stay in Germany with a contract. My supervisor does everything last minute so I have to beg the foreigner officers to process my case quickly. The situation is extremely stressful. My supervisor is not open to discussion on this issue and does this to most students."

(Anonymous respondent)

"Permanent contracts are so rare that you can forget any kind of compatibility with your partners career. 3 years in Germany, 2 years in England, 1 year in Spain, back to Germany. THATS what a scientists life looks like. Do you expect you partner to quit his/her job every time your contract expires and you need to move more than 500 km away? We need permanent contracts (for people with a PhD), or else there is no stability in your life."

(Anonymous respondent)

Chapter 6

Discrimination & Conflict

Key Points:

- 1 in 4 DRs have reported feeling discriminated against in some form
- Women are more than twice as likely to be subject to discrimination compared to men
- DRs who were subject to microaggressions more than once felt like quitting more and had lower overall satisfaction
- 26% of DRs had a serious conflict while working at the MPS. More than half of those conflicts were not reported officially
- All forms of discrimination, microaggressions, and conflict had a negative effect on DRs mental health

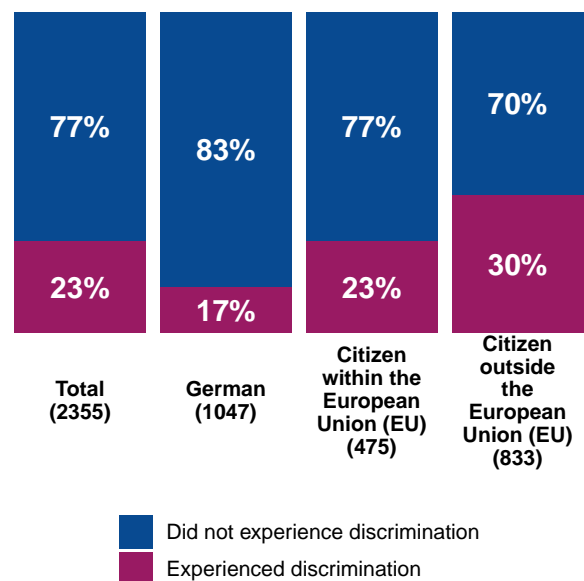


Figure 6.1: Have you ever felt discriminated in your work environment? Responses grouped by citizenship.

6.1 Discrimination

The Max Planck Society (MPS) represents a diverse range of people from many different facets of society. This diversity is also represented within the population of DRs as described in Chapter (2). However, with diversity comes the opportunity for discrimination. Discrimination by definition is the unfair or prejudicial treatment of people and groups based on a diversity of characteristics such as but not limited to nationality, gender, religion or sexual orientation [3]. This year for the first time the PhDnet survey has explicitly addressed the topic of discrimination.

Among all DRs surveyed, 1 in 4 have reported feeling discriminated against in some form. With non-EU citizens being the tar-

get of discrimination almost twice as much as German citizens (Figure 6.1). In the same vein, ethnic Europeans are less subjected to discrimination when compared to all other ethnicities combined, 18% vs 33% respectively (Supplementary Figure D.1).

When looking closer at why DRs might have been the target of discrimination, nationality and gender identity stand out with 42% and 36% respectively (Figure 6.2). It is not surprising that nationality stands as the main reason considering non-EU citizen are most afflicted by discrimination (Figure 6.1). When assessing discrimination by gender, women are more than twice as likely to be discriminated against in some form compared to men, 32% and 14% respectively

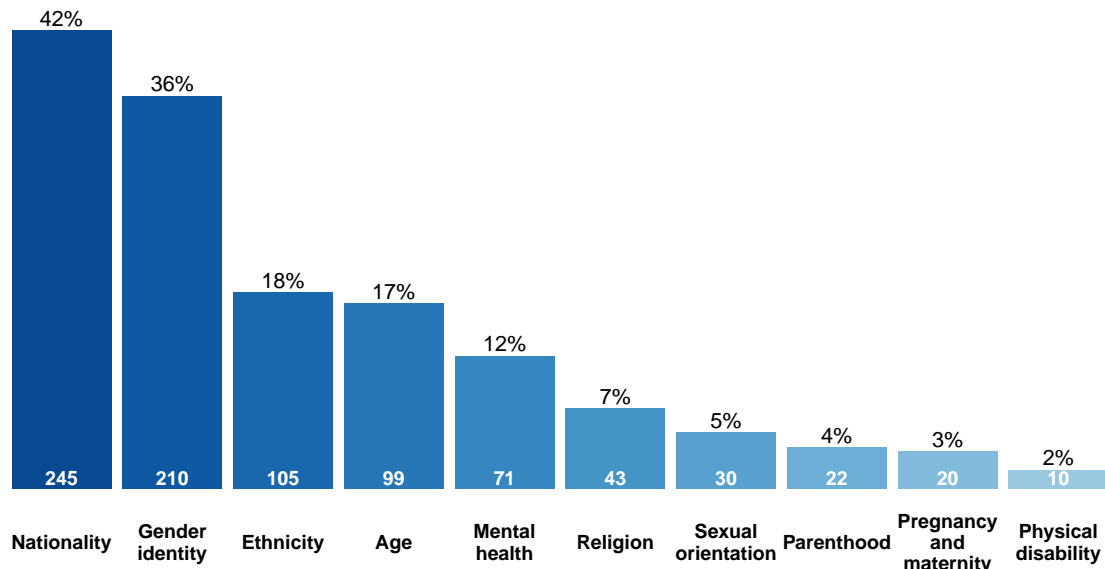


Figure 6.2: Have you ever felt discriminated in your work environment because of one or more of the following?

(Supplementary Figure D.2). The reason being that 17% of women surveyed feel discriminated because of their gender identity. This form of discrimination was hardly reported by men, <2%. Not reported in the graphs are the comparatively small number of DRs who identify with other gender representations, of whom almost all (75%) have felt some, often many forms of discrimination.

Gender identity as a social construct influences how people perceive themselves and each other and is not confined to a binary (woman/man) but exists along a continuum [22]. It can infer how people act and interact, and the distribution of power and resources within a society. In general most DRs felt comfortable expressing their gender identity (Figure 6.3). This was especially true for men, however in comparison, 14% of women don't always feel comfortable doing so. This result emulates those seen when looking at the proportions of gender based discrimination, with women and diverse/non-binary genders being those most burdened. Again, though the DRs who identify as having diverse/non-binary genders are small, it must be stated that not one of them felt safe expressing their gender identity at work.

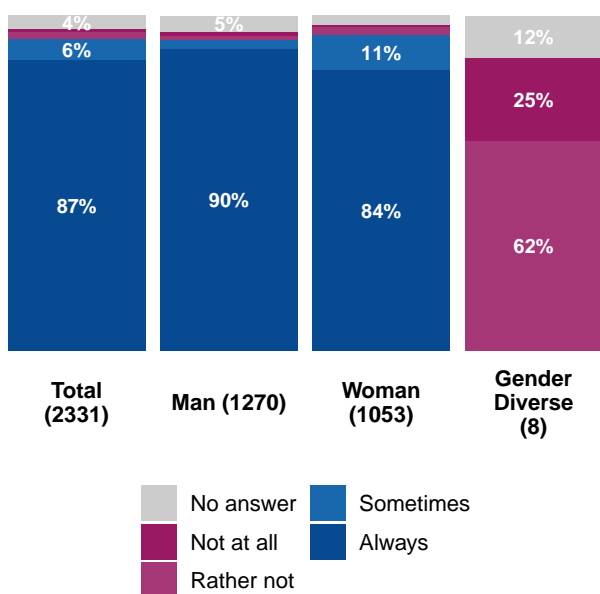


Figure 6.3: "Do you feel comfortable expressing your gender identity at work?" Responses grouped by gender.

6.2 Microaggression

"The straw that broke the camel's back" embodies the ideology that small and seemingly insignificant additions to a burden can over time render it too much to bear. Much like individual pieces of straw, microaggressions,

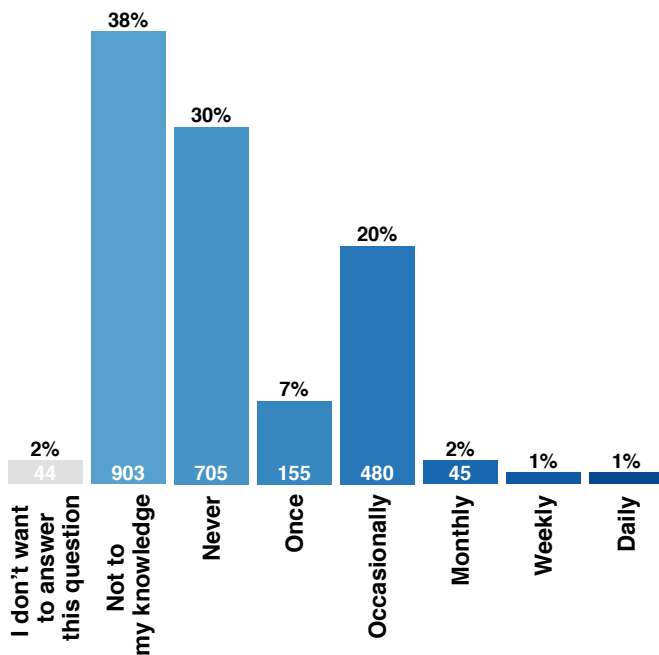


Figure 6.4: "Have you ever been subject to microaggressions in your work environment?"

subtle and often unintentional prejudice, over time can weigh heavily. In this years report we choose to look at the prevalence and effects of this often incognito form of discrimination.

Overall, 68% of DRs have either never been subject to microaggressions or were not aware of such discrimination (Figure 6.4). Fortunately, most reported microaggressions only happen occasionally. However, similar to the results seen in the discrimination section most of the DRs who have been subject to microaggressions are women (42%) (Supplementary Figure D.3) and non-German citizens (30% EU and 35% non-EU) (Supplementary Figure D.4). These results point to a clear bias and disproportional adverse treatment of these groups. The overall consequence of reoccurring microaggressions can be overwhelming. DRs, who were subject to microaggressions more than once, felt like quitting their PhD at a prevalence almost twice as high when compared to those facing little to no microaggressions, 46% vs 26% respectively (Figure 6.5). Similar results

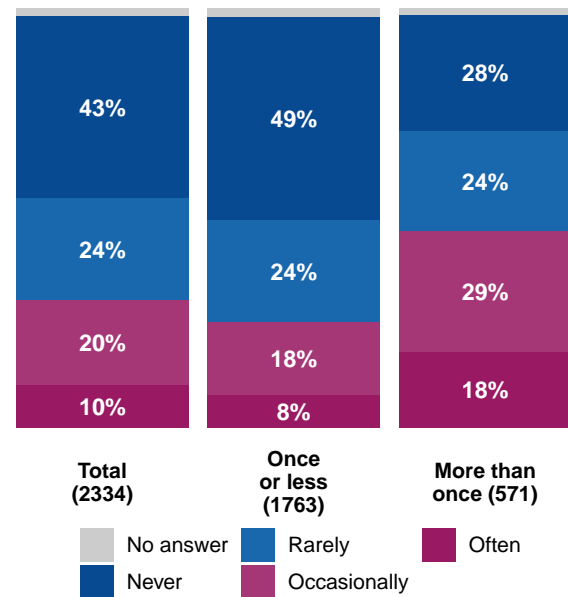


Figure 6.5: "Have you ever been subject to microaggressions in your work environment?" Responses grouped by prevalence of thinking about quitting.

can be seen when comparing prevalence of microaggressions and overall satisfaction (Supplementary Figure D.5). This might suggest that a substantial number of DRs think about quitting their PhDs based on how they are personally treated at work.

6.3 Conflict

Conflicts are inevitable in situations where people work closely together for long periods of time. What is important is examining the root cause of conflicts and managing them appropriately.

The majority of DRs (71%) did not have serious conflicts. However, quite a high number did (26%) (Figure 6.6). When conflicts did arise, the main perpetrators were supervisors and other researchers. What is most disconcerting is regardless of who DRs had conflicts with, more conflicts occurred than were reported to official sources (Supplementary Figure D.6). When assessing the reason why DRs did not report a conflict, the most outstanding reason regardless of the

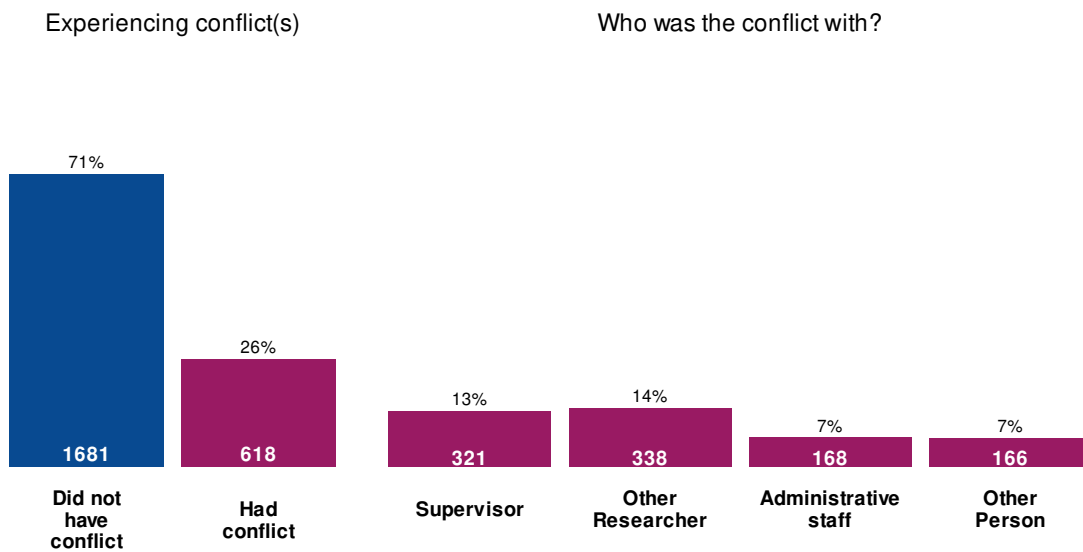


Figure 6.6: Occurrence of having a conflict or not, grouped by the perpetrator. Multiple responses were possible, so conflicts reported for each perpetrator add up to more than the total number of DRs affected by any conflict.

perpetrator is because they did not think it would be resolved (Figure 6.7). An alarming 51% of DRs who had conflicts with supervisors were especially fearful of reporting these conflicts because they were afraid of repercussions. This is a clear sign of power abuse that has been reported on in detail in past surveys but still persists. Additionally, a surprising amount of DRs who had a conflict did not know where to report their conflict (Figure 6.7). Suggesting more needs to be done to raise awareness of conflict reporting mechanisms already in place at the MPS and institute level.

6.4 Discrimination, Conflict & Mental Health

The relevance of raising awareness for instances of discrimination, microaggressions, and satisfactory conflict reporting and resolution is validated by the relationship of these variables to mental health.

Focusing first on discrimination, and specifically the question whether DRs feel comfortable expressing their gender identity, we found significantly higher levels in all measures of impaired mental health for the

group who did not always (or rather not, or not at all) feel comfortable expressing their gender identity (t-test: all $p < .001$). For example, those who reported always feeling comfortable expressing their gender identity at work, had a mean trait anxiety score of 43.5 (see Figure 6.8), while those who did not always feel comfortable had a mean trait anxiety score of 50.7 out of 80 points (note that those who did not want to answer this question had mean trait anxiety score of 47.1).¹

Given these results, it does not come as a surprise that a similar pattern is found when asking DRs more explicitly about various reasons for discrimination. First of all, experiencing any kind of discrimination yields higher depression, state and trait anxiety scores (t-test, depression and trait anxiety $p < .001$, state anxiety $p < .01$; e.g. for state anxiety see Figure 6.9).

¹Note that, due to few people responding that they not at all (n=22), rather not (n=49) or only sometimes (n=149) feel comfortable expressing their gender identity at work, we decided to merge these three groups and compared their mental health scores to those of the people who reported that they always feel comfortable expressing their gender identity at work.

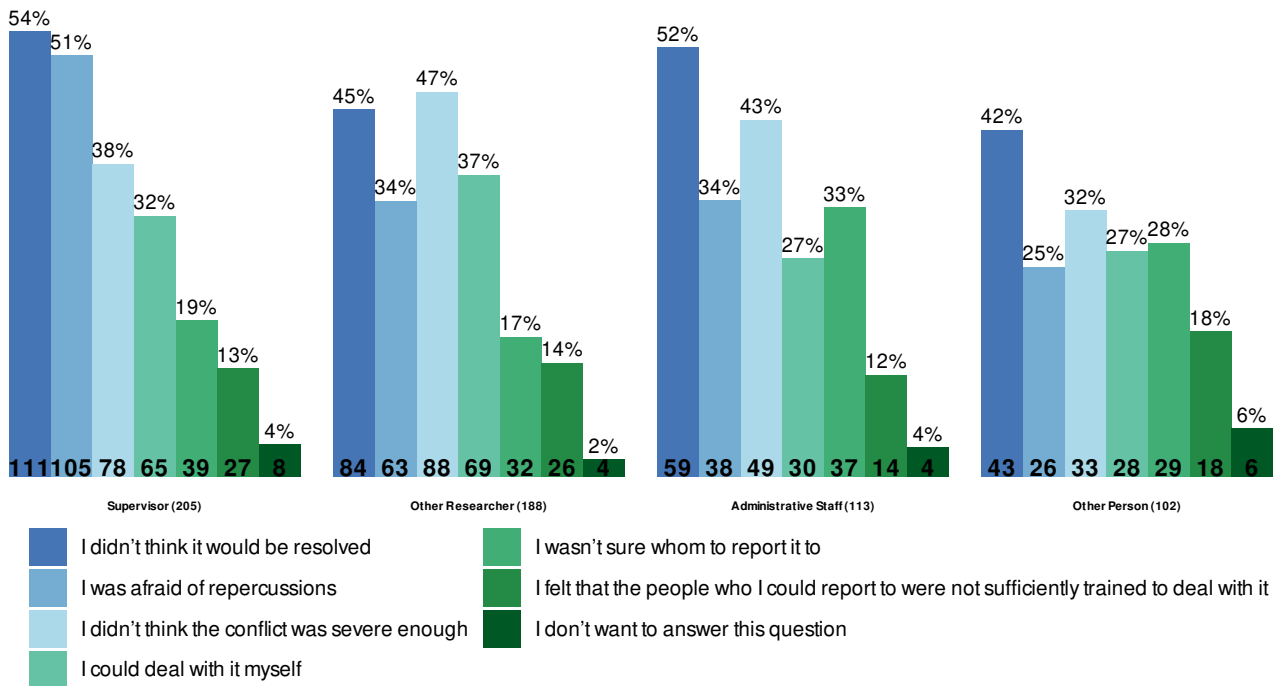


Figure 6.7: "Why did you not report your conflict?" Responses grouped by perpetrator; multiple responses possible.

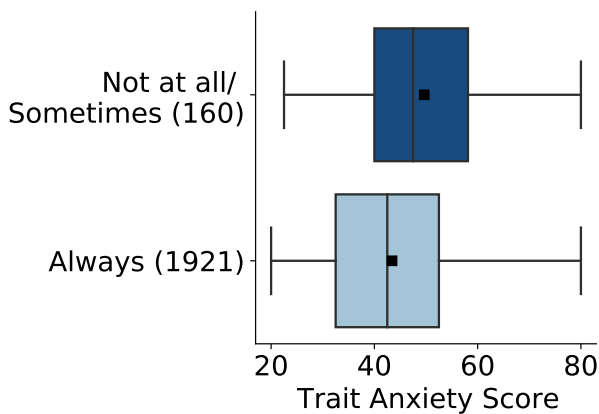


Figure 6.8: Trait Anxiety by DRs' Comfort When Expressing Their Gender Identity (black squares represent group means)

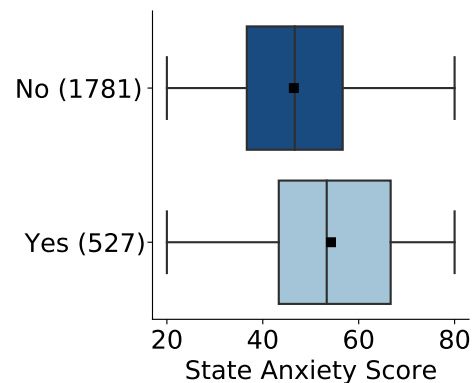


Figure 6.9: State Anxiety by Discrimination (black squares represent group means)

When taking a closer look at which specific causes of discrimination drive this effect, we found that depression, trait, and state anxiety scores are higher in correspondence of almost any all discrimination causes (e.g., for state anxiety, see Figure 6.10). This suggests that there is a significant connection between discrimination within the MPs has on DRs' mental health.

Apart from explicit discrimination, there is also a more implicit kind of discrimination, often in the form of subtle, indirect and

sometimes unintentional acts of prejudice, which is captured by the term microaggression. We observe that the more often people report to have been subject to microaggression, the higher their depression, trait and state anxiety scores. Statistical analyses show that each of our mental health metrics increases with increased frequency of experienced microaggressions (linear models, all coefficients' *p*-values <.05). For example, people who report to never experience any microaggression, have a mean depression score of 4.8 out of 24, while those who report to have experienced it daily have a

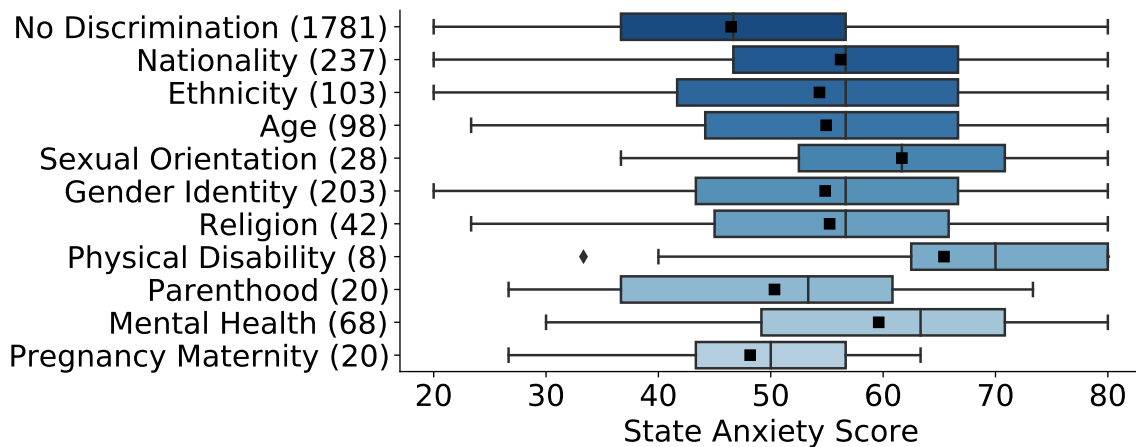


Figure 6.10: State Anxiety by Causes of Discrimination (black squares represent group means)

mean depression score of 13.3 (i.e., roughly 3 times as high; see Figure 6.11).

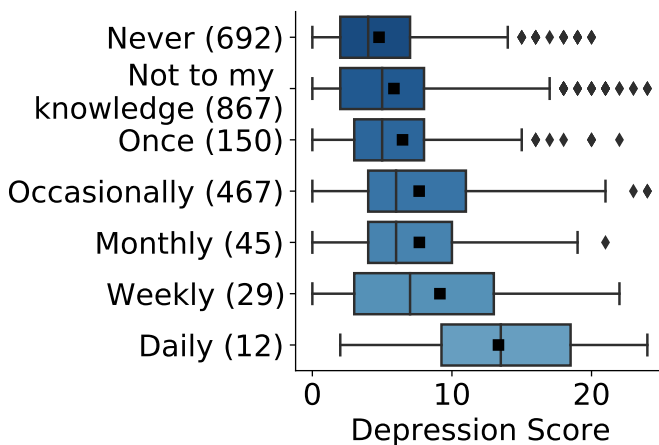


Figure 6.11: Depression by Microaggression Frequency (black squares represent group means)

The topic of power abuse and conflicts at the workplace, especially with researchers higher up in the hierarchy, once again received immense attention in the media ([9]). In this year’s survey, we asked DRs whether they have reported a conflict with a supervisor, another postdoc/doctoral researcher, administrative staff or another non-defined person at work in the past (see Figure 6.6). We find an overall effect of experiencing a conflict at work on mental health, regardless of the person one had the conflict with, and regardless of the mental health indicator (linear models, all coefficients’ p -values $< .001$).

For example, in the case of a non-reported

conflict with a supervisor, the mean trait anxiety score was 50.6, and thus about 7 scores higher than the mean trait anxiety score of those who reported that they had no conflict with a supervisor (mean = 43.3) and still roughly 2 scores higher than the mean score of those who had a conflict and reported it (mean = 48.4; see Figure 6.12).

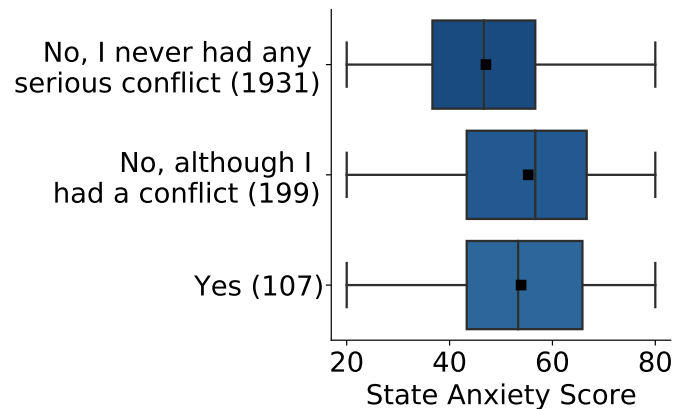


Figure 6.12: State Anxiety by Conflict Reporting (black squares represent group means)

When looking at the results for the follow-up question regarding how satisfied those, who reported a conflict, were with conflict resolution, we see that DRs who were very dissatisfied with the conflict resolution report noticeably higher trait anxiety scores (see Figure 6.13). The situation is less clear with the other satisfaction levels, however there is a tendency of lower trait anxiety scores in correspondence of higher satisfaction levels. Moreover, our linear regres-

sion analysis suggests that higher satisfaction levels, for any reported conflict with a supervisor, postdoc/PhD or administrative staff, correspond to lower state and trait anxiety scores (linear models, all coefficients' p -values $<.05$). So for example, those who reported a conflict with their supervisor and were very satisfied with conflict resolution had a reduced mean trait anxiety score of 41.3, but being very dissatisfied with resolution of this conflict was related to a mean trait anxiety score of 56.5 (see Figure 6.13).

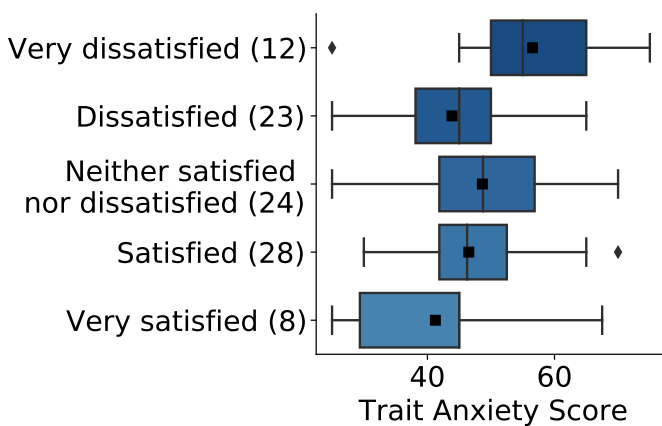


Figure 6.13: Trait Anxiety by Conflict Resolution Satisfaction (black squares represent group means)

To conclude, our data speaks to an urgent tackling of issues of discrimination, microaggression and conflict reporting. Importantly, these issues and their relationship with mental health appear to be more of a general phenomenon instead of being specific to a certain minority.

6.5 Selected Voices

"Even if frequency of microaggressions encountered is low, it can be very damaging and the emotional energy it took to confront the "aggressor" was enough to pull me away from my work and keep my mind distracted from work."

(Anonymous respondent)

"From all the conflicts that I was witnessing in the institute, the person in the higher hierarchy is considered right anyway and the student is either fired or not given the extension as a punishment of reporting the conflict. So the students prefer not to report the conflicts at all..."

(Anonymous respondent)

"I had arguments with both my direct and formal supervisors, but we sorted them out without external help. I appreciate that this is not easy for many of my fellow PhD students."

(Anonymous respondent)

"It is never meant badly, but it is still annoying - being complimented on my parking skills,...being asked how old I was and then being surprised and complimenting me on how great my achievements are for such young age."

(Anonymous respondent)

Chapter 7

Cluster Analysis

Key Points:

- Our cluster analysis identifies (unreported) supervision, German nationality/proficiency, satisfaction and conflicts as important characteristics.
- DRs directly supervised by their formal supervisor have less interaction and are comparably less satisfied compared to DRs not directly supervised by their formal supervisor.
- Satisfaction of international students is influenced by the institute's support (e.g., German courses, administrative support, etc.).
- The majority of senior DRs are dissatisfied, indicating that the majority of DRs will have problems throughout their PhD.
- Dissatisfied DRs are less likely to continue a career in academia and exhibit higher depression as well as anxiety scores.
- In total, 1283 DRs (53.8%) are generally dissatisfied with several factors of their PhD or have been subject to discrimination/micro aggressions. 100 of these DRs indicated unreported conflicts.

As in previous years, we conducted a cluster analysis using principal component analysis (PCA) [24] and k -means clustering [18] in addition to the exploratory analysis presented in previous chapters. Here, doctoral researchers were grouped by the similarity of their answers, revealing eight distinct clusters, as shown in Figure 7.1. This chapter discusses the individual clusters and details and draws conclusions supporting those in previous chapters. We start by highlighting how

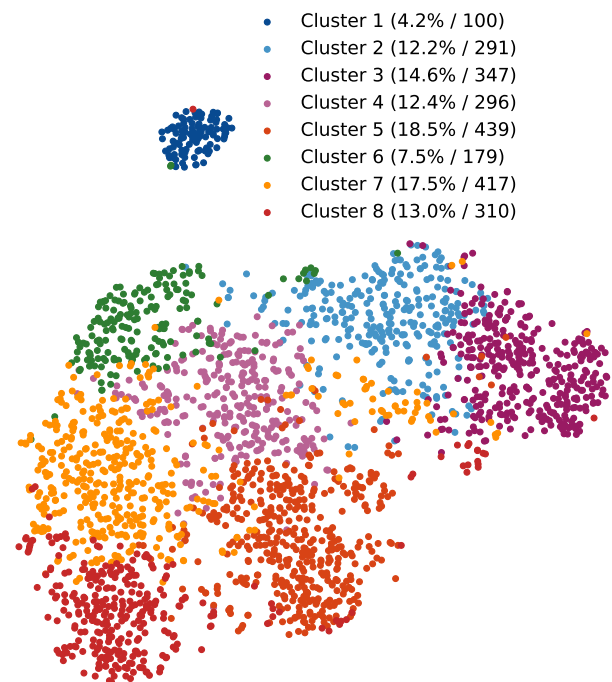


Figure 7.1: Visualization of obtained clusters using t-SNE, see Section 7.1 for details. We found eight clusters, indicated by color, and report relative and absolute cluster sizes. In Section 7.2, we show that cluster one represents DRs with an unreported conflict. Clusters two to eight are obtained by dividing DRs by supervision, nationality and language and general satisfaction.

to read the presented figures.

7.1 Methods and Visualization

We obtained the clusters corresponding to colors in Figure 7.1 using k -means clustering [18] after dimensionality reduction using principal component analysis (PCA) [24]. To this end, most of the DRs answers where converted to numerical values. Following com-

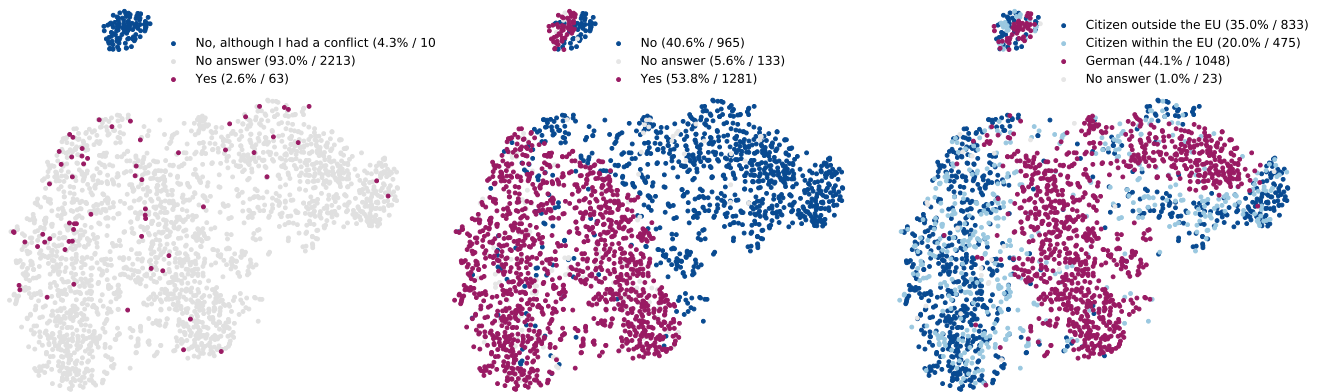


Figure 7.2: **Left:** “Have you ever reported a conflict, in terms of a situation where you felt mistreated, with one of the following people to an official third party: Others?” Cluster 1 in Figure 7.1 is comprised of DRs that had a conflict with a third-party, but did not report it. **Middle:** “Is your formal supervisor your direct supervisor?” Clusters 2 through 8 are split according to supervision. For example, clusters 2 and 3 are *not* directly supervised by their formal supervisor. **Right:** “What is your citizenship? Should you have multiple citizenships, please select the one you feel best represented by.” Clusters 4 and 5 correspond to German DRs, or DRs with high German proficiency, while clusters 6, 7, and 8 correspond mostly to international DRs.

mon practice, we use t-SNE [17] to further reduce the answers to two dimensions for visualization, i.e., corresponding to spatial dimensions in Figure 7.1. We refer to Appendix F.4 for details on our methods.

How to Read the Presented Figures? Figure 7.1 shows all DRs and their assigned cluster using a two-dimensional t-SNE visualization. Each individual point represents one DR and its color represents cluster assignment (e.g., **dark blue** for Cluster 1). Distances in the two-dimensional plane represent similarity between the DRs, i.e., their answers. The exact absolute distances, however, are irrelevant which is why we hide both axes for clarity. This is because t-SNE is intended solely for visualization. We also emphasize that the clustering was *not* obtained in two dimensions, which is why individual points do not necessarily lie close to their respective clusters.

7.2 Obtaining the Clusters

In the following, we discuss the individual clusters in detail. We found that the 8 clusters shown in 7.1 are aligned along four main characteristics, which we will elaborate on in

the following:

1. *Unreported conflict:* whether a work conflict occurred but was not reported;
2. *Supervision:* whether DRs are supervised by their formal supervisor or not;
3. *Nationality and native language:* whether DRs have German nationality or speak fluent German;
4. and *Satisfaction:* satisfaction of DRs across various different aspects.

7.2.1 Unreported Conflicts

Cluster 1, **dark blue**, corresponds to DRs that had a conflict at work, but did *not* report it to an official third party, as shown in Figure 7.2 (left). We note that this does not necessarily reflect conflicts with the DRs’ supervisor or the administration, but with “others”. This is independent of why the conflict was not reported, e.g., whether the DRs did not think that the conflict could be resolved or the conflict was not severe enough (cf. Appendices E.1 and E.2). Note that this cluster is the smallest one, containing 100 DRs.

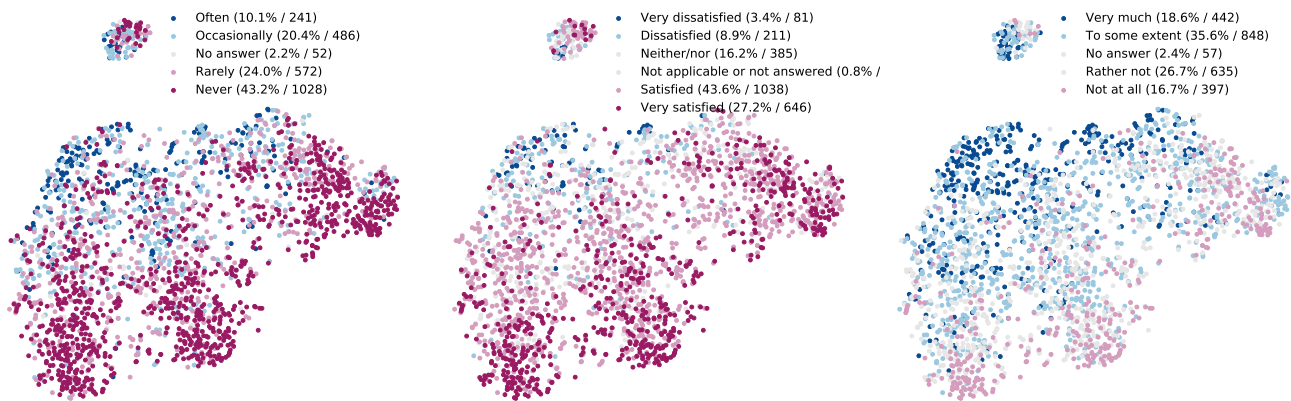


Figure 7.3: **Left:** “Have you ever considered quitting your PhD?” Clusters 2, 4, 6 and 7 comprise DRs that frequently consider quitting their PhD. Generally, these DRs are less satisfied, for example wrt. the work environment: **Middle:** “If you think about your own situation as a doctoral researcher, how satisfied are you with the following aspects: work environment and atmosphere? These clusters are also less satisfied with the work environment, in general. **Right:** “Which of the following aspects of your work as a doctoral researcher would you like to be improved: work environment and atmosphere?” Even DRs that are generally more satisfied, e.g., in Clusters 3, 5 and 8, want their work environment to be improved.

7.2.2 Supervision

Clusters 2 and 3, light blue and dark magenta on the right, correspond to DRs that are *not* supervised by their formal supervisor, see Figure 7.2 (middle). Most commonly, this corresponds to DRs with, e.g., a director as formal supervisor, but a more junior researcher, e.g., post-doc or group leader, as direct supervisor (cf. Appendices E.3 and E.4). Note that the DRs in Cluster 1 are also split according to supervision. The remaining clusters, i.e., Clusters 4 to 8, contain DRs that are supervised by their formal supervisor. We found that personal attributes of the supervisor play no important role, including gender or having children (cf. Appendices E.5 and E.6). Often, DRs supervised by their formal supervisor will, on average, have less regular interaction, even though they do not favor less interaction (cf. Appendices E.7 and E.8).

7.2.3 Nationality, Citizenship and German Proficiency

Clusters 4 to 8, rose, orange, green, yellow and red, are further subdivided by nationality resp. citizenship or fluency of German. This is shown in Figure 7.2 (right) using cit-

izenship as example. Note that Clusters 3 and 4 are also subdivided, even though this is not reflected in our clustering, showing that supervision is not significantly different between local and international students. We found that this also aligns with German proficiency (cf. Appendix E.9). Furthermore, among DRs with German citizenship or near-native language proficiency, Caucasian is by far the biggest ethnic group, even among international students.

7.2.4 Satisfaction

Clusters 2, 4, 6 and 7, light blue, rose, green and yellow, contain DRs that are predominantly dis-satisfied with their current situation. This means that they are dis-satisfied with multiple, but not necessarily all, aspects of their PhD. We emphasize that this corresponds to 53.8%, including Cluster 1. Clusters 3, 5 and 8, magenta, orange and red, in contrast, comprise DRs that are generally satisfied. This is best summarized by Figure 7.3 (left), showing that dis-satisfied DRs are more likely to consider quitting their PhD. It is important to note that DRs dis-satisfaction can have various reasons. Figure 7.3 (middle) considers work environment as an ex-

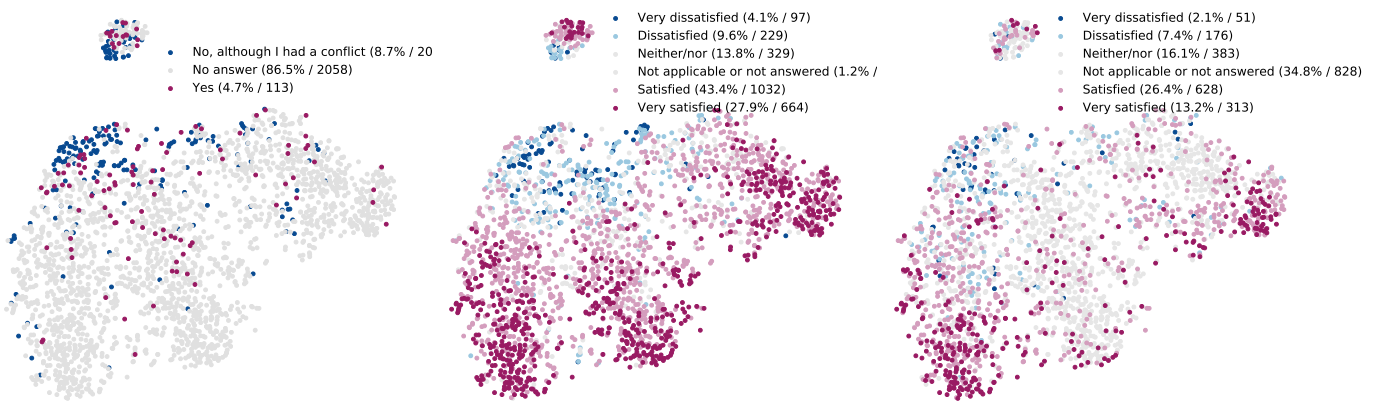


Figure 7.4: **Left:** “Have you ever reported a conflict, in terms of a situation where you felt mistreated, with one of the following people to an official third party: supervisor?” Conflicts with supervisors are contributing to the dissatisfaction of many DRs. **Middle:** “If you think about your own situation as a doctoral researcher, how satisfied are you with the following aspects: supervision?” **Right:** “If you think about your own situation as a doctoral researcher, how satisfied are you with the following aspects: support for international doctoral researchers?” For international students, dedicated support is important for DRs to be satisfied with their work.

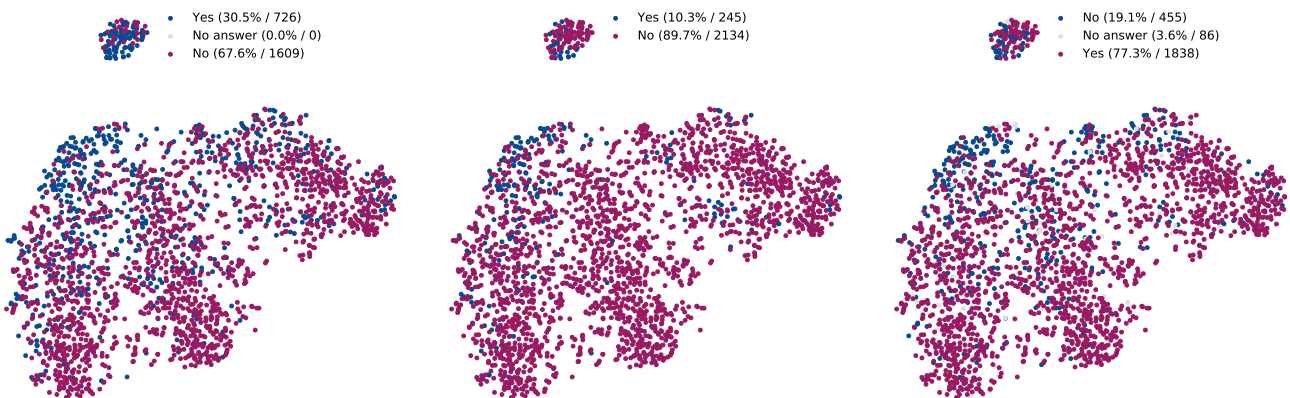


Figure 7.5: **Left:** “Have you ever been subject to microaggressions in your work environment?” Micro-aggressions at work have direct impact on satisfaction of DRs. **Middle:** “Have you ever felt discriminated in your work environment because of one or more of the following: nationality?” International students are clearly less satisfied when subject to discrimination based on nationality. **Right:** “Do you feel free to take days off?” DRs in Clusters 2, 4, 6 and 7, feel more pressured to work and less free to take days off.

ample. DRs dis-satisfied with, e.g., the work environment generally also express a wish to improve work atmosphere, cf. Figure 7.3 (right). It is important to note, however, that dis-satisfaction also includes aspect such as support for families and international students, supervision, career development and prospects, social life as well as discrimination and conflicts, to name just a few (cf. Appendices E.16 to E.20). There are, however, also facets that DRs are predominantly satisfied with, e.g., laboratory or office equipment (cf. E.10 and E.11). Furthermore, Section 7.3 will show that this also translates to high depres-

sion and anxiety level.

7.3 Discussion

In the following, we summarize and discuss all our findings. We also link our findings to the previous chapters, e.g., discussing mental health issues.

Conflicts: In Figure 7.1, Cluster 1 is the most distinct. 100 DRs indicated unreported conflicts with an “other” third party, i.e., not their supervisor, a post-doc or administrative staff. Figure 7.4 (left) highlights that DRs

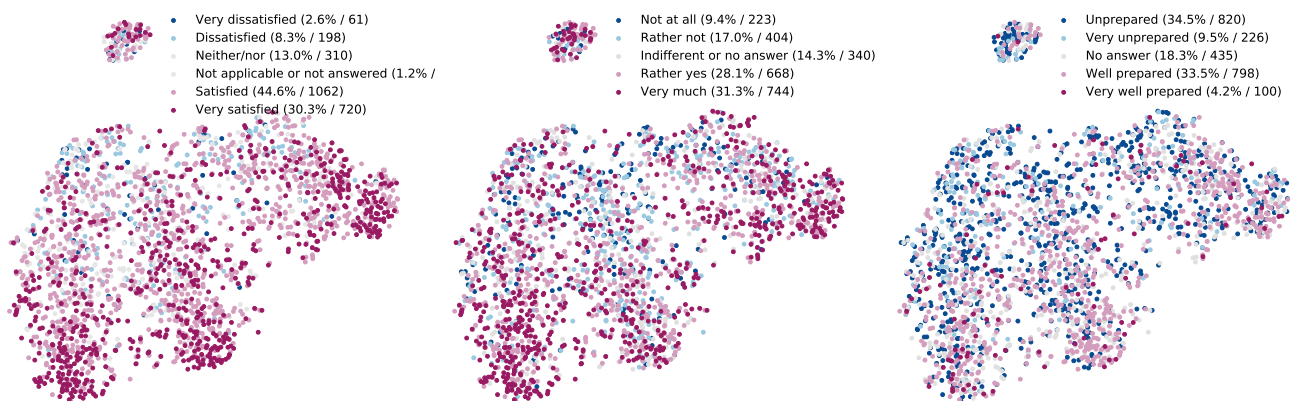


Figure 7.6: **Left:** “If you think about your own situation as a doctoral researcher, how satisfied are you with the following aspects: COVID-19 situation handling at your institute?” Most DRs are satisfied with how COVID-19 is handled at their institutes. **Middle:** “Which field would you like to work in after completing your PhD? Academia.” Dis-satisfied DRs, i.e., Clusters 2, 4, 6 and 7, are less inclined to stay in academia. **Right:** “Do you think that you are well trained for a job outside science?” These DRs also feel less well-prepared to jobs outside of academia.

with a conflict with their supervisor overlap Cluster 1, but also spread to other Clusters. This might indicate that DRs frequently have conflicts with yet unidentified groups within the institutes. We found that conflicts are usually not reported in fear of repercussions or in believe of the conflict not being resolved (cf. Appendix E.1 and E.2). Beyond these conflicts, DRs in Cluster 1 are also subject to discrimination or micro-aggressions and are generally dis-satisfied with their situation, see, e.g., Figure 7.5. This indicates that many conflicts are related to discrimination and or micro-aggressions.

Supervision and Nationality: Following Figure 7.2 (middle and right), DRs are split by supervision, i.e., whether their formal supervisor directly supervises them, and nationality/language, i.e., German or international students. Both aspects are important for satisfaction: Figure 7.4 (middle) shows that DRs supervised directly by their formal supervisor are more likely to be dis-satisfied with their supervision. We also found dis-satisfaction to align well with whether DRs believe they are behind in their PhD work (cf. Appendix E.21). Similarly, international students are more prone to discrimination, e.g., by nationality as shown in Figure 7.4 (right). We also found that DRs not supervised by their formal supervisor have more frequent inter-

action, indicating that more regular interaction improves satisfaction (cf. Appendix E.7). We did not find a significant difference in supervision between German and international DRs.

Satisfaction: Besides supervision and nationality, satisfaction is the most important aspect of the clustering in Figure 7.1. While Clusters 2, 4, 6 and 7 are predominantly comprised of dis-satisfied DRs, this does not imply that *all* of these DRs are dis-satisfied with *all* aspects of their PhD. Figure 7.2 (left) shows that individual DRs in these clusters might not consider quitting their PhD. However, we found that all of these DRs are at least dis-satisfied with some specific aspects. Generally, DRs are very satisfied with laboratory/office equipment or vacation days and reasonably satisfied with administrative support (cf. Appendices E.10 to E.13). DRs are significantly less satisfied with psychological support, workload and social life at institutes. For example, DRs might not feel free to take days off, see Figure 7.5 (right). Surprisingly, DRs are also not very satisfied with their contribution to research and scientific outreach, even though that should be at the core of each DRs’ work (cf. Appendix E.14 and E.15). As shown in Figure 7.6, most DRs are satisfied with the COVID-19 situation at their institutes. Thus, DRs’ dis-satisfaction seems

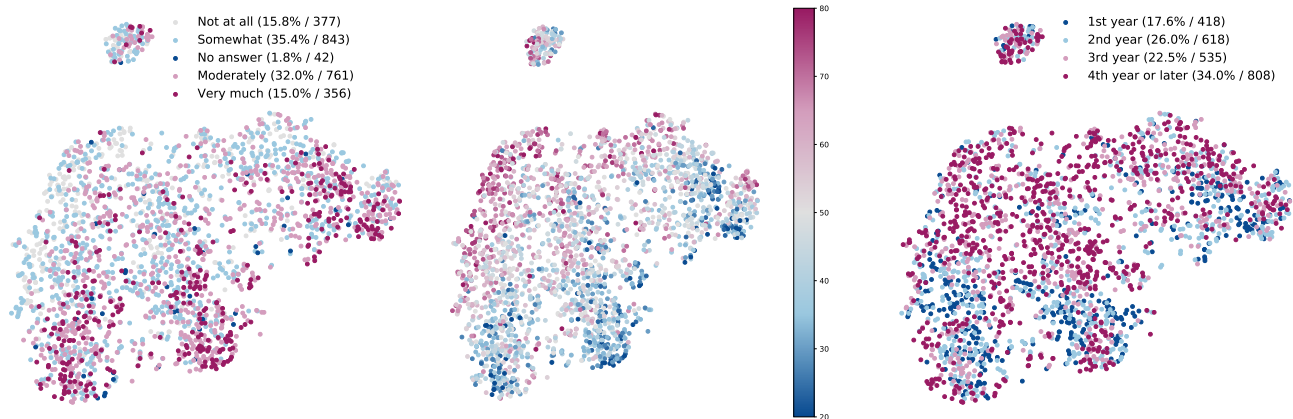


Figure 7.7: Left: “Please read each statement below and then indicate how you generally feel: I am calm, cool and collected.” Dis-satisfied DRs feel less calm in everyday work, i.e., general dis-satisfaction has direct impact of the everyday feelings. **Middle:** Anxiety score. This can be measured using the anxiety score discussed in Chapter 3. **Right:** Year of PhD. As dis-satisfied DRs are predominantly senior PhD students, it is likely that nearly all DRs will be dis-satisfied with at least some aspects throughout their doctoral studies.

unrelated to COVID-19. Across DRs, we found women to be dis-satisfied slightly more often.

Academic Career: Satisfaction also impacts DRs’ views on academia in general. Specifically, DRs are almost always dis-satisfied with the prospects of an academic research career, including salaries, availability of permanent positions, workload and compatibility with private life (cf. Appendices E.22 to E.24). Figure 7.6 (middle and right) shows that, as a result, dis-satisfied DRs are less willing to stay in academia while feeling not well-prepared for jobs outside academia. This is pronounced for international students, which might be due to insufficient support, see Figure 7.4 (right).

Mental health: Finally, Figure 7.7 (left) shows that dis-satisfaction correlates well with DRs feeling at the time of taking the survey. Less satisfied DRs, Clusters 2, 4, 6 and 7, in particular, also feel less “calm, cool and collected”. Strikingly, the anxiety scores from Chapter 3 also correlate with dis-satisfaction: more satisfied DRs exhibit lower anxiety scores. As the survey represents a snapshot of DRs across Max Planck Society, Figure 7.7 (right) shows DRs colored by their year. It can be seen that senior PhDs, e.g., third or fourth year, are the largest part among the dis-satisfied DRs. This indicates

that it is very likely that nearly every DR will be dis-satisfied with some aspects throughout their PhD.

7.4 Summary

In conclusion, our clustering analysis aligns with many insights from previous sections. Most strikingly, the clusters capture the satisfaction of DRs with respect to various aspects. Overall, the majority DRs will be dissatisfied with multiple important aspects throughout their PhD time. This also correlates well with mental health, everyday work and likelihood of staying in academia.

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Appendix A

Supplementary Figures: Demographic & Mental Health

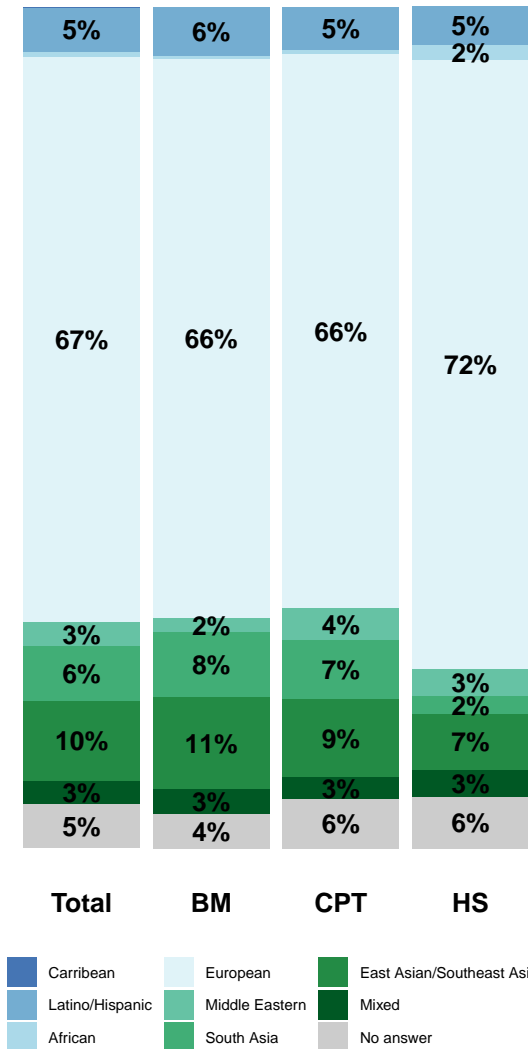


Figure A.1: Ethnicity of DR

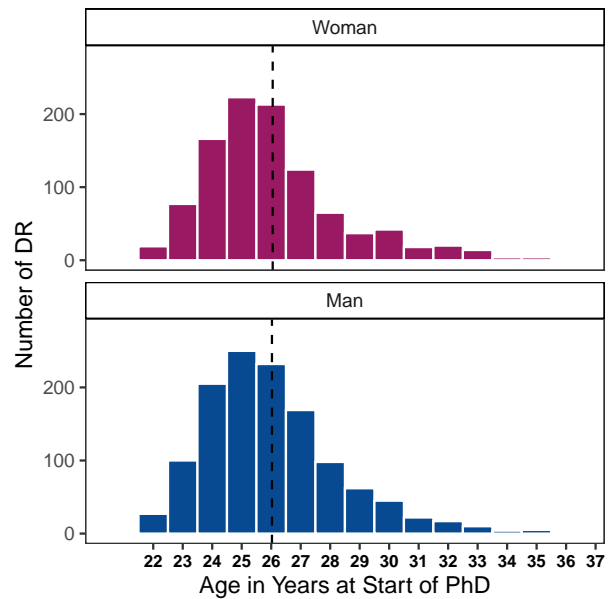


Figure A.2: Age of DR at the Start of their PhD

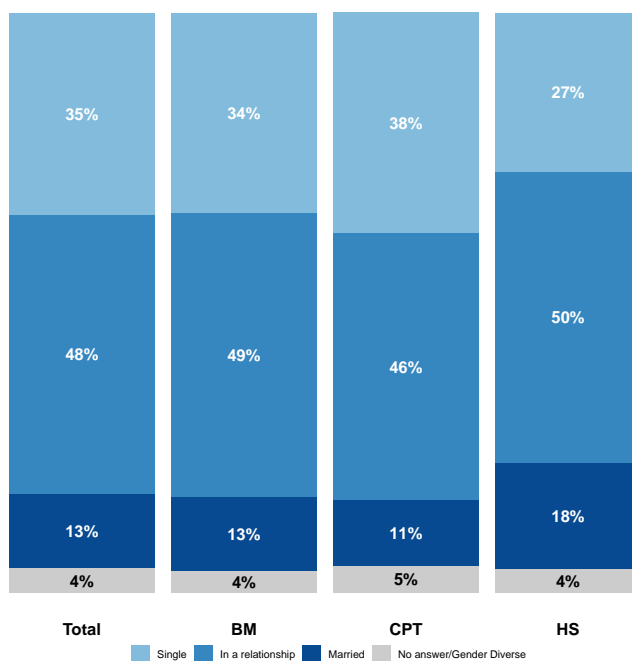


Figure A.3: Relationship Status

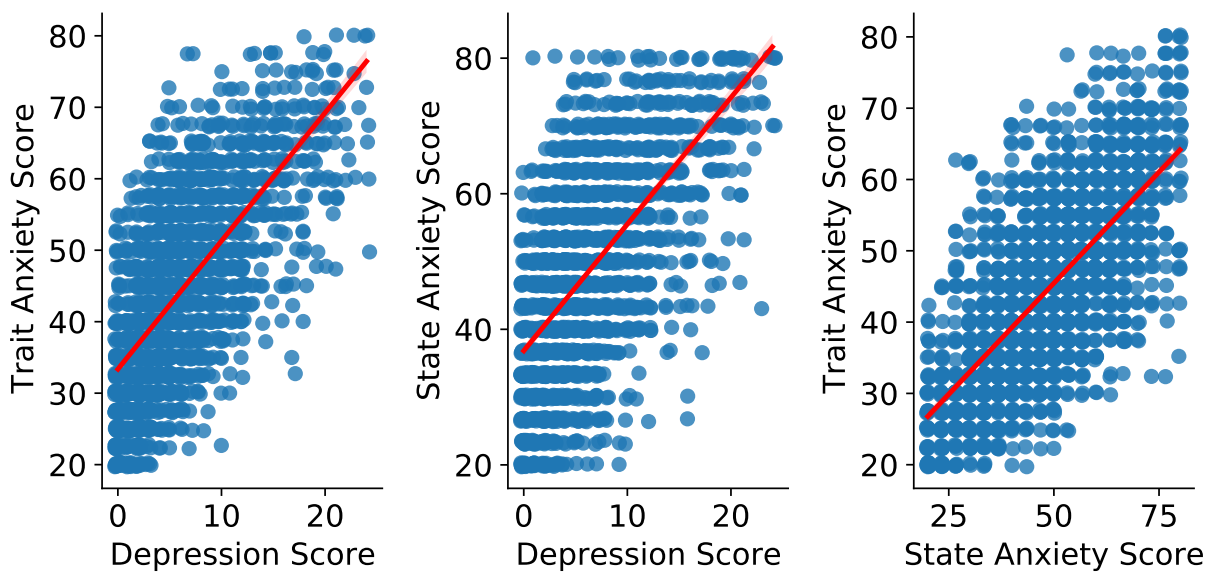


Figure A.4: Correlations Between The Three Mental Health Indicators

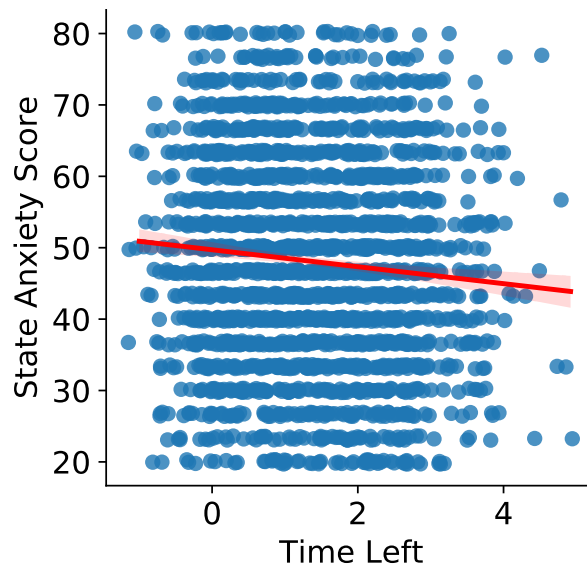


Figure A.5: State Anxiety Score by Time Left for PhD-Completion

Appendix B

Supplementary Figures: Working Conditions

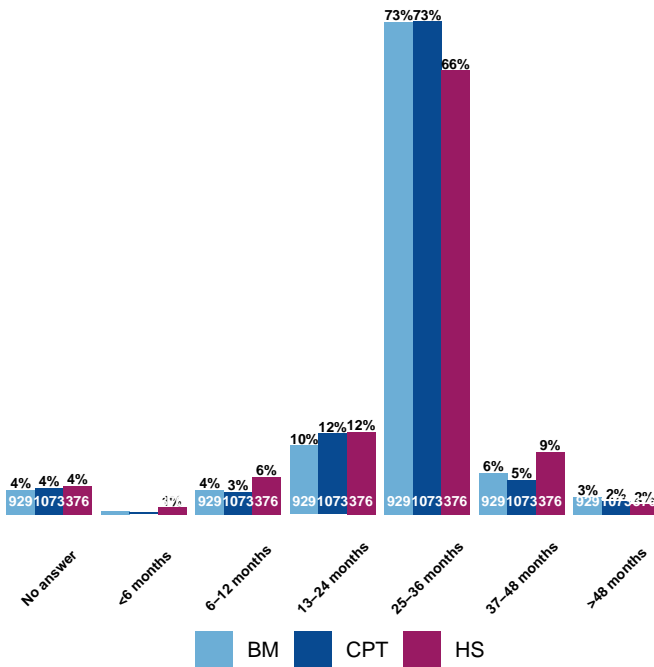


Figure B.1: Duration of Contracts of DR per Section

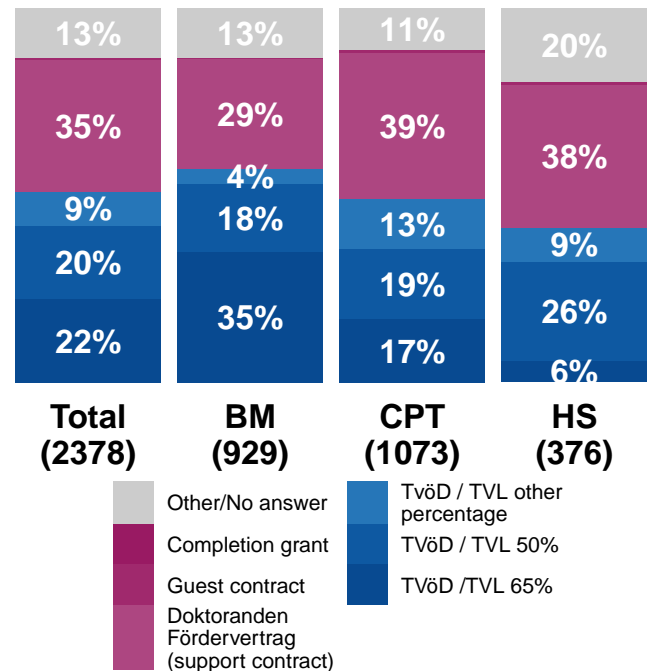


Figure B.2: Types of Contracts of DR per Section

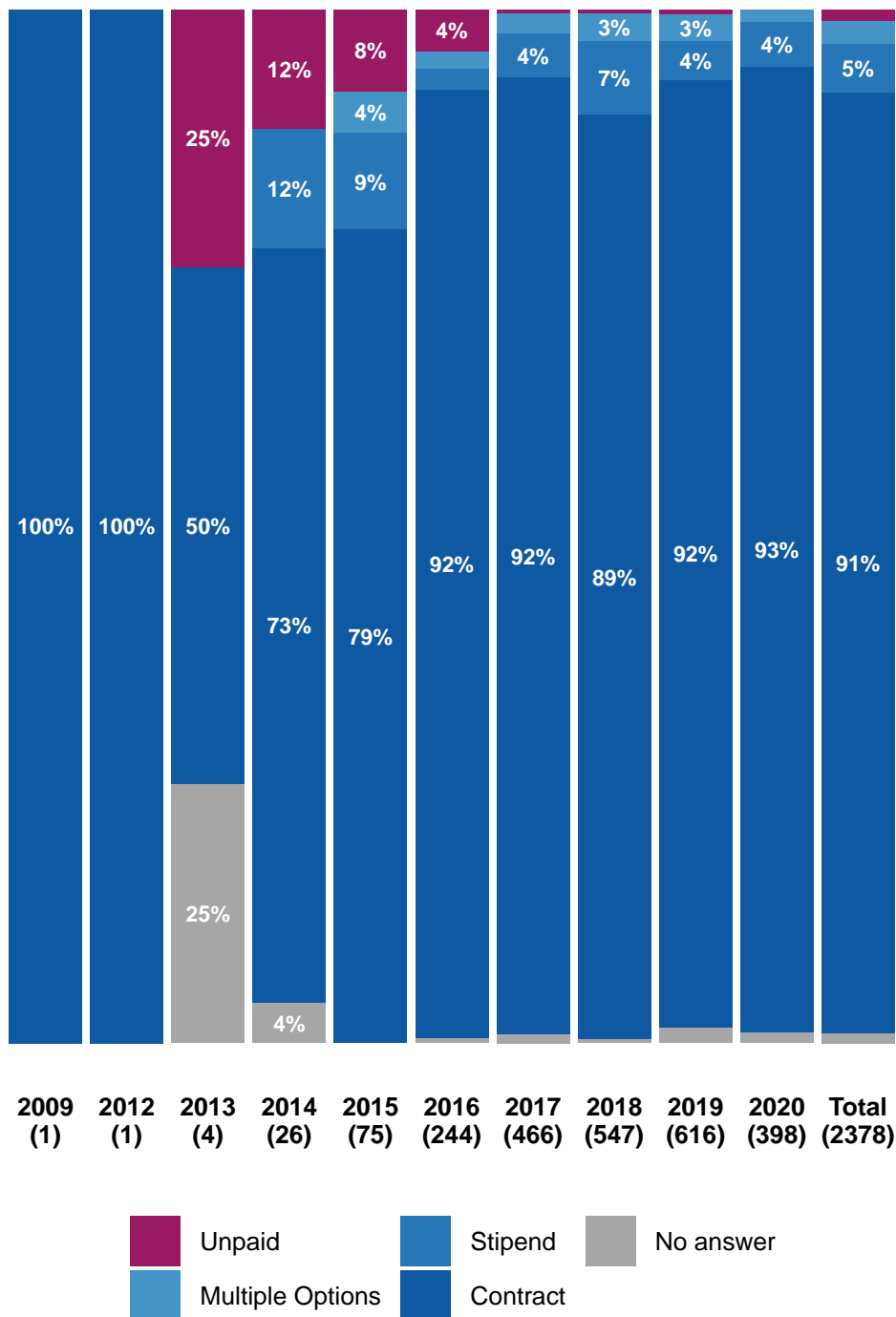


Figure B.3: Types of Contracts of DR per Year

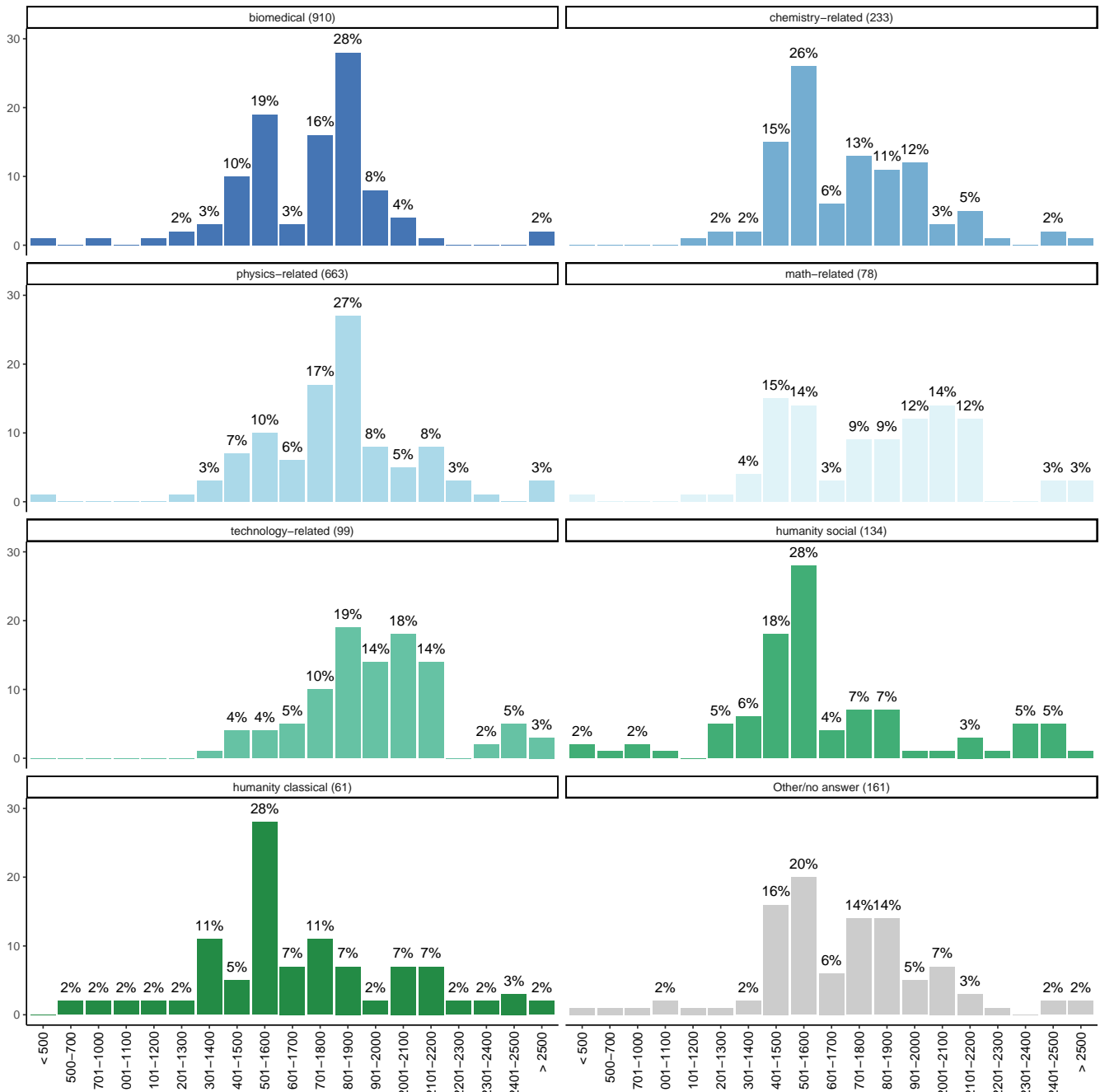


Figure B.4: Net income by field of work

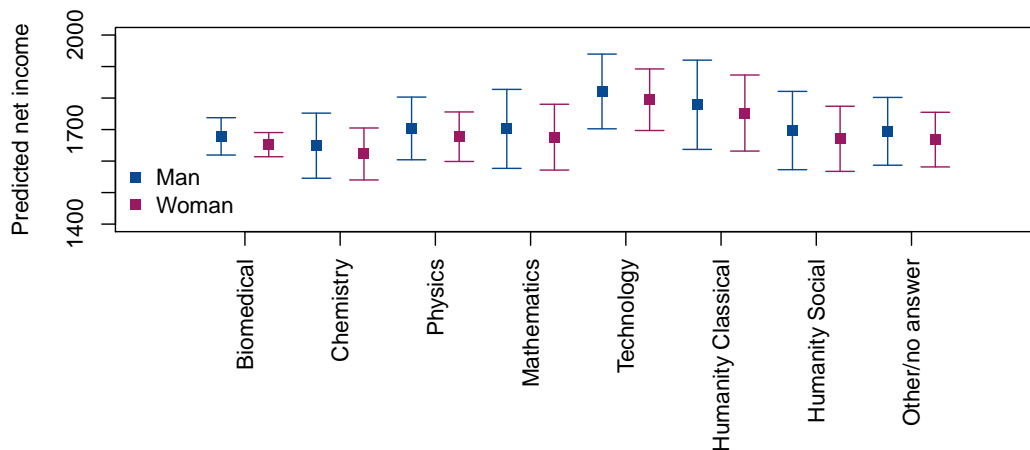


Figure B.5: Predicted average (and 95% confidence intervals) net income by gender and field of work.

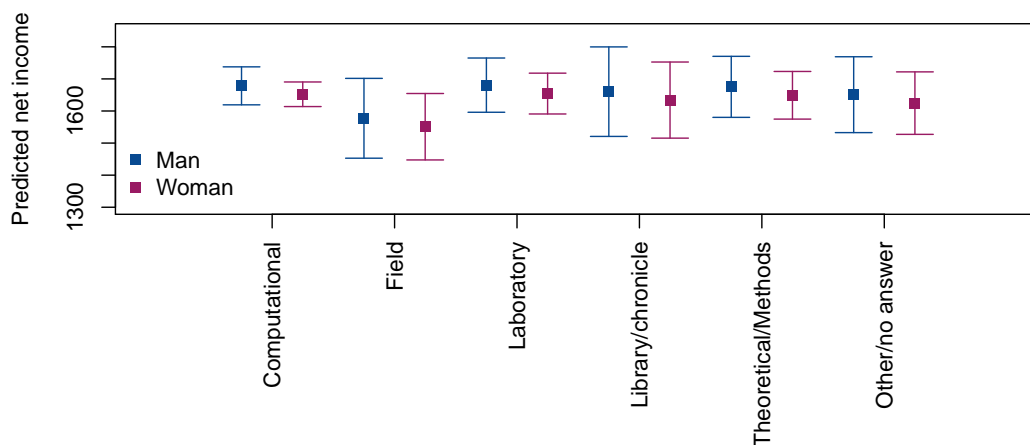


Figure B.6: Predicted average (and 95% confidence intervals) net income by gender and type of work.

I do not get external financial support

Sources of external financial support

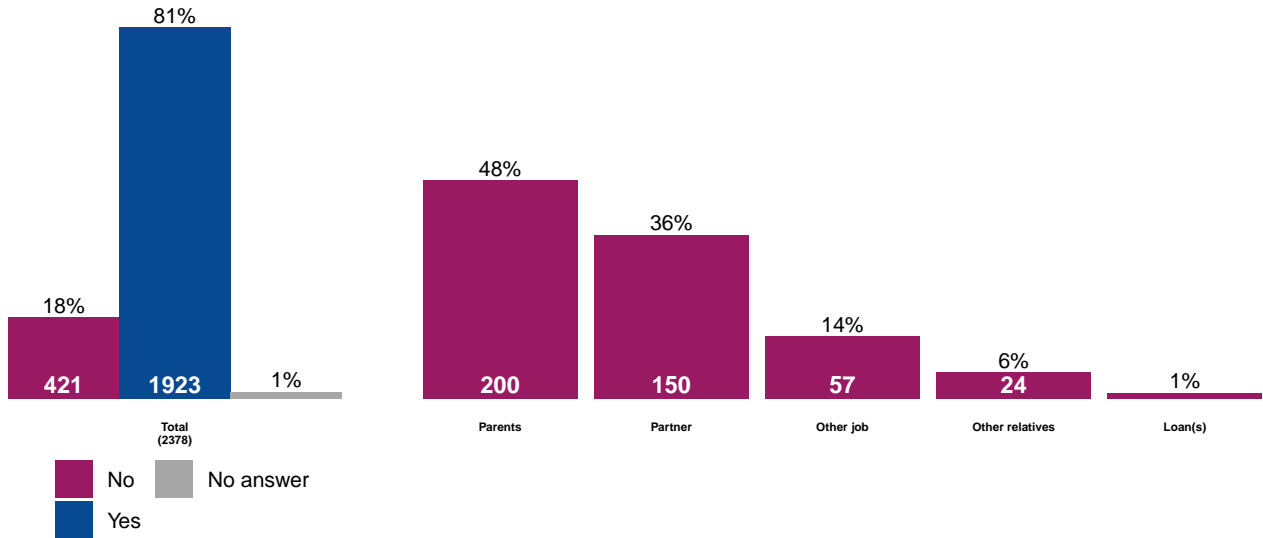


Figure B.7: Financial Support

Do you get external financial support to cover your living expenses besides your salary?

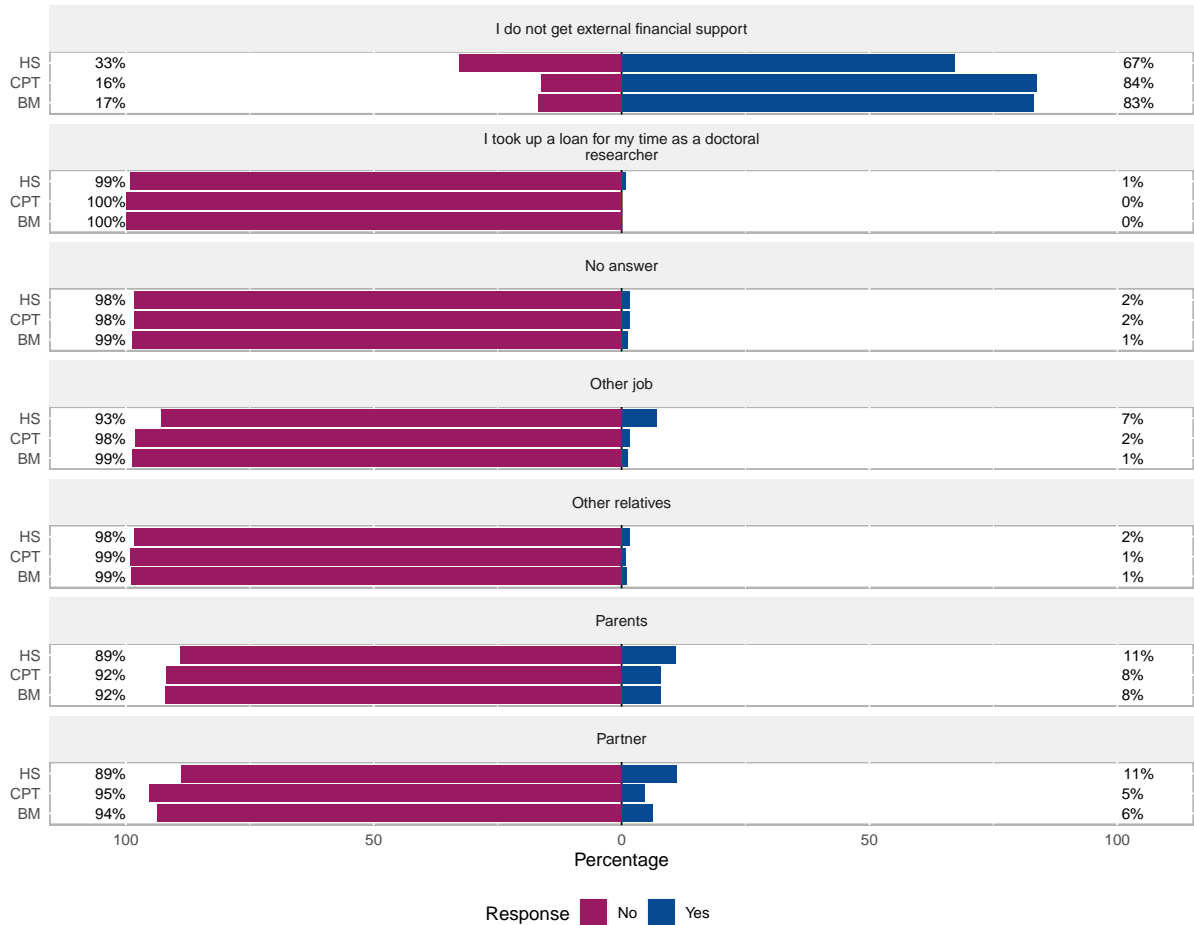


Figure B.8: Financial Support by Section (Responses given less than 2% are not labelled)

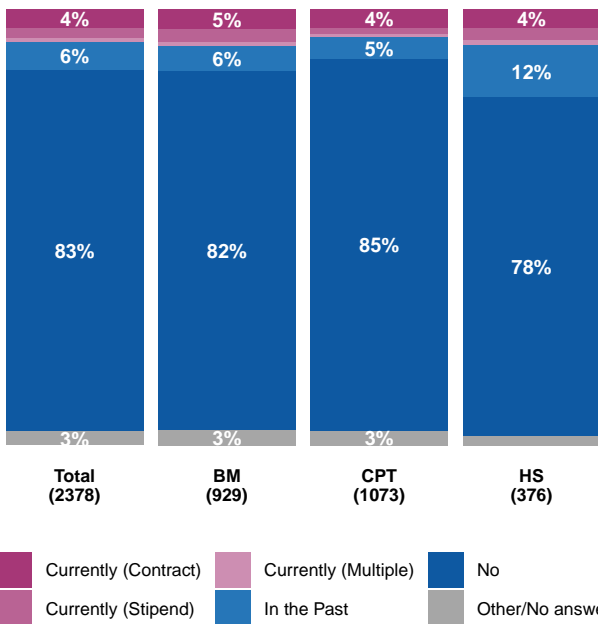


Figure B.9: External Funding by Section (Responses given less than 2% are not labelled)

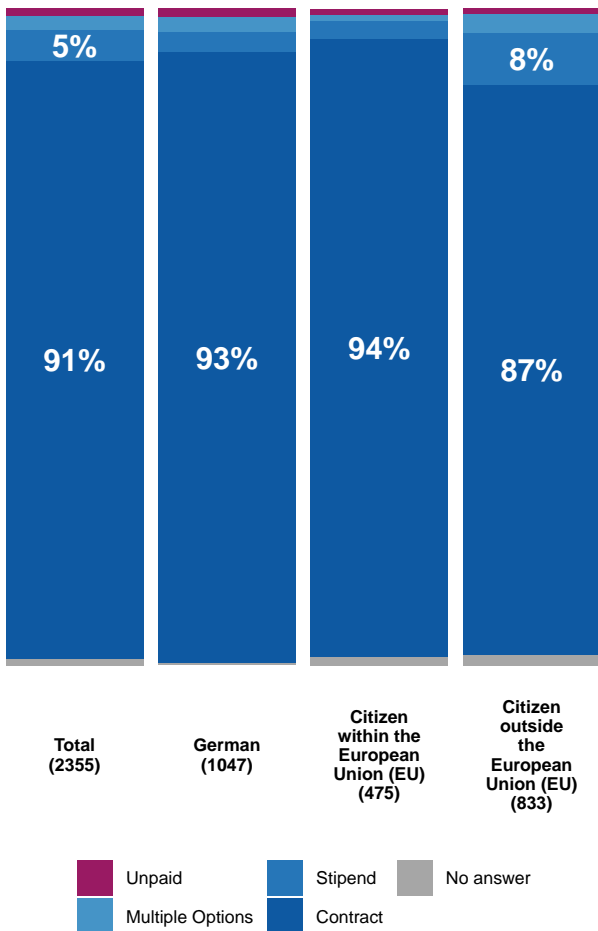


Figure B.10: Types of Contracts of DR by Citizenship (Total: 2356, German: 1048, Citizen within the European Union: 475, Citizen outside the European Union: 833; Responses given less than 3% are not labelled)

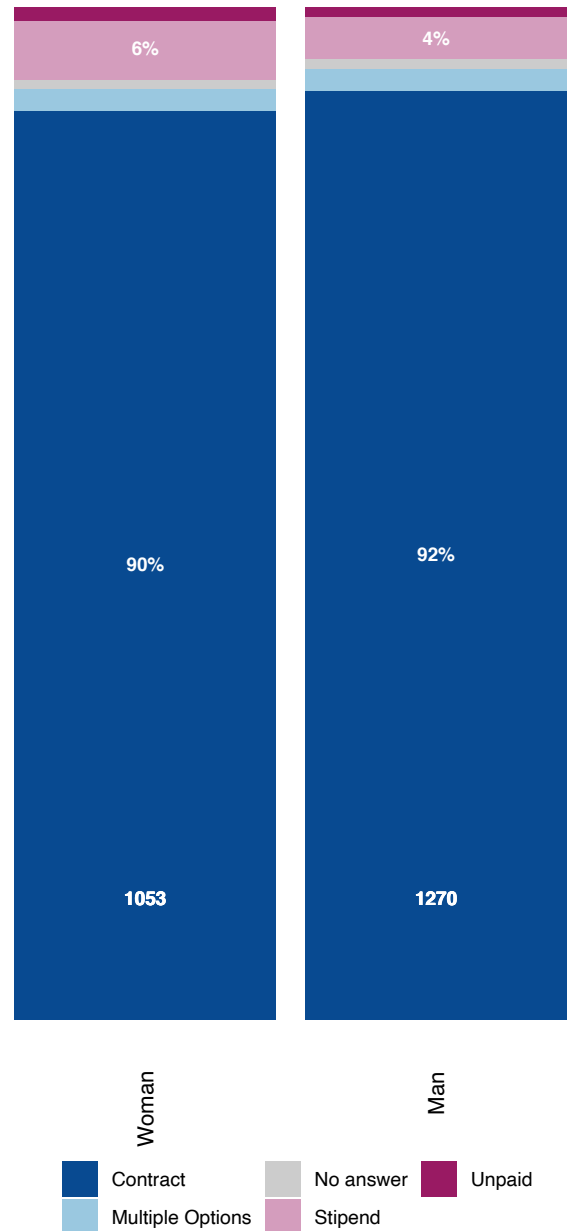


Figure B.11: Types of Contracts of DR by gender (Responses given less than 3% are not labelled)

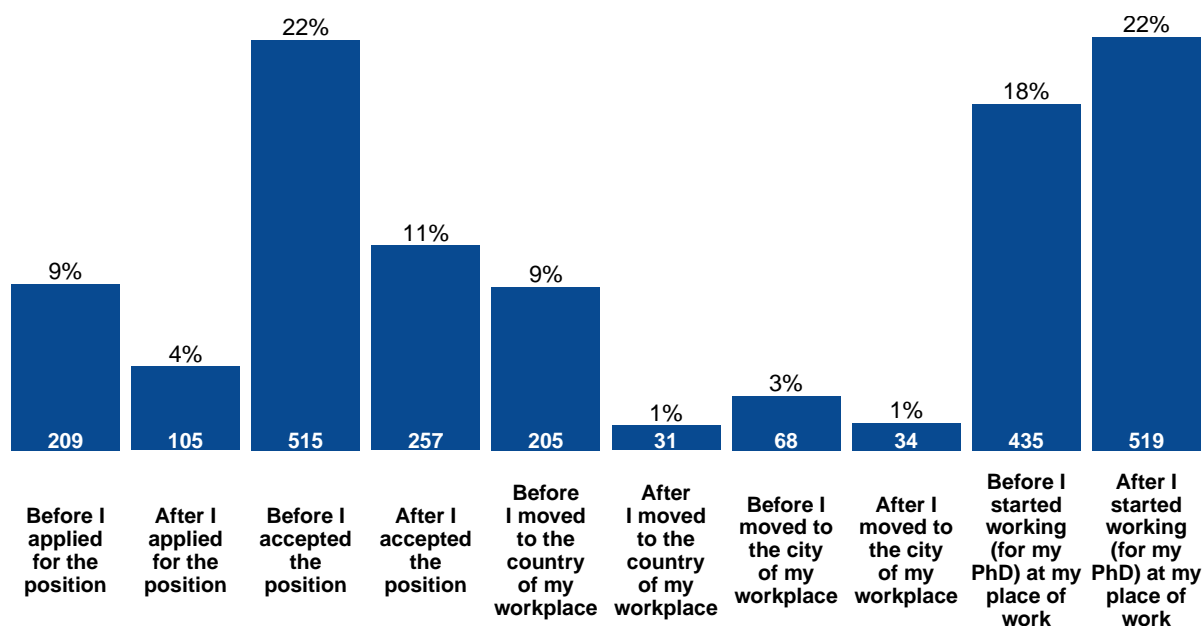


Figure B.12: "When did you receive all relevant information regarding your contract?" Responses represent the earliest of the chronologically ordered time points at which the relevant information was received.

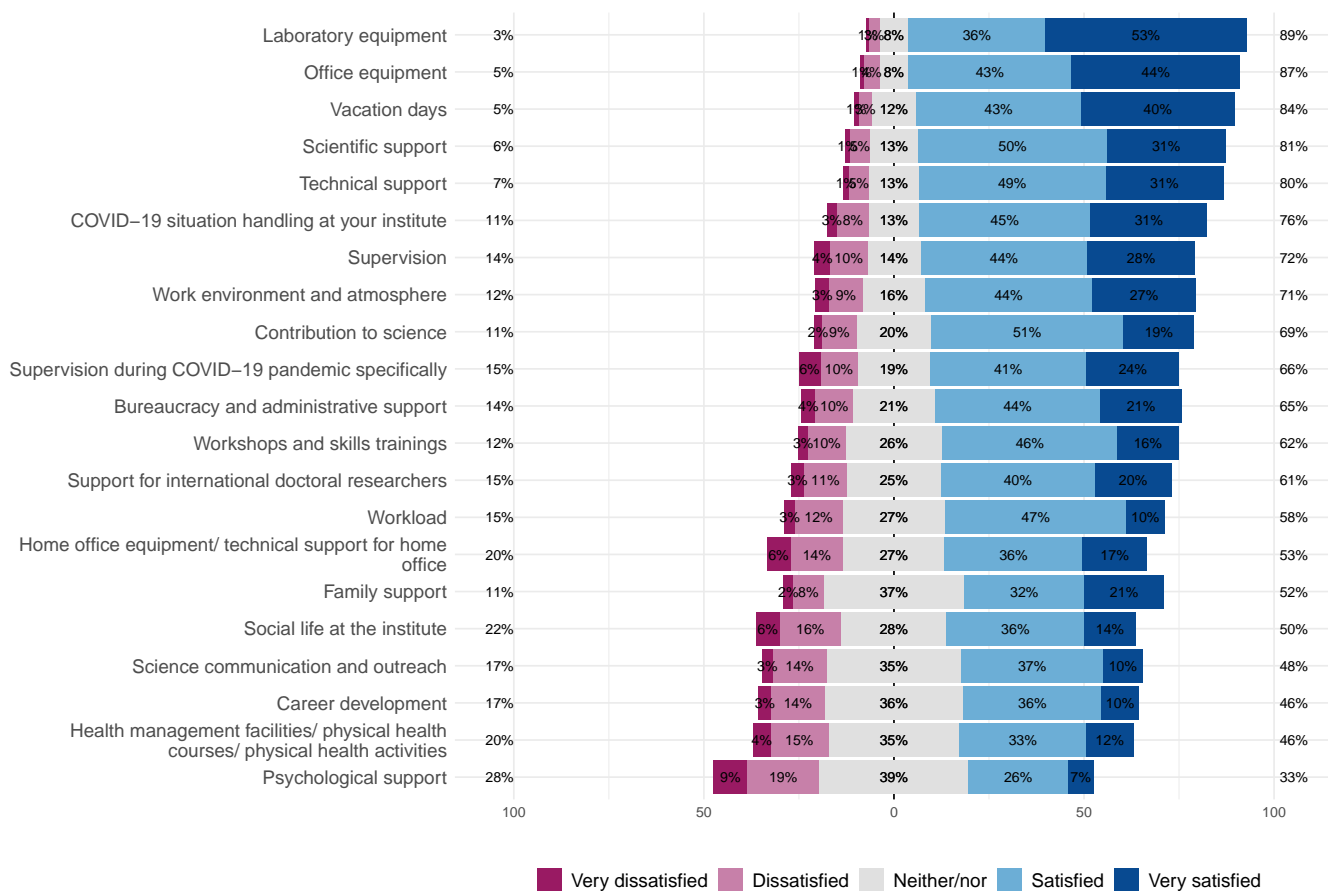


Figure B.13: "If you think about your own situation as a doctoral researcher, how satisfied are you with the following aspects?"

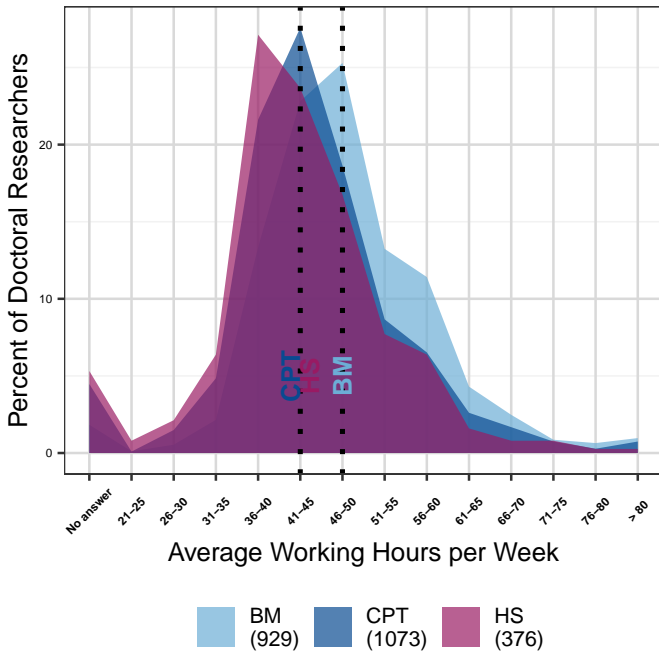


Figure B.14: Working Hours of DR by section

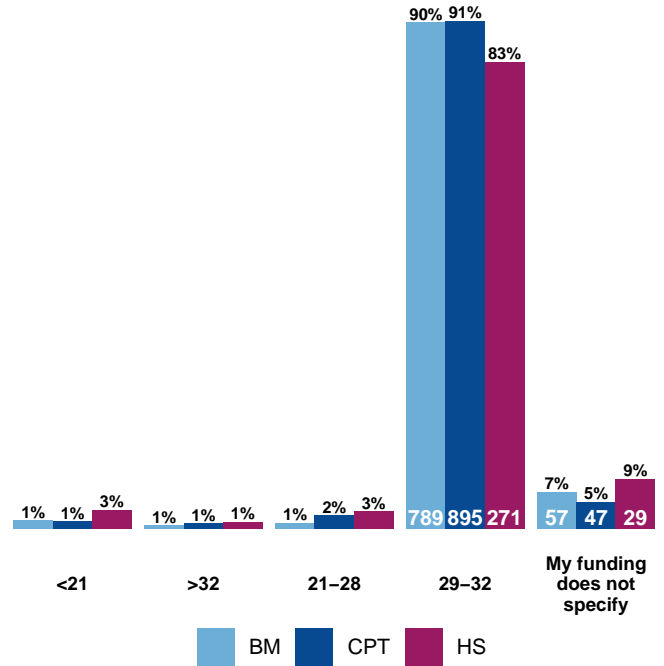


Figure B.16: Holidays of DR

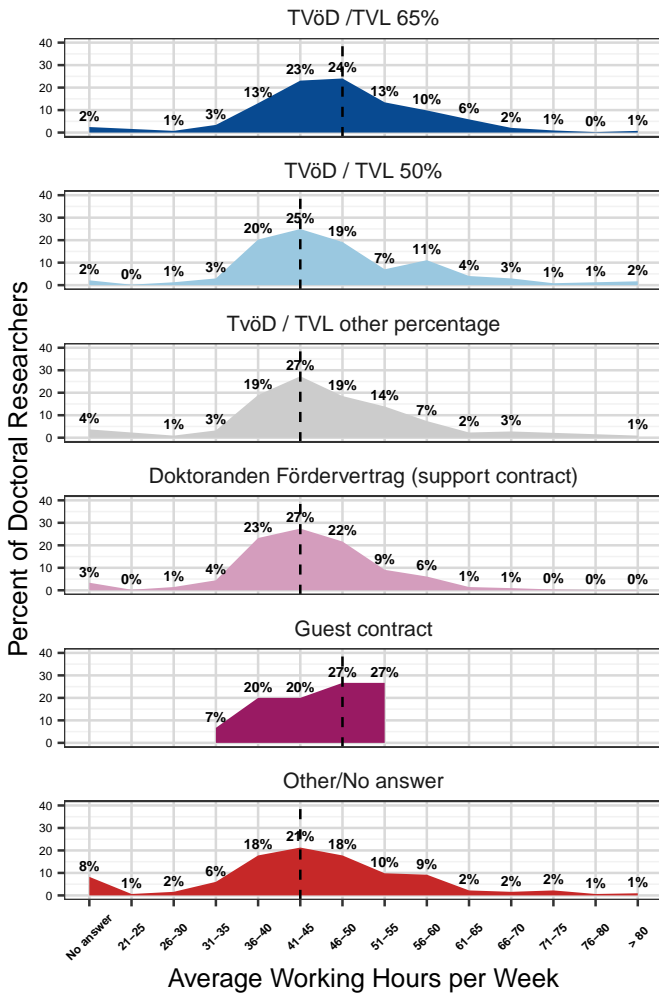


Figure B.15: Working Hours of DR by contract type

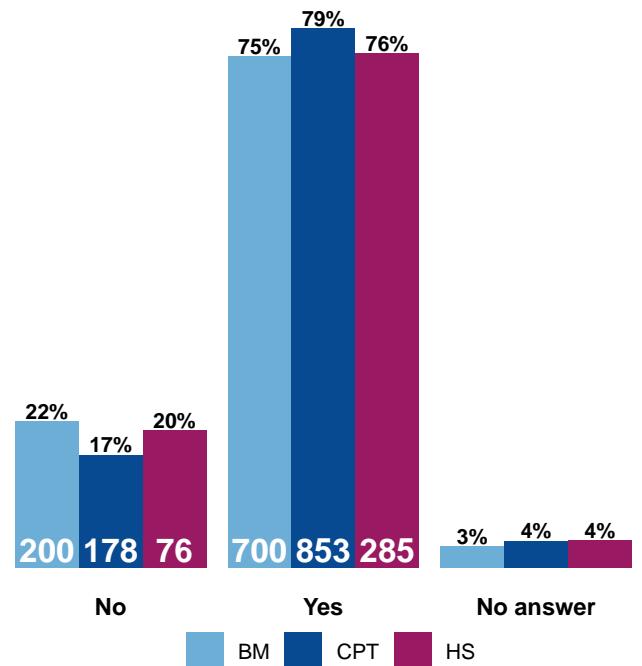


Figure B.17: Holidays of DR

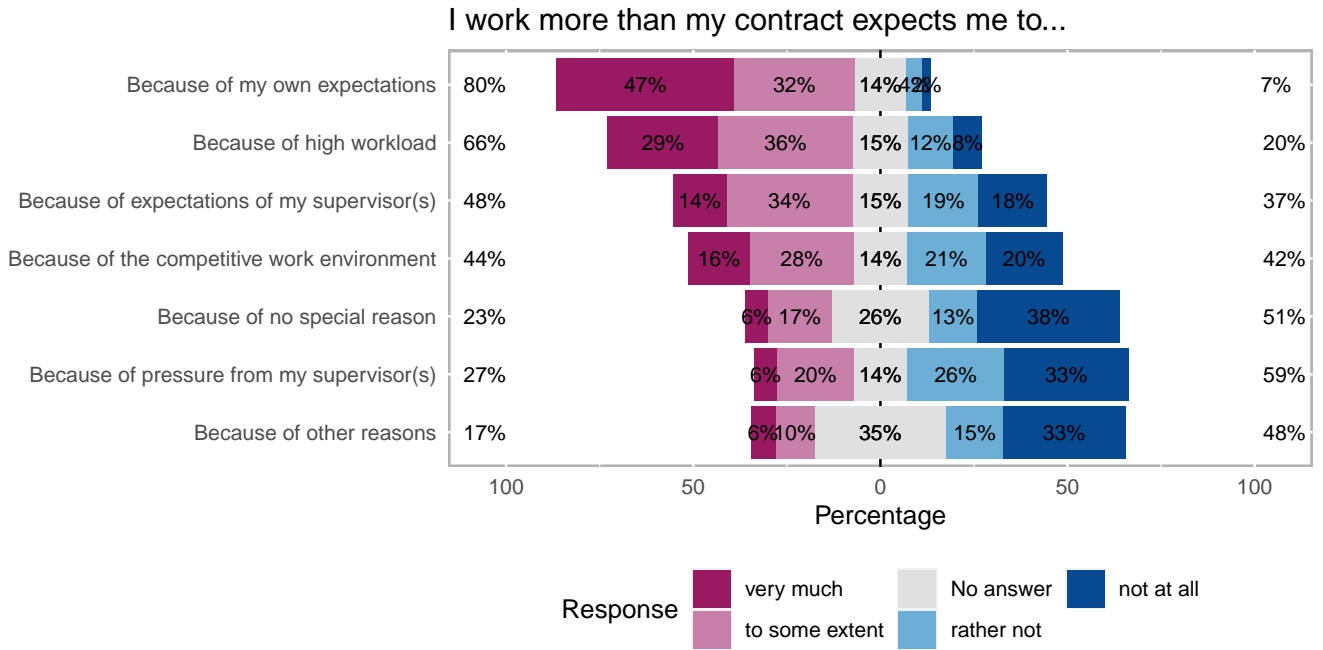


Figure B.18: Reasons to work longer

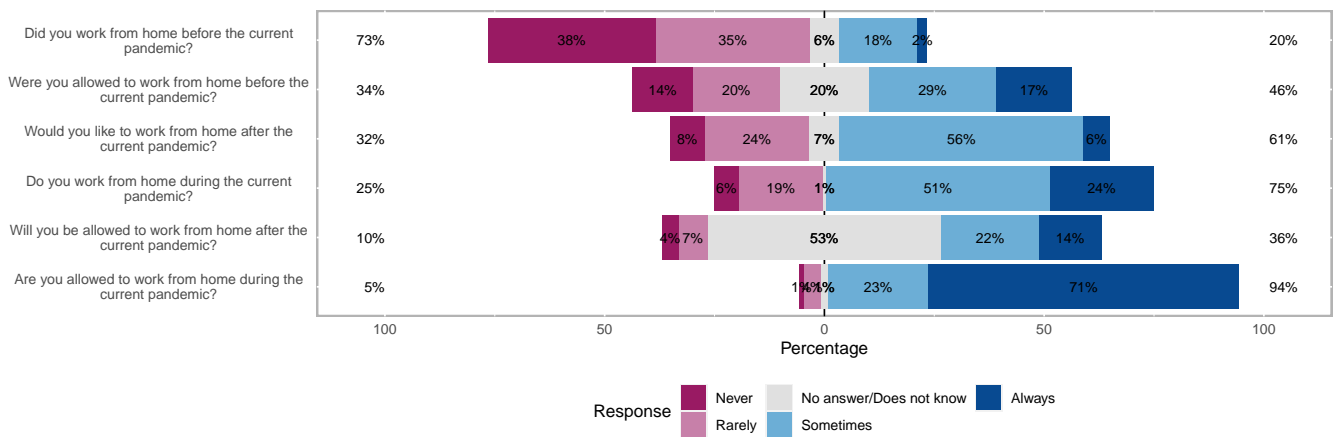


Figure B.19: Working from Home

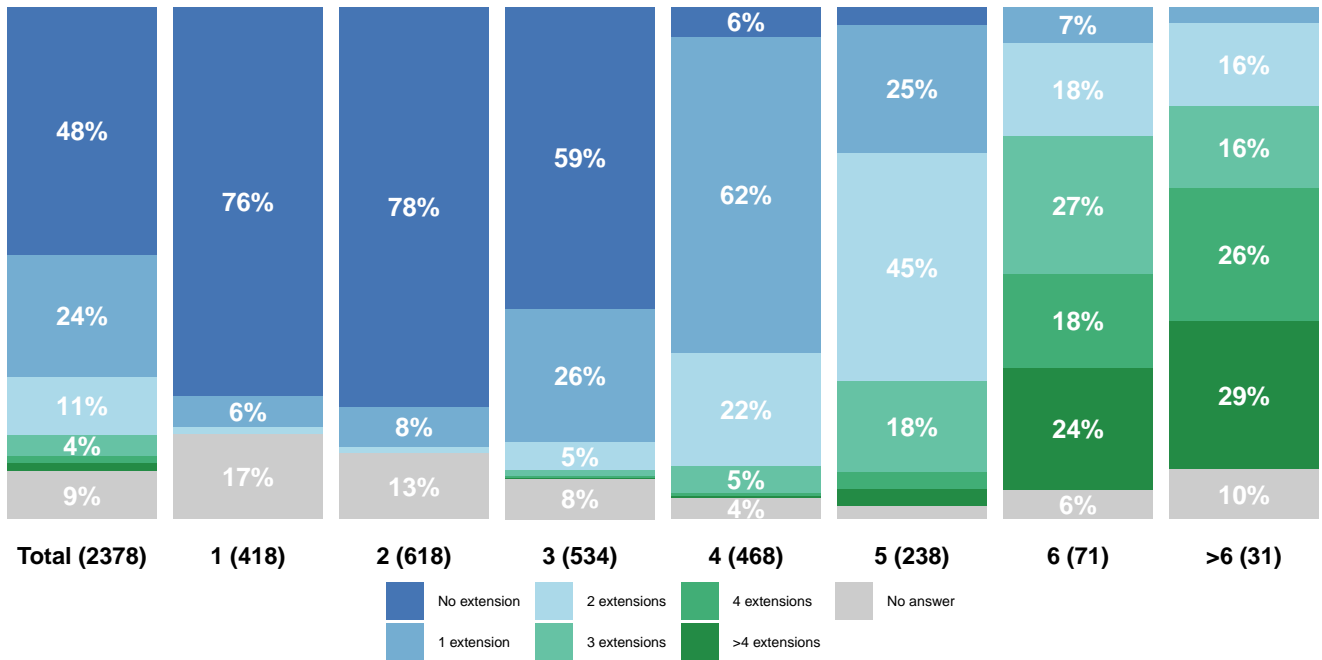


Figure B.20: Contract Extensions received

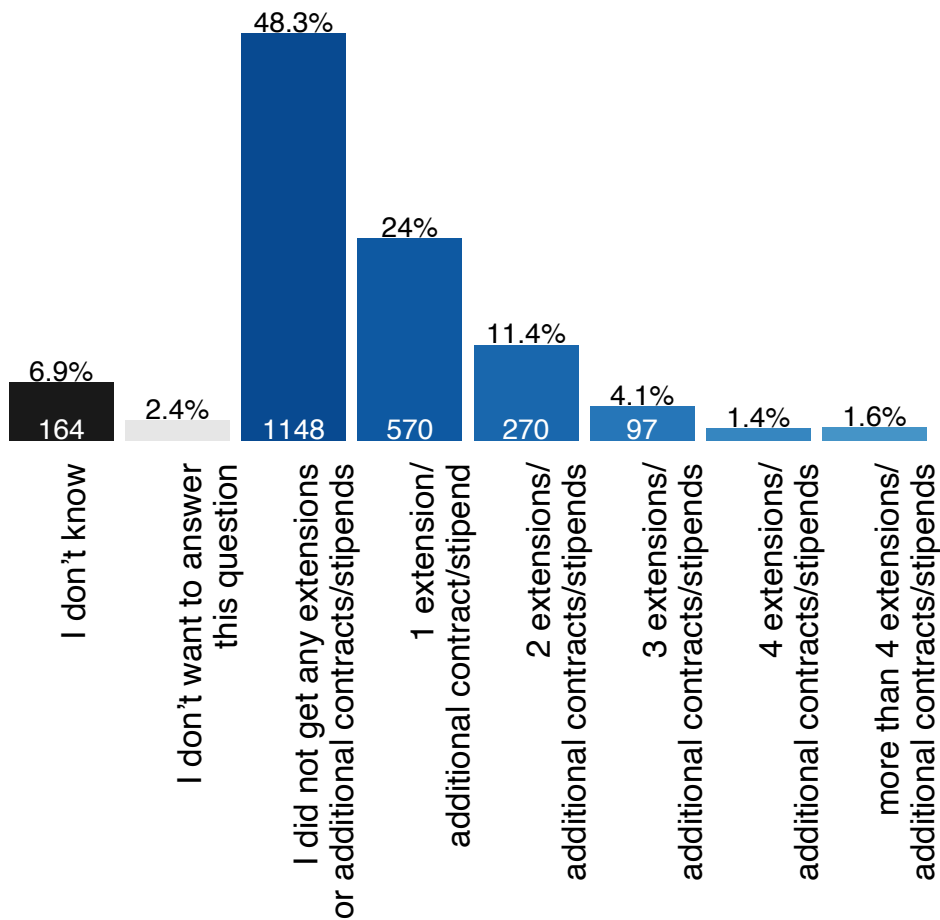


Figure B.21: "If any, how many extensions or additional contracts/stipends did you get during your PhD?"

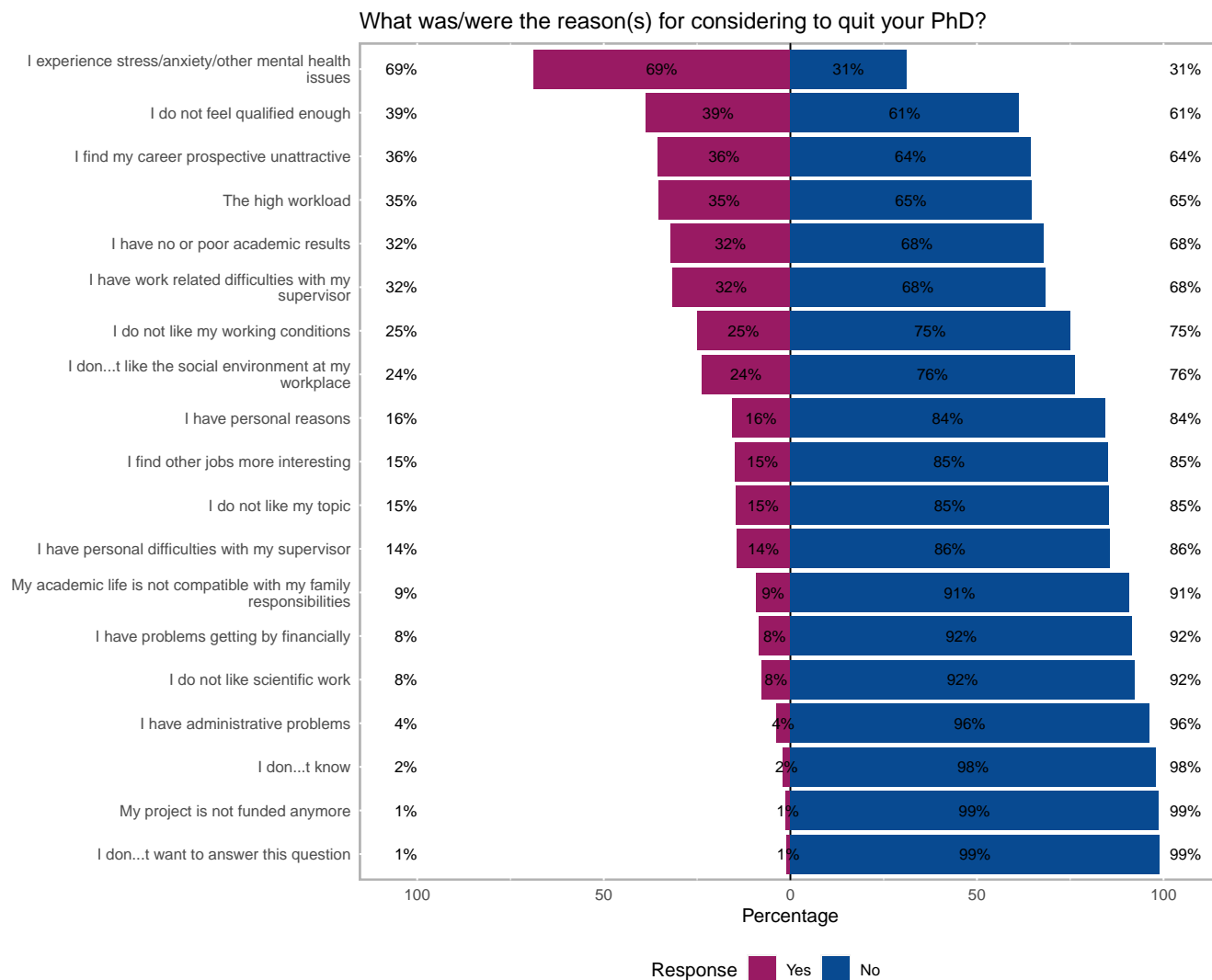


Figure B.22: "What was/were the reason(s) for considering to quit your PhD?"

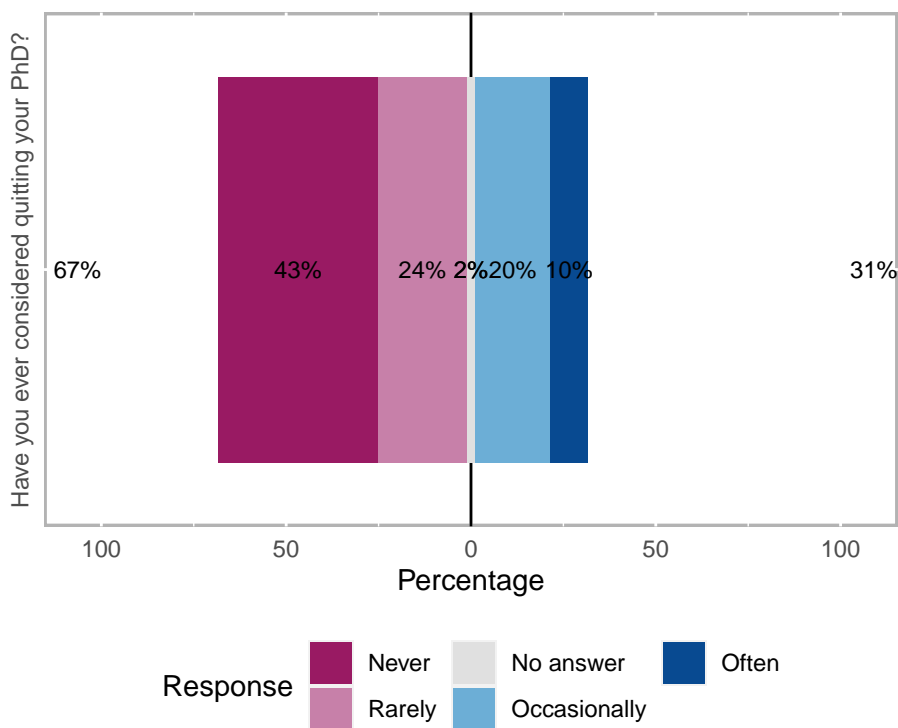


Figure B.23: "Have you ever considered quitting your PhD?"

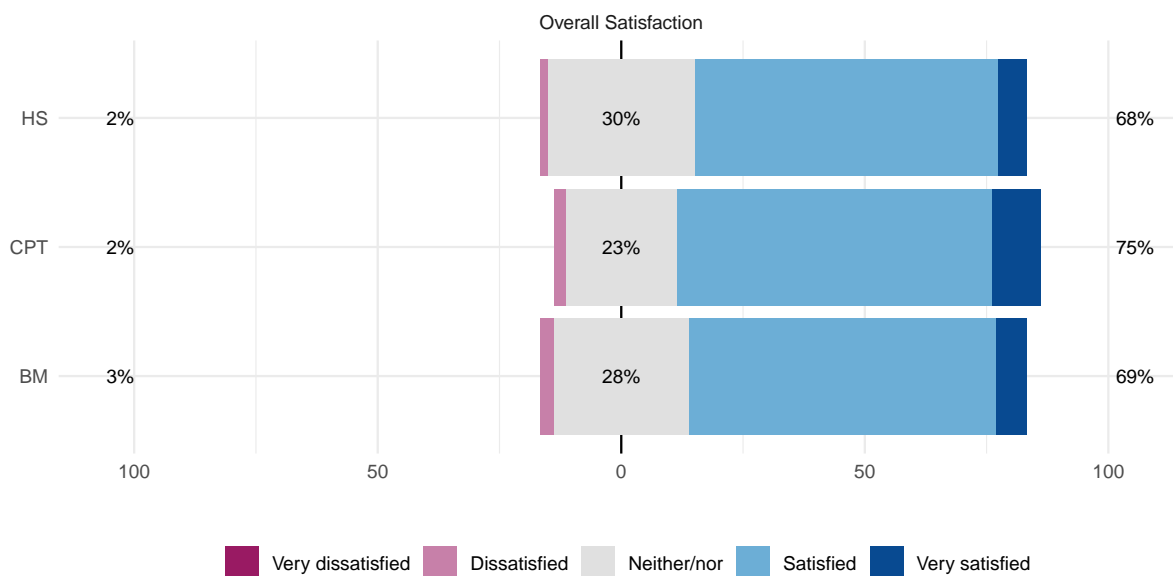


Figure B.24: Overall satisfaction of DRs by section.

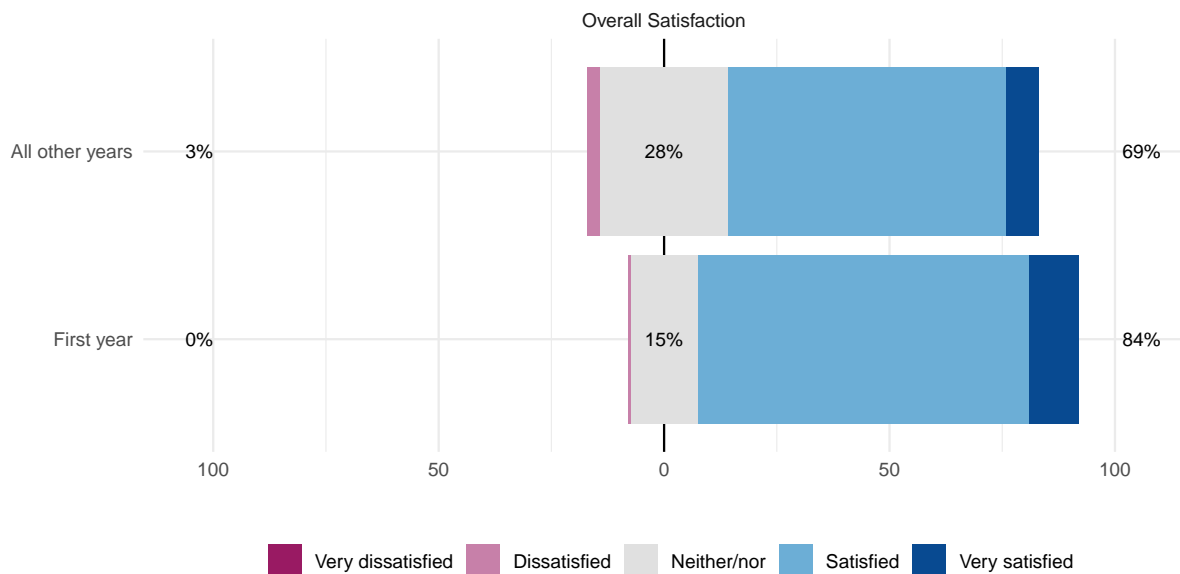


Figure B.25: Overall satisfaction of DRs by year of PhD.

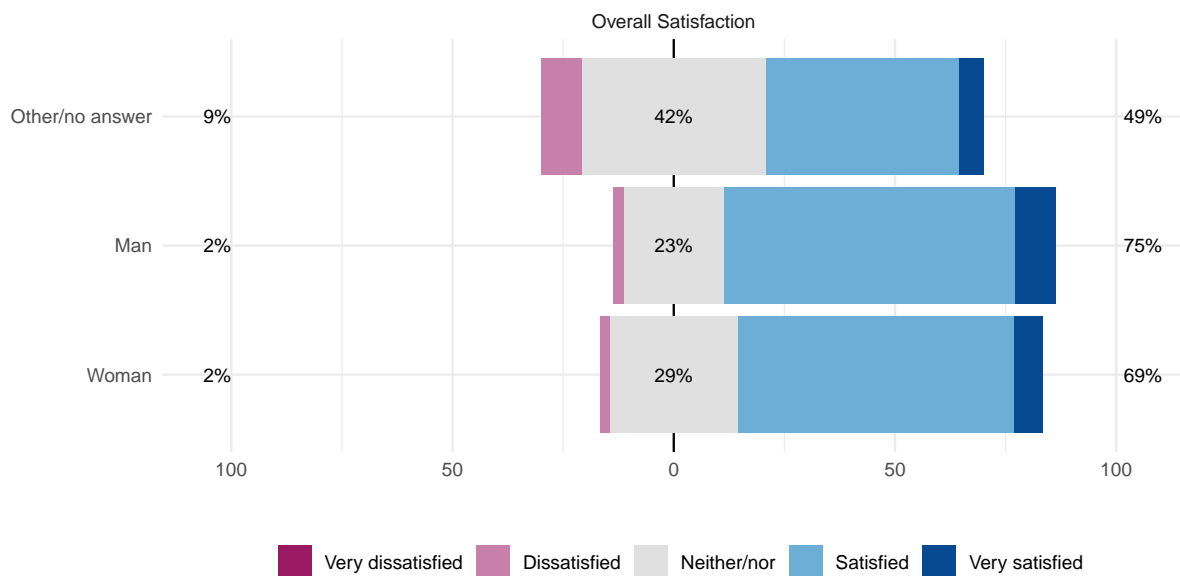


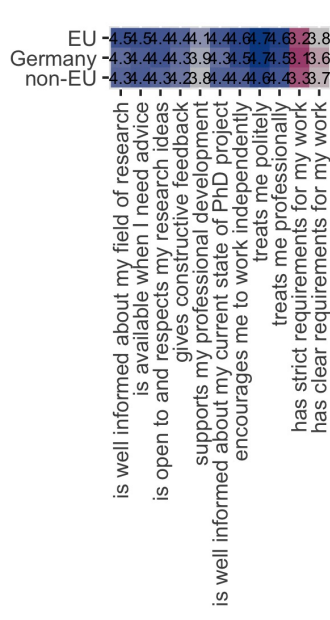
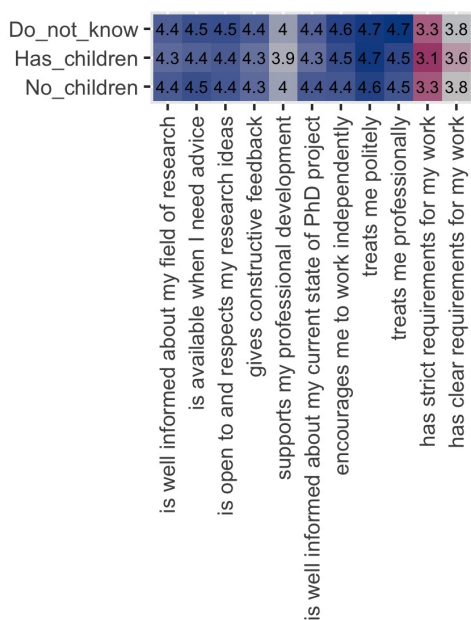
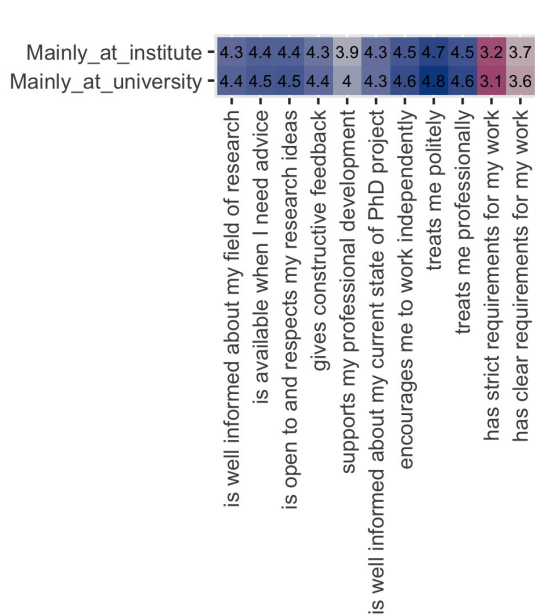
Figure B.26: Overall satisfaction of DRs by gender identity.

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	1680.0376	19.8995	84.43	0.0000
gender: Woman (reference)				
gender: Man	26.2763	10.6463	2.47	0.0137
gender: no answer/Gender diverse	43.2563	35.2374	1.23	0.2197
section: BM (reference)				
section: CPT	21.9260	18.7404	1.17	0.2421
section: HS	-63.4185	23.8996	-2.65	0.0080
field: biomedical (reference)				
field: chemistry-related	-29.5678	22.4870	-1.31	0.1887
field: humanity classical	100.3235	42.0277	2.39	0.0171
field: humanity social	18.5103	33.1595	0.56	0.5767
field: math-related	23.7622	33.7230	0.70	0.4811
field: physics-related	25.1931	20.5289	1.23	0.2199
field: technology-related	142.5759	30.2688	4.71	0.0000
field: Other/no answer	16.0328	24.6640	0.65	0.5157
type of work: computational (reference)				
type of work: field work	-101.1572	33.2445	-3.04	0.0024
type of work: laboratory work	2.1752	12.9001	0.17	0.8661
type of work: library/chronicle work	-18.1428	40.9406	-0.44	0.6577
type of work: theoretical/methodological work	-3.1754	18.3089	-0.17	0.8623
type of work: Other/no answer	-27.5986	30.1039	-0.92	0.3594
ethnicity: European (reference)				
ethnicity: African	-36.3867	61.7214	-0.59	0.5556
ethnicity: Carribean	138.8447	171.3133	0.81	0.4178
ethnicity: East Asian/Southeast Asian	-58.7829	17.8656	-3.29	0.0010
ethnicity: Latino/Hispanic	11.7132	23.0517	0.51	0.6114
ethnicity: Middle Eastern	50.6001	30.4251	1.66	0.0964
ethnicity: Mixed	19.1898	30.7181	0.62	0.5322
ethnicity: South Asia	-28.3174	20.8722	-1.36	0.1750
ethnicity: No answer	-28.2928	23.9896	-1.18	0.2384
contract situation: Contract (reference)				
contract situation: Multiple Options	-263.7481	34.7751	-7.58	0.0000
contract situation: Stipend	-336.8909	38.2095	-8.82	0.0000
contract situation: Unpaid	-1099.1487	59.3359	-18.52	0.0000
contract situation: No answer	-192.0513	63.4304	-3.03	0.0025
contract type: Doktoranden Fördervertrag (support contract) (reference)				
contract type: TVöD / TVL 50%	-122.4024	14.3839	-8.51	0.0000
contract type: TvöD / TVL other percentage	307.0917	18.9848	16.18	0.0000
contract type: TVöD /TVL 65%	86.5495	14.0000	6.18	0.0000
contract type: Other	181.9892	26.8739	6.77	0.0000
contract type: No answer	58.7431	31.6171	1.86	0.0633
first year PhD: yes (reference)				
first year PhD: no	83.5424	13.3290	6.27	0.0000

Table B.1: Results of the regression model for the net-income.

Appendix C

Supplementary Figures: Support Structures & Scientific Environment



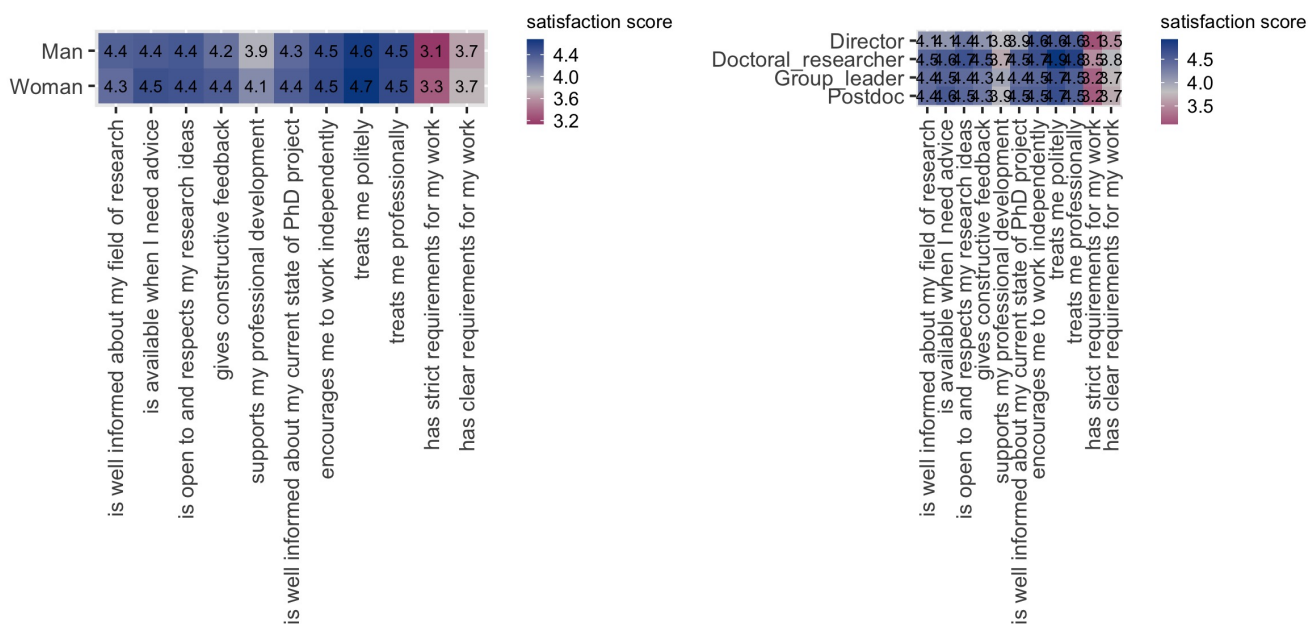
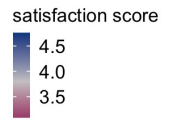
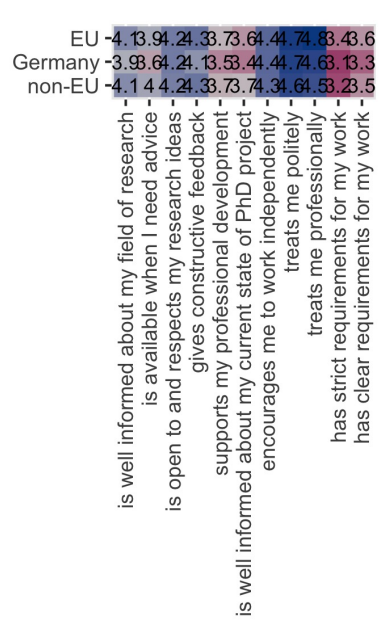
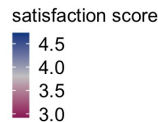
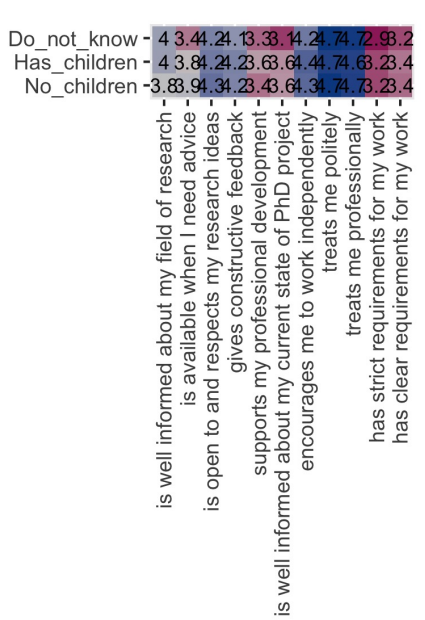
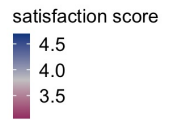
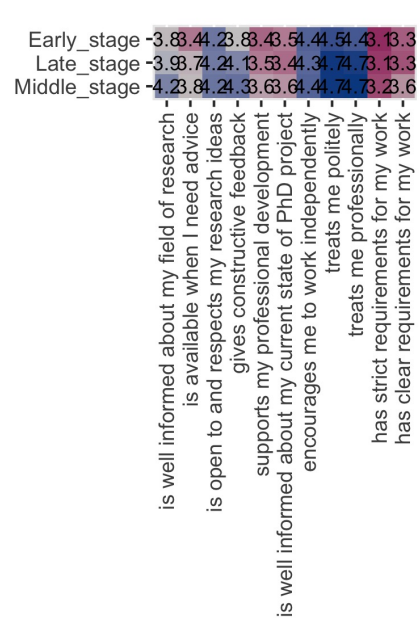
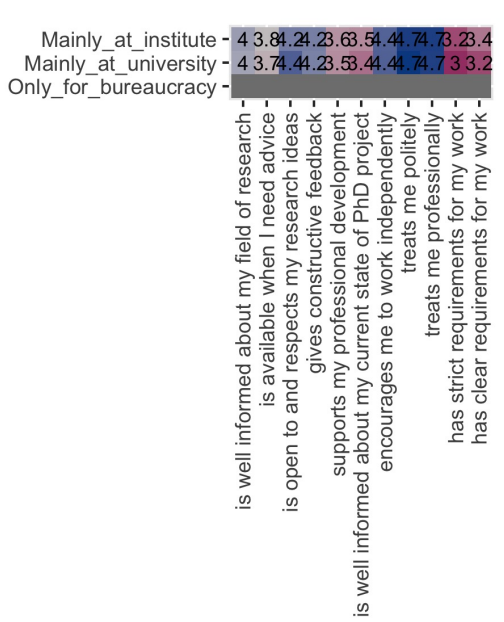


Figure C.1: Supervision overview regarding direct supervisors. Satisfaction score: very dissatisfied: 1, dissatisfied: 2, neither/nor:3, satisfied: 4, very satisfied: 5



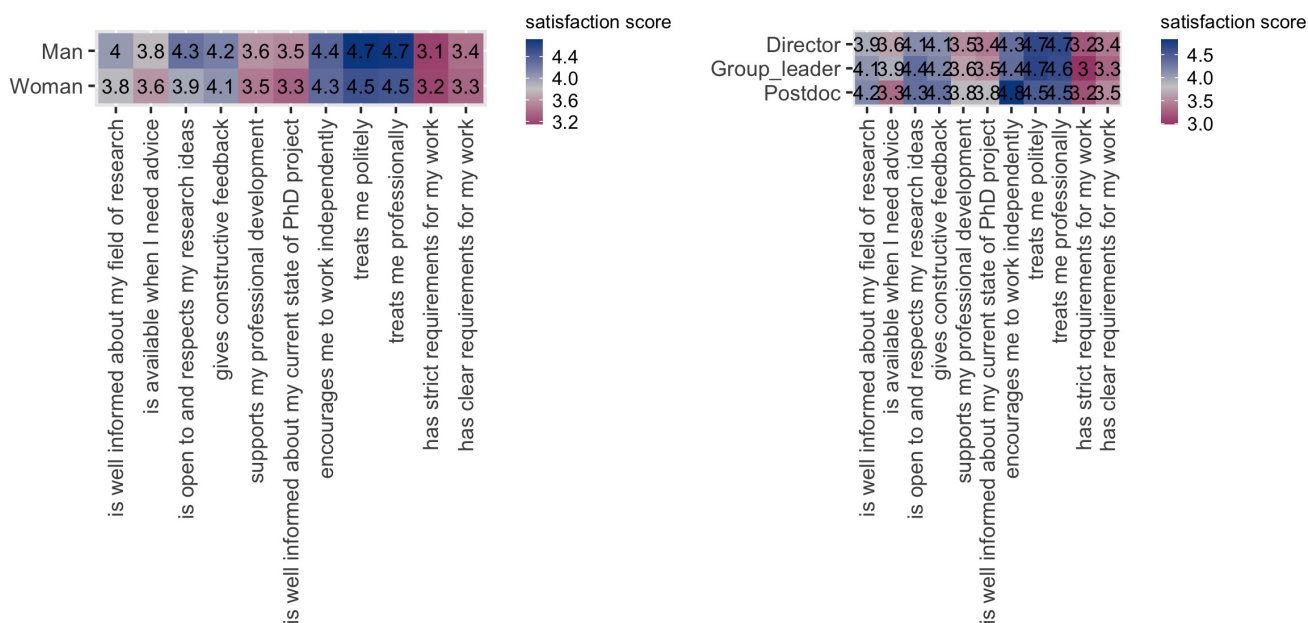


Figure C.2: Supervision overview regarding formal supervisors. Satisfaction score: very dissatisfied: 1, dissatisfied: 2, neither/nor:3, satisfied: 4, very satisfied: 5

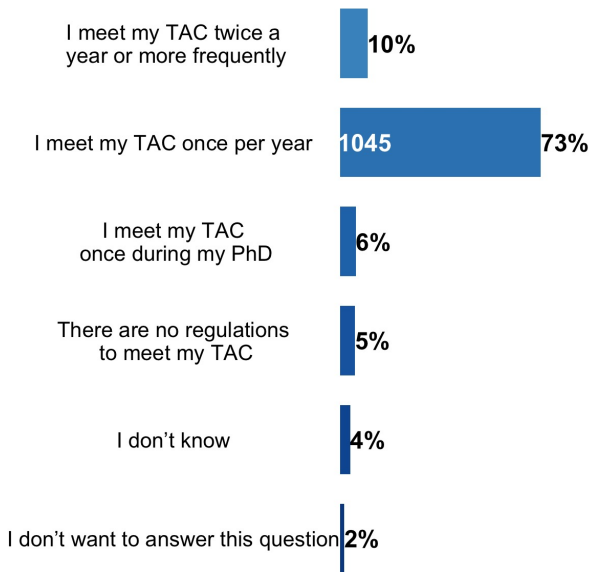


Figure C.3: “How often do you meet your thesis advisory committee (TAC)?”

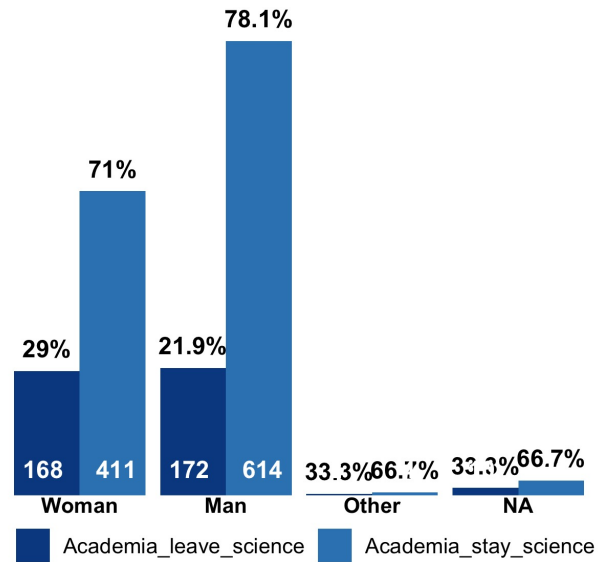


Figure C.5: Percentage of DRs choose to leave or stay in science divided by gender

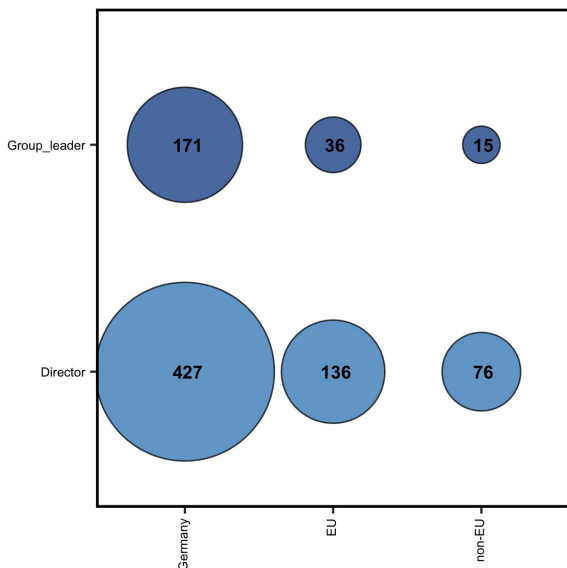


Figure C.4: Bubble chart of groups of formal supervisors at different positions and citizenship

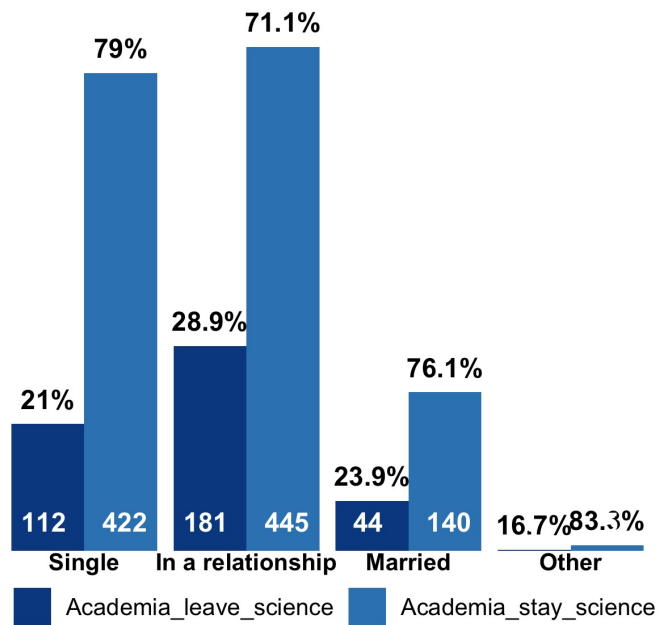


Figure C.6: Percentage of DRs choose to leave or stay in science divided by relationship status

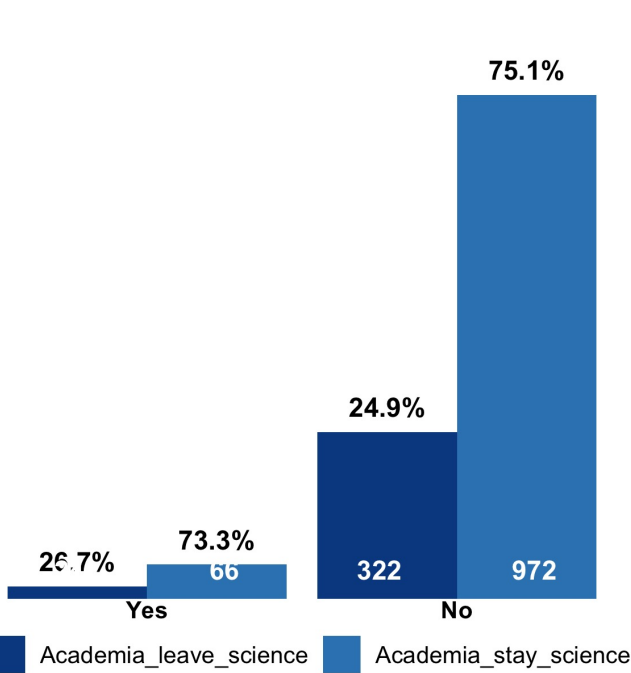


Figure C.7: Percentage of DRs choose to leave or stay in science divided by if they currently have or are planning to have children

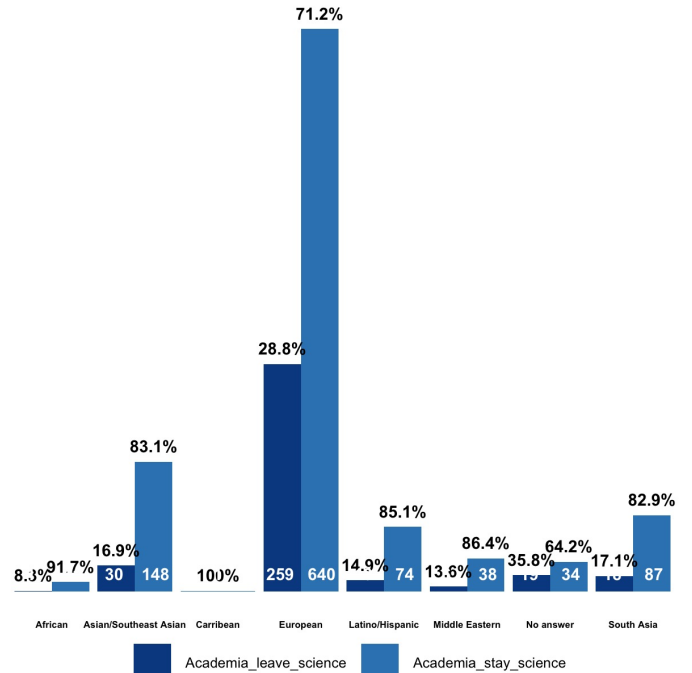


Figure C.9: Percentage of DRs choose to leave or stay in science divided by ethnicity

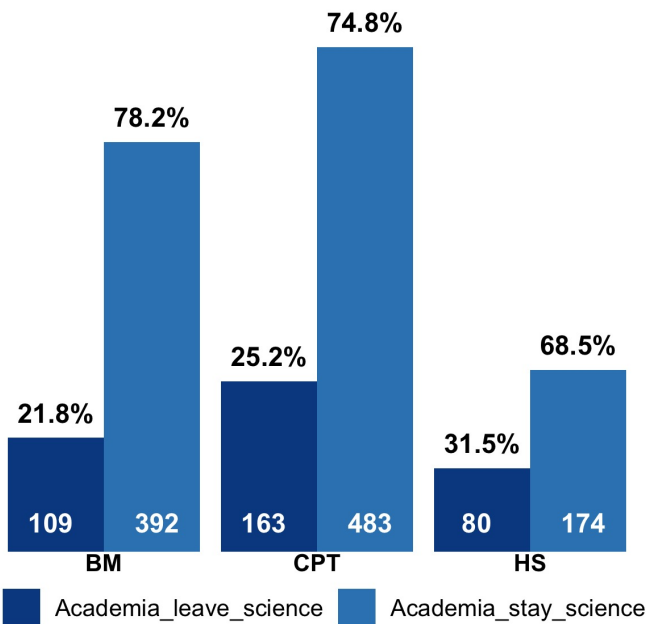


Figure C.8: Percentage of DRs choose to leave or stay in science divided by section

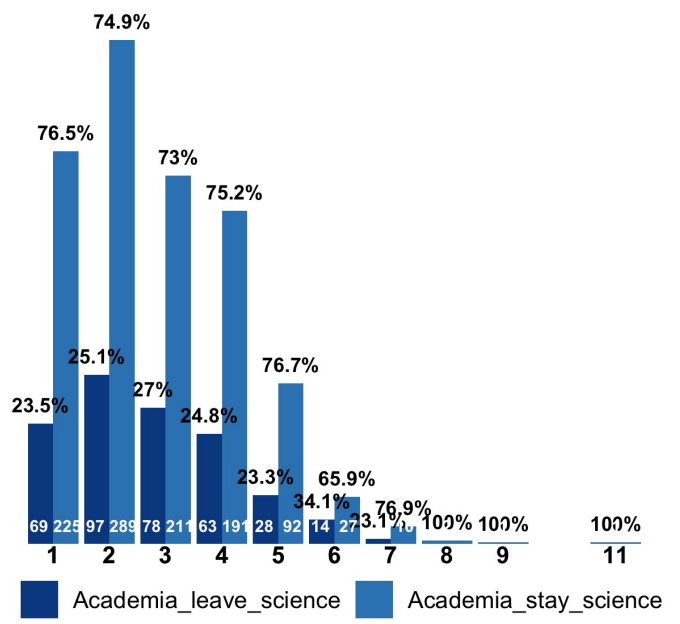


Figure C.10: Percentage of DRs choose to leave or stay in science divided by their years of doing PhD

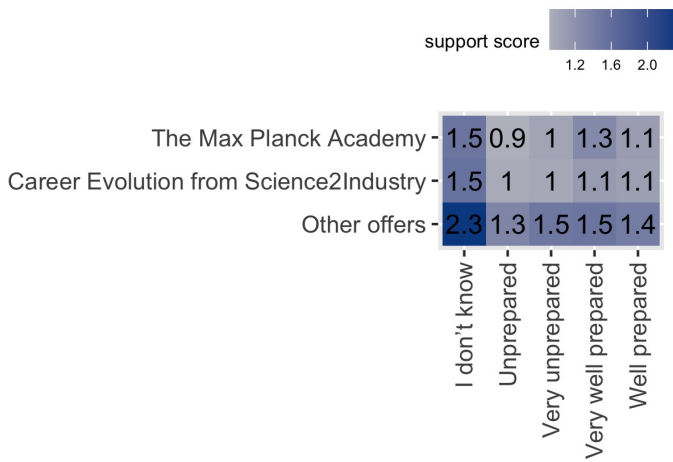


Figure C.11: The knowledge of career support measures from MPS, score to the knowledge: no: 0, to some extends: 1, to great extends:2

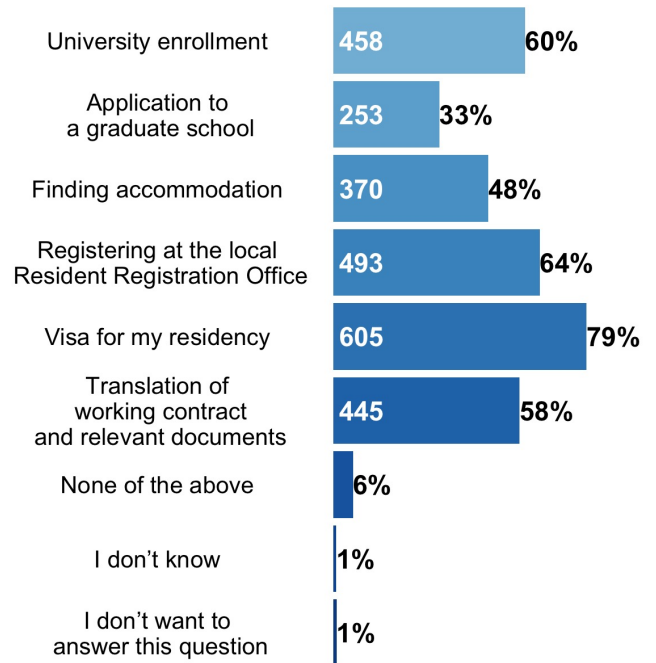


Figure C.13: Percentage of international DRs (from non-EU countries) have received support from institutes

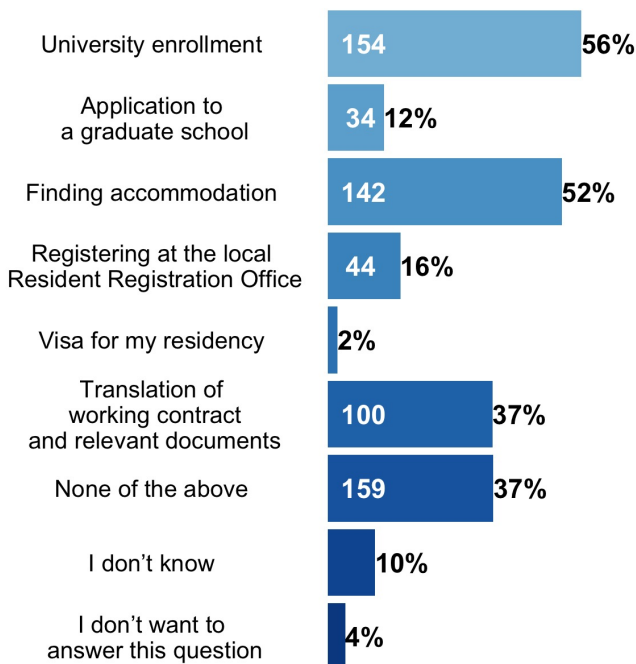


Figure C.12: Percentage of international DRs (from EU countries) would have needed more support from institutes

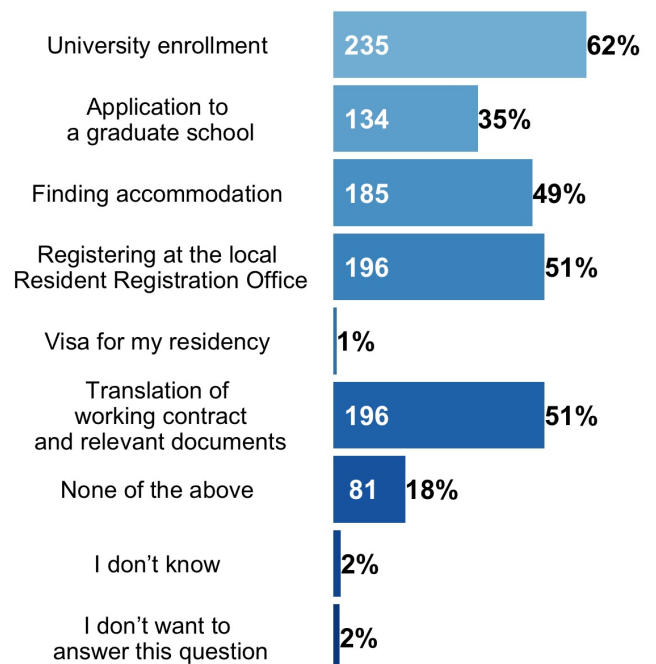


Figure C.14: Percentage of international DRs (from EU countries) have received support from institutes

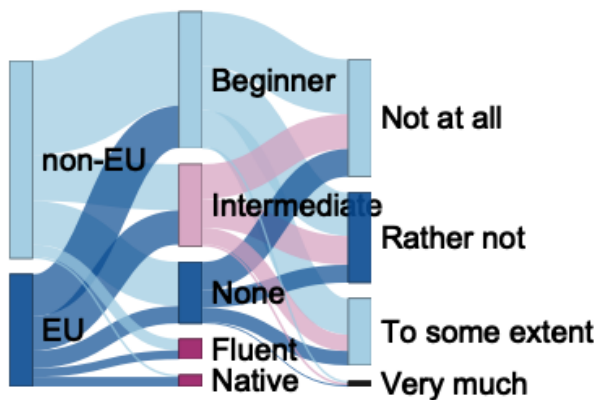


Figure C.15: Sankey plot showing the DRs’ citizenship, German language proficiency, and if language is an obstacle for communication with people at their institute/center/unit

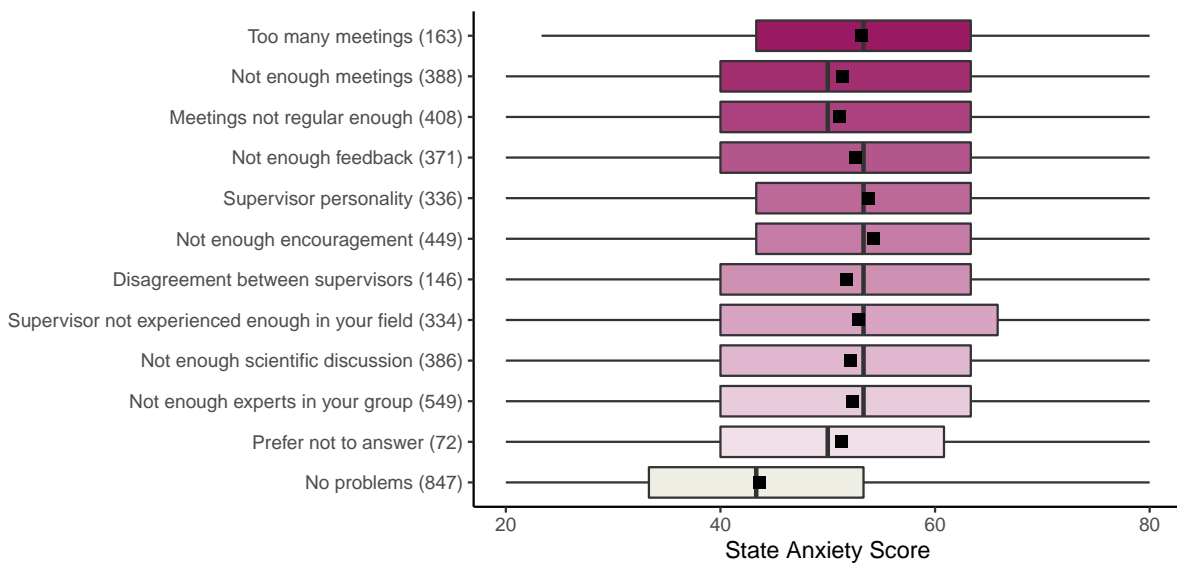
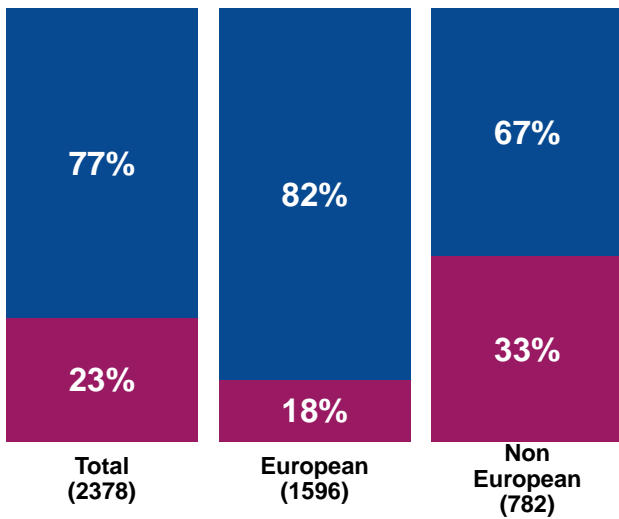


Figure C.16: State Anxiety by Supervision Problems

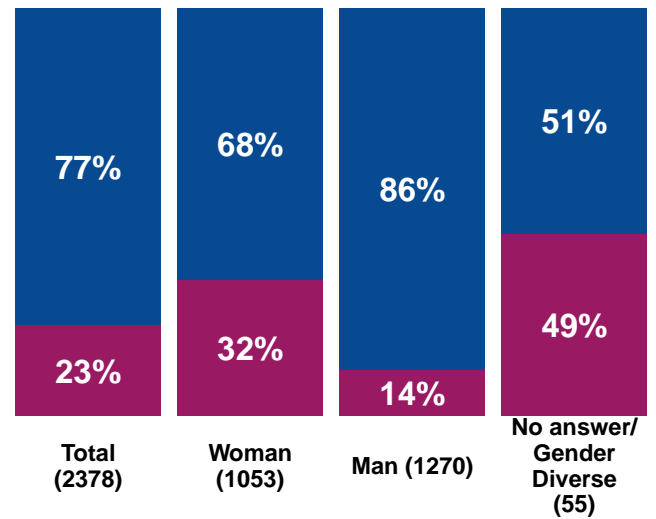
Appendix D

Supplementary Figures Discrimination & Conflict



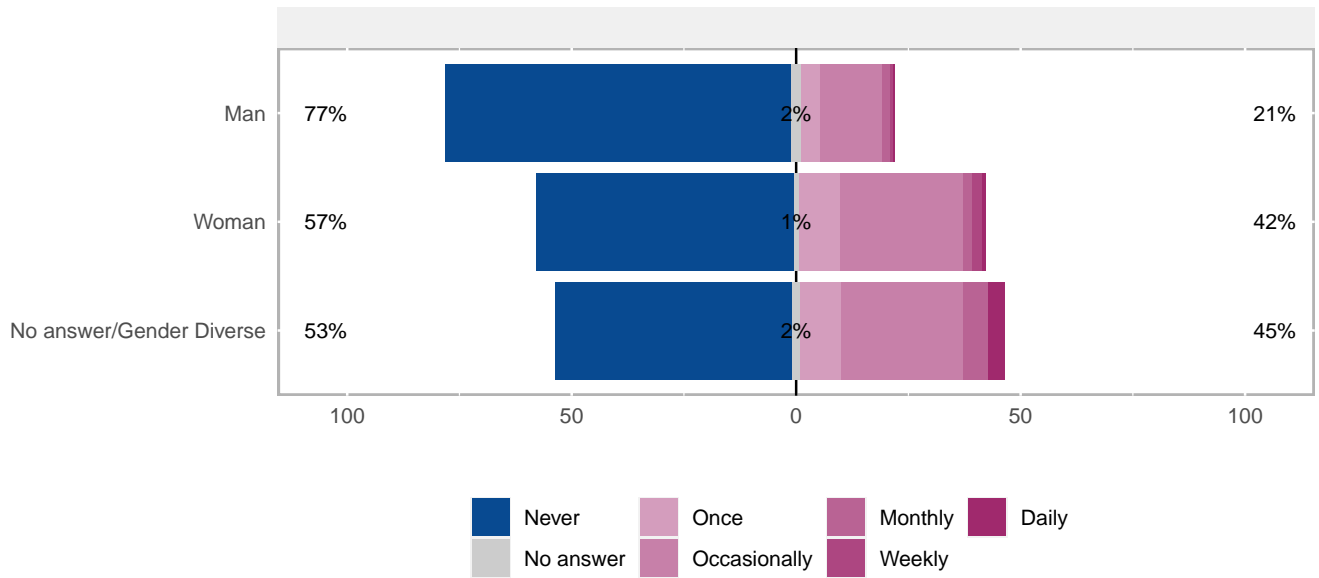
■ Did not experience discrimination
■ Experienced discrimination

Figure D.1: Have you ever felt discriminated in your work environment? Responses grouped by ethnicity.



■ Did not experience discrimination
■ Experienced discrimination

Figure D.2: Have you ever felt discriminated in your work environment? Responses grouped by gender.



Total answers: 2378

Figure D.3: Have you ever been subject to microaggressions in your work environment? Responses grouped by gender.

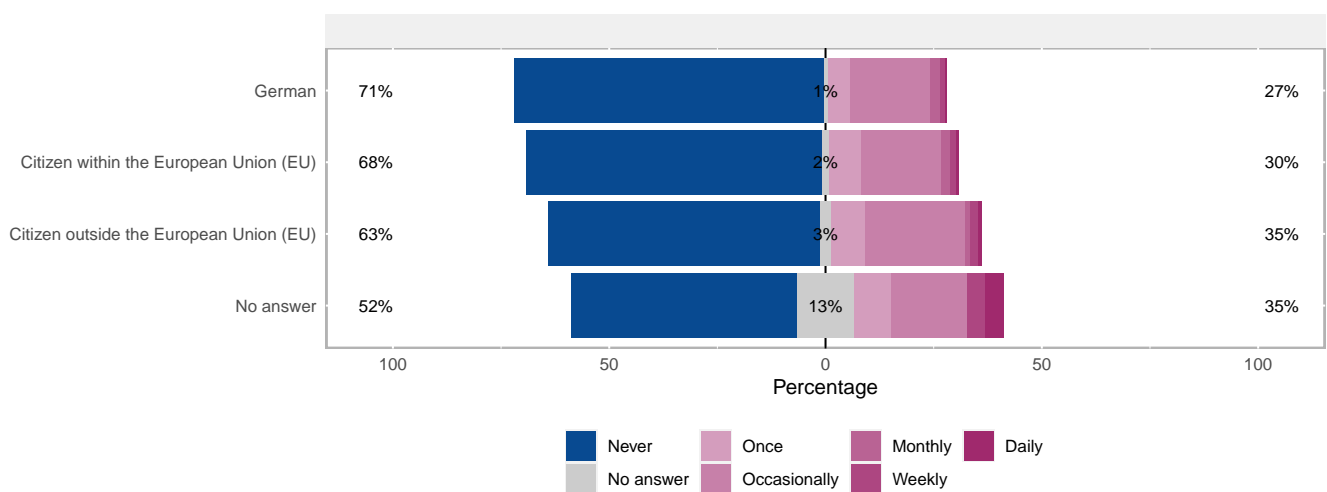


Figure D.4: Have you ever been subject to microaggressions in your work environment? Responses grouped by citizenship.

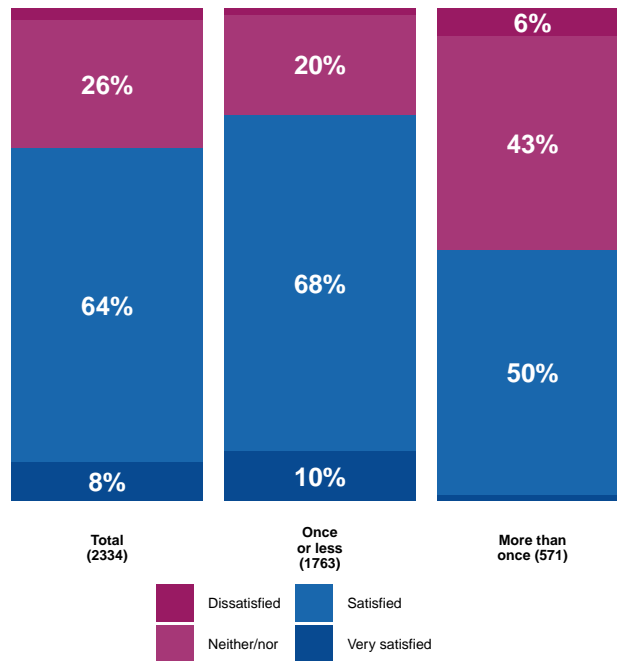
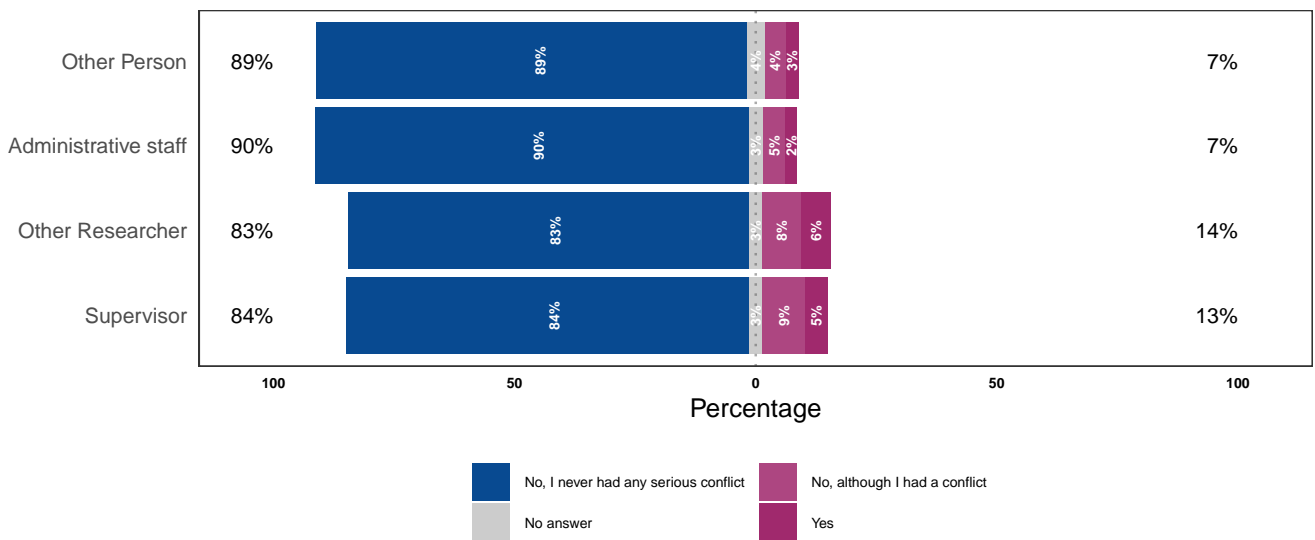


Figure D.5: "Have you ever been subject to microaggressions in your work environment?" Responses grouped by overall satisfaction.



Total answers: 2378

Figure D.6: "Have you ever reported a conflict, in terms of a situation where you felt mistreated?" Responses grouped by perpetrators.

Appendix E

Supplementary Figures Cluster Analysis

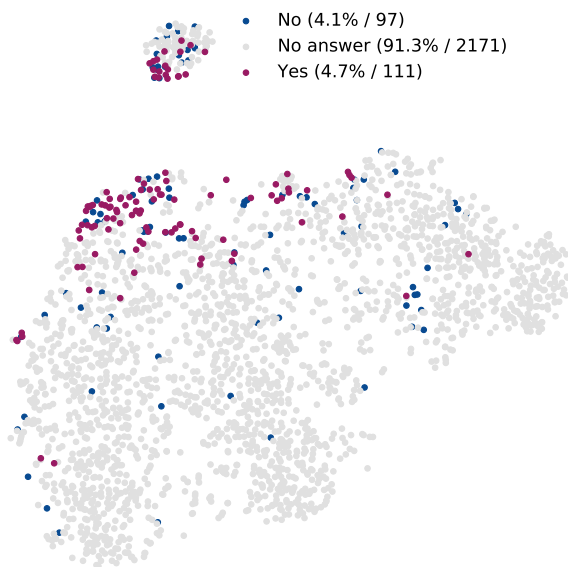


Figure E.1: "Why did you not report your conflict with your supervisor? I didn't think it would be resolved."

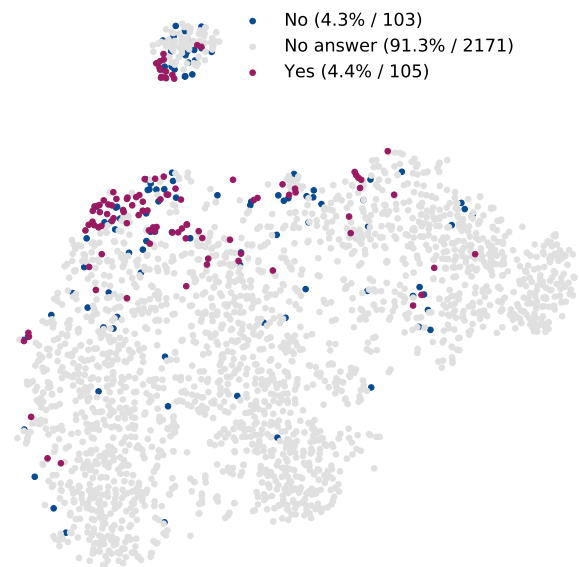


Figure E.2: "Why did you not report your conflict with your supervisor? I was afraid of repercussions."

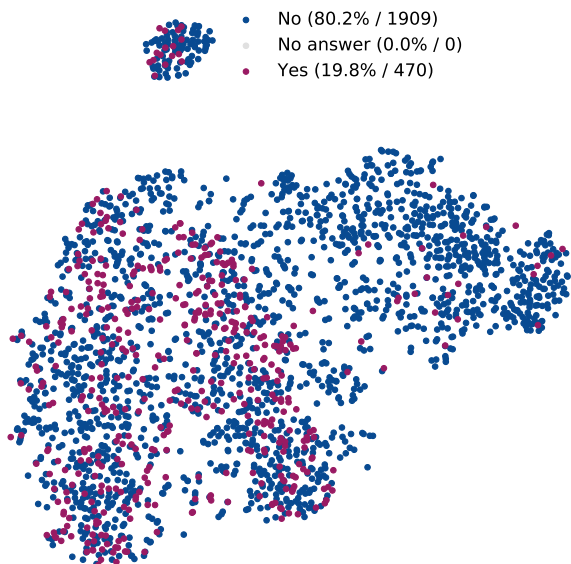


Figure E.3: “My direct supervisor is a director.”

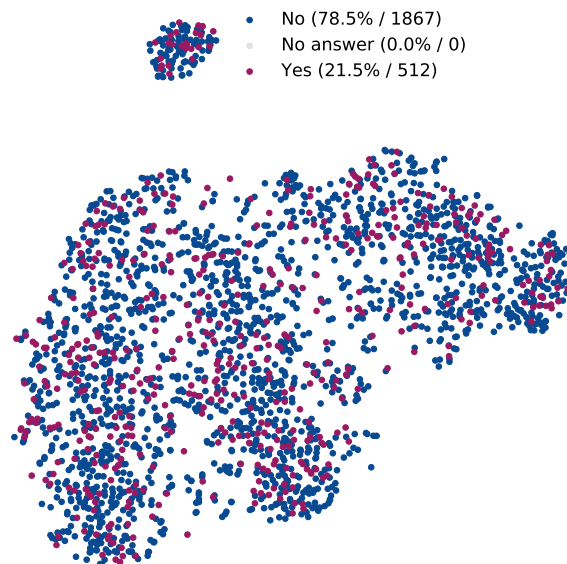


Figure E.5: “My direct supervisor is a woman.”

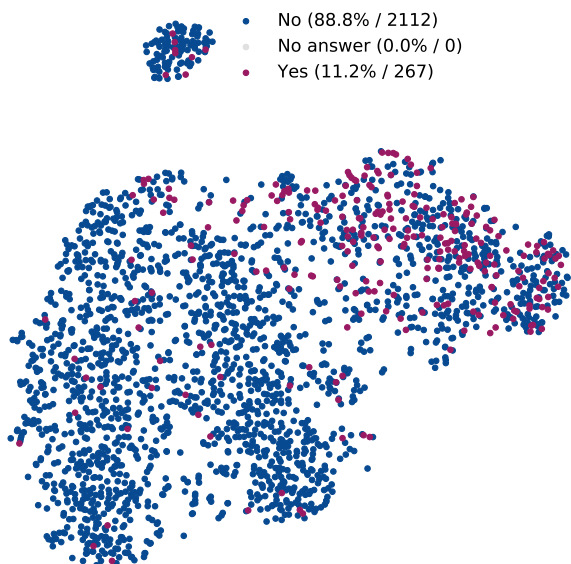


Figure E.4: “My direct supervisor is a post-doc.”

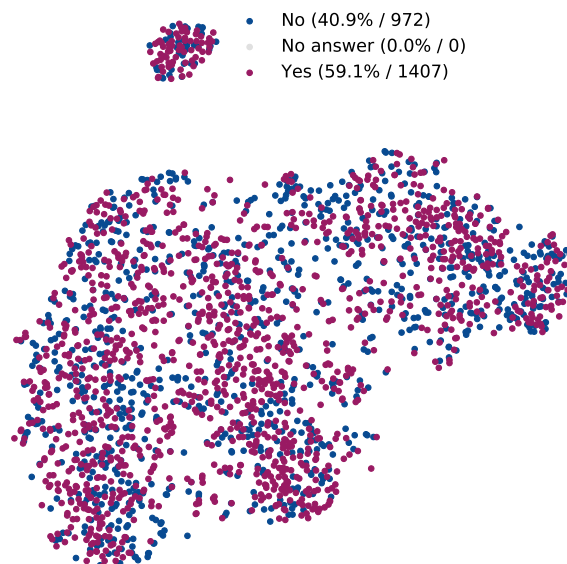


Figure E.6: “My direct supervisor has children.”

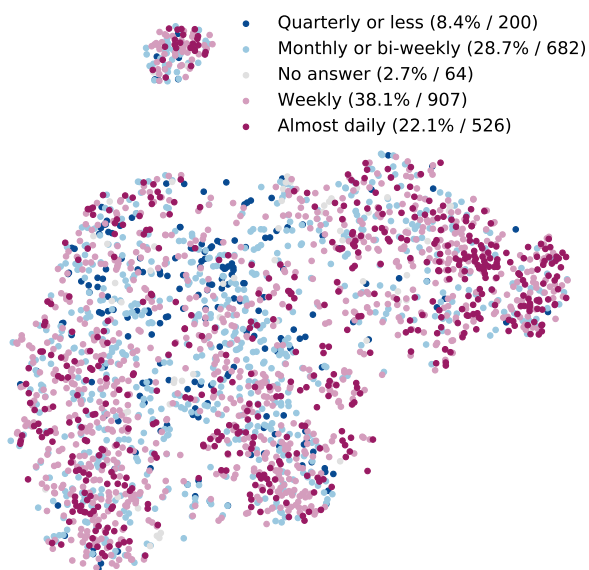


Figure E.7: “This question is about the average communication with your direct supervisor about your PhD project: how often do you communicate?”

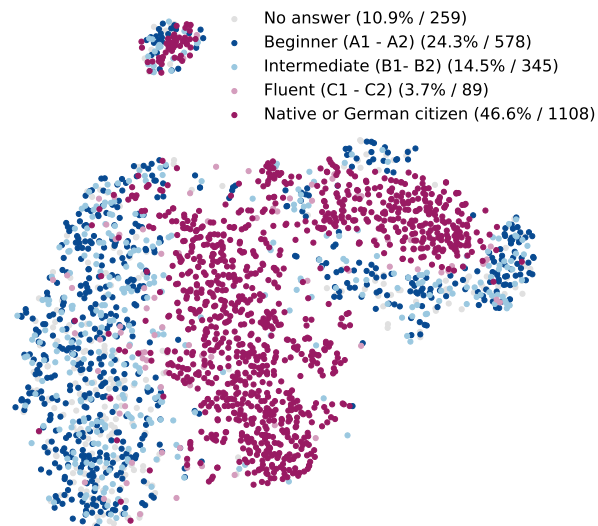


Figure E.9: “Do you speak German?”

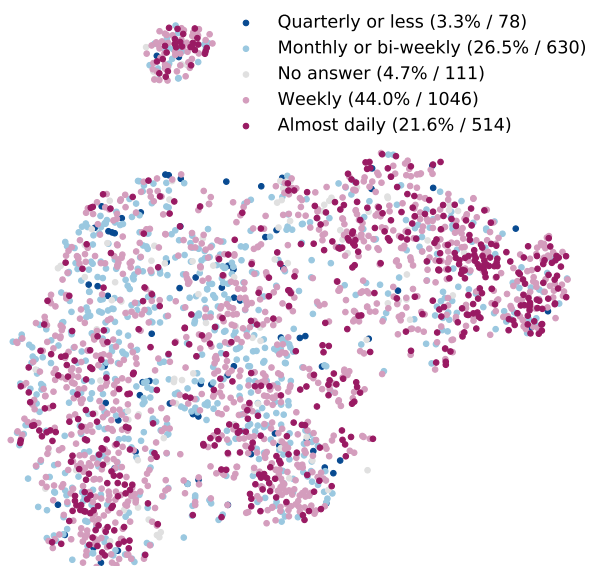


Figure E.8: “This question is about the average communication with your direct supervisor about your PhD project: how often would you like to communicate?”

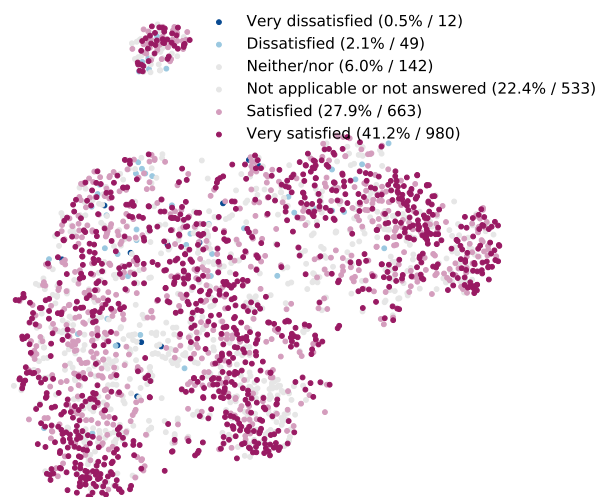


Figure E.10: “If you think about your own situation as a doctoral researcher, how satisfied are you with the following aspects: Laboratory equipment?”

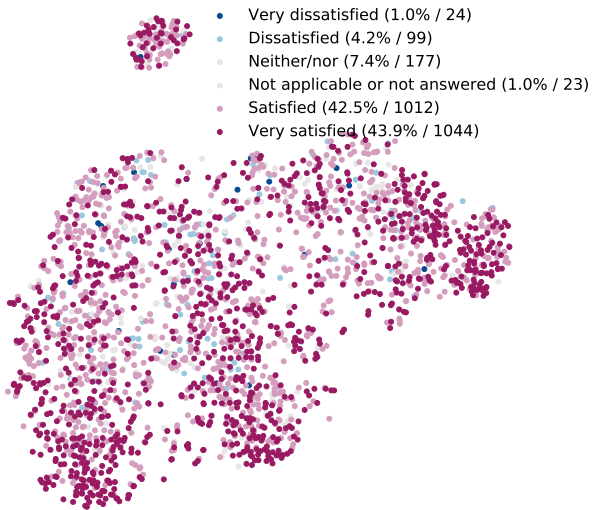


Figure E.11: “If you think about your own situation as a doctoral researcher, how satisfied are you with the following aspects: Office equipment?”

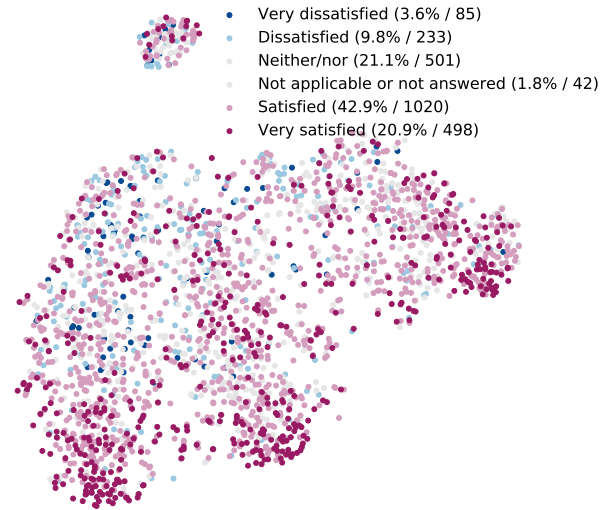


Figure E.13: “If you think about your own situation as a doctoral researcher, how satisfied are you with the following aspects: Bureaucracy and administrative support?”

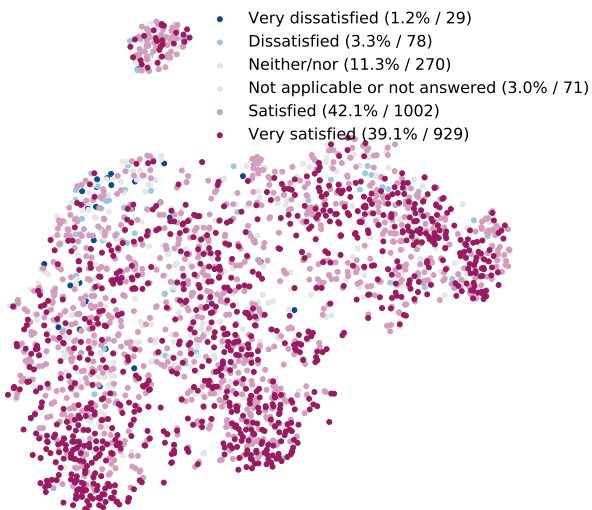


Figure E.12: “If you think about your own situation as a doctoral researcher, how satisfied are you with the following aspects: Vacation days?”

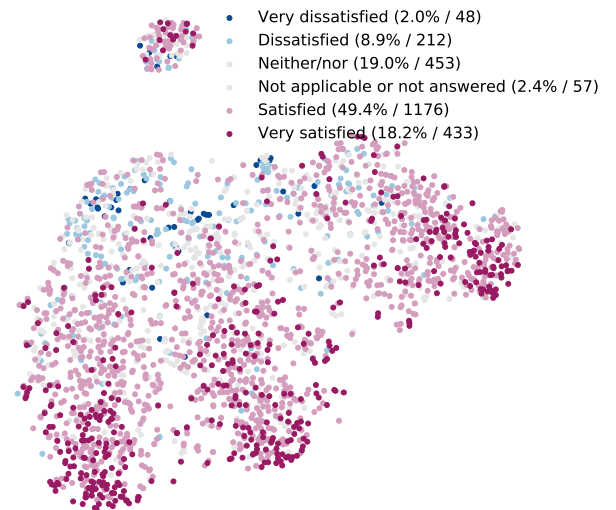


Figure E.14: “If you think about your own situation as a doctoral researcher, how satisfied are you with the following aspects: Contribution to science?”

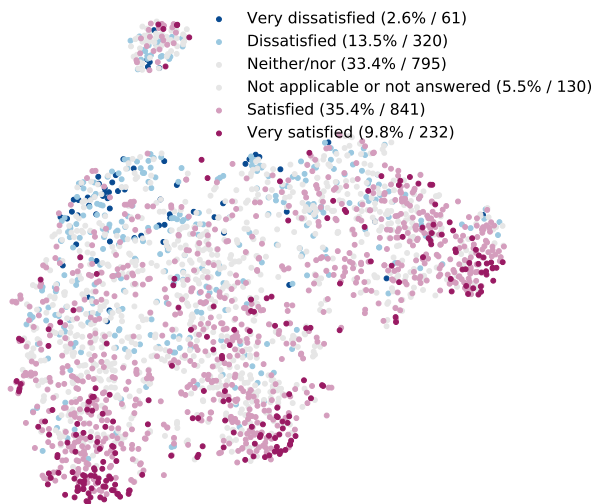


Figure E.15: “If you think about your own situation as a doctoral researcher, how satisfied are you with the following aspects: Science communication and outreach?”

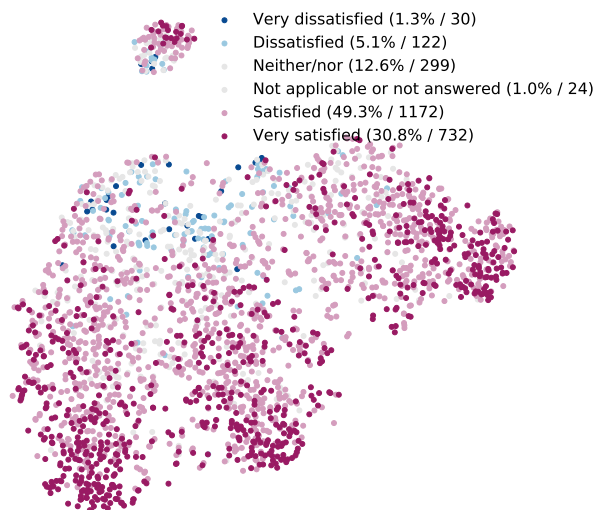


Figure E.17: “If you think about your own situation as a doctoral researcher, how satisfied are you with the following aspects: Scientific support?”

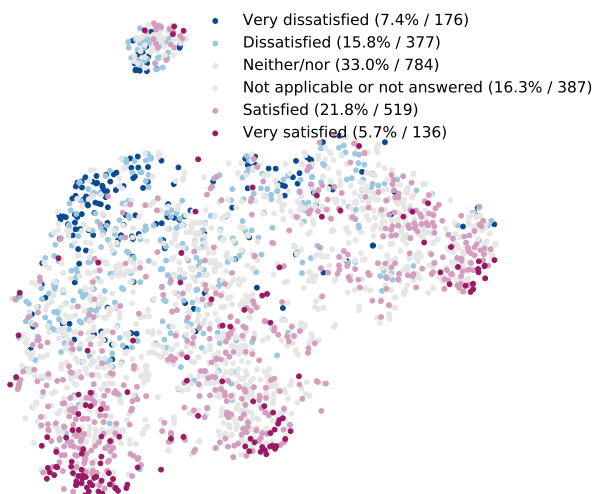


Figure E.16: “If you think about your own situation as a doctoral researcher, how satisfied are you with the following aspects: Psychological support?”

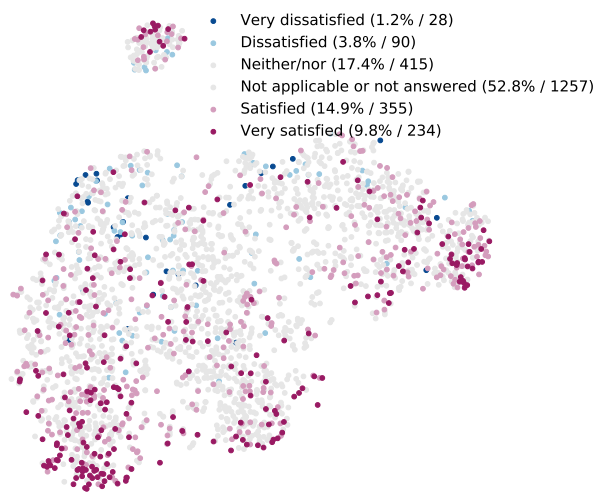


Figure E.18: “If you think about your own situation as a doctoral researcher, how satisfied are you with the following aspects: Family support?”

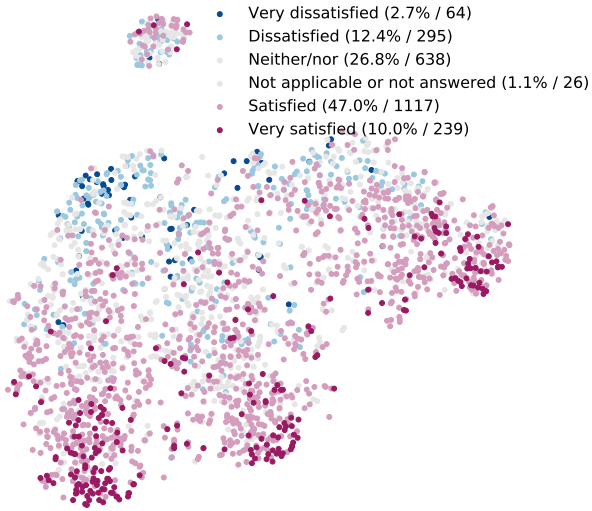


Figure E.19: “If you think about your own situation as a doctoral researcher, how satisfied are you with the following aspects: Workload?”

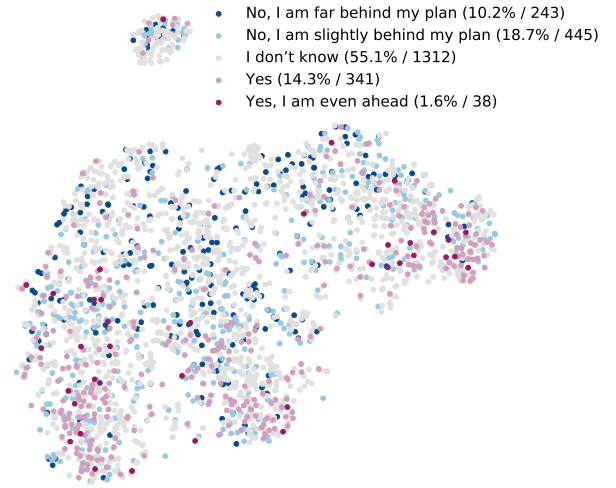


Figure E.21: “Is your project progress according to your (reviewed) project plan?”

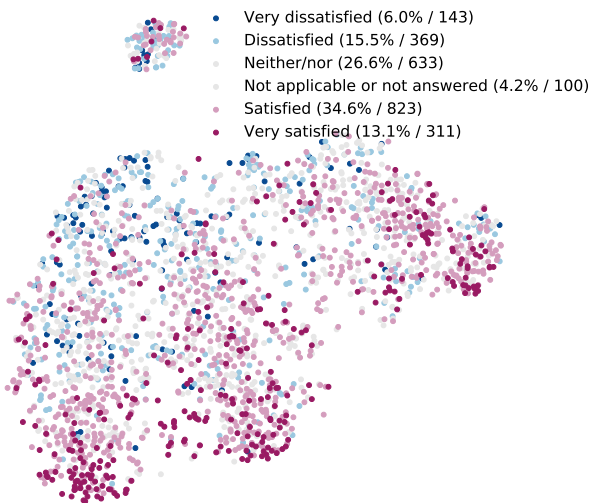


Figure E.20: “If you think about your own situation as a doctoral researcher, how satisfied are you with the following aspects: Social life at the institute?”

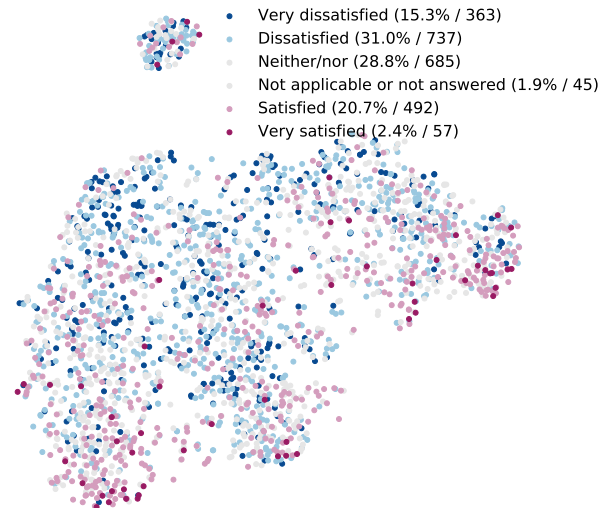


Figure E.22: “In general, how satisfied are you with the following aspects of an academic research career: Salaries in academia?”

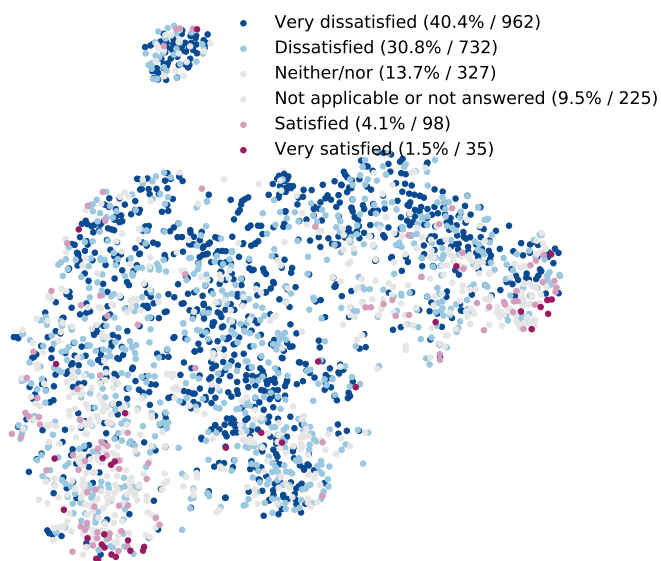


Figure E.23: “In general, how satisfied are you with the following aspects of an academic research career: Availability of permanent positions?”

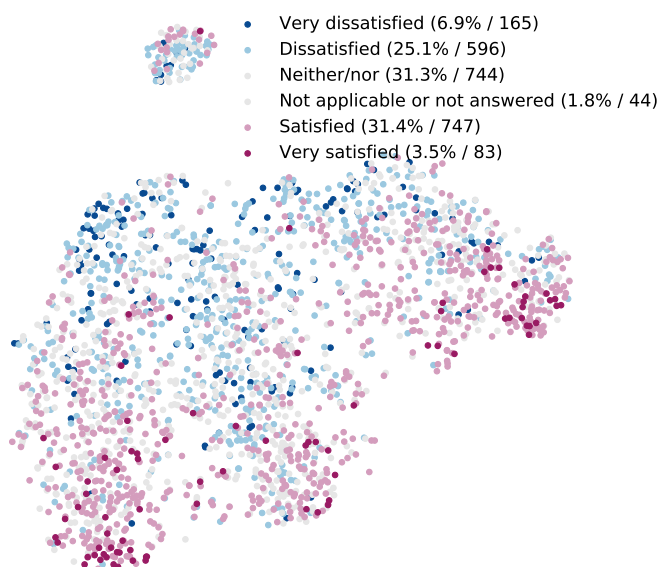


Figure E.24: “In general, how satisfied are you with the following aspects of an academic research career: Workload?”

Appendix F

Methods

F.1 General Analysis

In this section, we detail the data clean-up and the calculation of accessory variables applied to the raw data.

The data clean-up which was applied to our raw data will be detailed as an ordered list below, corresponding to the order of the respective cleanup steps.

1. Some participants did not choose their Institute via the provided Drop-Down menu, but opted for the free-text field. We realised that most of the entered institutes still corresponded to Institutes already in our list. So these free text answers were manually corrected to the respective Institute in our list of Institutes.
2. We then removed all (940) incomplete responses. Of these 394 were missing all key responses including the host institute and section, the others lacked a majority of responses of interest.
3. As all birth years before 1985 were only queried as "Before 1985", their value was set to 1984 to allow for numerical operations
4. For participants that identify as several of the provided Ethnicities, the Ethnicity was set to "mixed"
5. Questions B1 and B4 were merged into one category indicating if external funding was currently or previously granted, and if currently, whether it is in the form of a contract, a stipend, multiple or other options.
6. Questions A12 and A13, recording the start and predicted end year of the PhD respectively were used to calculate the expected duration of the PhD for each participant.
7. Question A4 (year of birth) and A12 (start year of PhD) were used to calculate the age of each participant at the start of their PhD

F.2 Mental Health

F.2.1 Mental Health Indicators: Score Calculation & Category Assignment

As for last year's report, we calculated sum scores for the scales measuring symptoms of depression, state and trait anxiety, respectively. Since the same short versions of the state and trait anxiety scales were used as last year, we also employed the same weighting strategy (to account for the reduction in items per scale).

In the following, we will list the items of each scale, explain how they were scored and mark the cases when items were negatively phrased and thus had to be reversed scored/coded.

Depression Scale

For the list of items used to assess symptoms of depression, see Table F.1. Every item could

No.	Item
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 F.1: Items referring to the question “Over the last two weeks, how often have you been bothered by any of the following problems?” (module PHQ-9; [15])

Response Option	Score
“Not at all”	0
“Several days”	1
“More than half the days”	2
“Nearly every day”	3
“I don’t want to answer this question”	not available

Table F.2: Scores for response options to the question “Over the last two weeks, how often have you been bothered by any of the following problems?” (module PHQ-9; [15])

be responded to with the options listed in Table F.2 (respective scoring indicated next to it).

For each individual, the sum score for the depression scale (module PHQ-9; [15]) was calculated by simply summing up the single scores per item. In case a participant did not answer one or more items (i.e. coding = not available), no sum score was calculated for this participant. The minimum possible sum score was 0, the maximum possible sum score was 24.

Albeit debated among experts, one could use these sum scores to categorize the participant’s level of depressive symptoms. This would result in the categories displayed in Table F.3.

State & Trait Anxiety Scales

For the list of items used to assess symptoms of state and trait anxiety, see Tables F.4 and F.5. Note that some items were formulated in a way that requires reverse coding (because,

for these items, agreeing means low anxiety).

For both scales, every item could be responded to with the options listed in Table F.6 (respective scoring indicated next to it). Reverse coded items received the score 1 for the response “Very much”, 2 for the response “Somewhat”, and so on.

Each item score of the state anxiety scale was calculated by attaching the weight $w = 20/6$ to it. Then, the weighted single item scores were summed up for the sum score. This was done, because the long version of this scale contained 20 items for state anxiety, of which only 6 were used here, and attaching these weights allowed for comparability of the resulting sum scores with those reported last year as well as in the literature. Similarly, each item score of the trait anxiety scale was calculated by attaching the weight $w = 20/8$ to it, because the long version of this scale contained 20 items for state anxiety, of which only 8 were used here.

In case a participant did not answer one or more items (i.e. coding = not available),

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”

Table F.3: Categorization of severity of depression symptoms as indicated by an individual’s sum score for the depression scale

No.	Item	Reverse Coding (blank = No)
1	I feel calm	Yes
2	I feel tense	
3	I feel upset	
4	I feel relaxed	Yes
5	I feel content	Yes
6	I feel worried	

Table F.4: State Anxiety Items referring to the question “Please read each statement below and then indicate how you feel right now, at this moment.” (STAI; [19])

no sum score was calculated for this participant. For both scales, the minimum possible sum score was 20, the maximum possible sum score was 80.

Like for the depression scale, one could use state and trait anxiety sum scores to categorize the participant’s level of state and trait anxiety symptoms. However, for the anxiety scales, there is no agreed-upon categorization. We suggest the categories displayed in Table F.7, but ask the reader to refrain from over-interpretation. This categorization differs from last year’s categorization as it is more intuitive. Note that this categorization can be used for both types of anxiety symptoms, as the same coding and scoring strategy is used for these two scales.

F.2.2 Mental Health and Consideration to Quit the PhD

The question assessing DRs’ considerations to quit offered several response options, which are also shown in Figure 3.6. For analyzing the relationship with DRs’ mental health status, we binarized the responses, such that responding “Never” was dummy-coded as 0 (i.e. indicating no consideration

to quit), while responding “Rarely”, “Occasionally” or “Often” were dummy-coded as 1 (i.e. indicating a consideration to quit). The responses “Unsure” and “Prefer not to answer” were left out from the analysis as they provided no meaningful information. We then subjected this new dummy-coded binary variable as the dependent variable to a binomial regression (specifically, a generalized linear model assuming a binomial distribution) separately for each mental health indicator (i.e. the predictor in those analyses being the depression, state and trait anxiety scores, respectively). For this kind of analysis, the statistical test is usually done on log odds ratios. However, to understand the results in a meaningful way, it is usually advised to exponentiate the log odds ratios to simple odds ratios, which are centered around 1. An odds ratio of 1 implies no difference in the odds of considering to quit versus not considering to quit due to changes in the mental health score. An odds ratio > 1 implies a change towards higher odds of considering to quit and an odds ratio < 1 implies a change in the opposite direction (lower odds of considering to quit). The specific change can then be understood as the

No.	Item	Reverse Coding (blank = No)
1	I am "calm, cool and collected"	Yes
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	Yes
5	I have disturbing thoughts	
6	I lack self-confidence	
7	I feel secure	Yes
8	I take disappointments so keenly that I can't put them out of my mind	

Table F.5: Trait Anxiety Items referring to the question "Please read each statement below and then indicate how you generally feel." (STAI; [19])

Response Option	Score
"Not at all"	1
"Somewhat"	2
"Moderately"	3
"Very much"	4
"I don't want to answer this question"	not available

Table F.6: Scores for response options to the questions of the state and trait anxiety scales, respectively (STAI; [19])

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

Table F.7: Categorization of severity of state and trait anxiety symptoms as indicated by an individual's sum score for the respective anxiety scale

percentage change in the odds ratio by subtracting 1 from the odds and then multiplying this with 100. Example: an odds ratio of 1.20 implies a $1.20-1=0.20 \times 100= 20$ percent change in the odds ratio, specifically towards higher odds of considering to quit. In contrast, an odds ratio of 0.70 would imply a $0.70-1 = -0.30 \times 100 = -30$ percent change in the odds ratio, in our case implying 30 percent lower odds of considering to quit. The specific results of the odds ratios were for depression: OR = 1.20, $p < .001$, for state anxiety: OR = 1.06, $p < .001$, and for trait anxiety: OR = 1.07, $p < .001$).

F.2.3 Mental Health and Financial Safety

The level of financial safety was calculated in the following way: For each pay category (e.g., 1301–1400€), we calculated the average net income (i.e. $(1301+1400)/2 = 1350$ €) to have only one number per pay category. We repeated this procedure for the reported monthly living expenses (e.g. for the category 300–400€, we calculated the average of 350€). After assigning each participant one value for net income and one value for monthly expenses in this way, we subtracted the monthly expenses from the net income value to create the financial safety value for each participant.

F.3 Scientific Environment

F.3.1 Career Choice

To explore potential reasons for those who desire to stay in academia but think they will work in non-scientific jobs, we selected the respondents who answer "very much" and "rather yes" for "Academia" on the question "Which field would you like to work in after completing your PhD?". In question "Which field do you think you will work in after your PhD?" we selected those who chose "academia" and "non-academic scientific research" as the sign of staying in science,

and those who did not choose "academia", "non-academic scientific research", or "further education" as the sign of leaving science. To better picture the experience of those two populations, "would like to work in academia and will stay in science" and "would like to work in academia but will leave science", we scored their satisfaction with their own situation and with a career in academic research in general, from very unsatisfied as 1, to very satisfied as 5.

F.3.2 Supervision Quality

Supervision Quality was assessed with the list of items displayed in Table F.8. For the response options to each of these items and our scoring strategy, see Table F.9. For each participant, we simply summed up the individual item scores to compute the Supervision Quality Score. In case a participant did not answer one or more items (i.e. coding = not available), no sum score was calculated for this participant. Note that, since item no. 10 seemed to offer too much room for interpretation (i.e. it is not clear whether "strict" requirements were perceived as something positive or negative), we excluded this item from sum score calculation.

F.4 Clustering Analysis

In the following, we describe the methods and analysis conducted for the clustering analysis presented in Chapter 7. Specifically, we discuss data clean up and standardization as well as the clustering and dimensionality reduction methods employed. We also present additional results supporting the conclusions drawn in Chapter 7.

This analysis was based on an early version of the cleanup data which differs from the version used for the rest of the survey in the assigned institute and section membership of 22 data points (responses) only. Major difference in the cluster analysis caused

No.	Item
1	My supervisor is well informed about my field of research.
2	My supervisor is available when I need advice.
3	My supervisor is open to and respects my research ideas.
4	My supervisor gives constructive feedback.
5	My supervisor supports my professional development (establishing contacts, recommending conferences...).
6	My supervisor is well informed about my current state of PhD project.
7	My supervisor encourages me to work independently. My supervisor treats me politely.
8	My supervisor treats me professionally.
9	My supervisor has clear requirements for my work.
10	My supervisor has strict requirements for my work.

Table F.8: Items for assessing perceived supervision quality

Response Option	Score
“Fully disagree”	0
“Partially disagree”	1
“Neither agree disagree”	2
“Partially agree”	3
“Fully agree”	4
“I don’t want to answer this question”	not available

Table F.9: Scores for response options to the items assessing supervision quality

by differences between these two versions of the cleaned up data are unlikely.

F.4.1 Data Clean-Up

Data clean-up follows five steps: 1. ignoring questions not appropriate for clustering, 2. handling cases where questions have not been answered, 3. convert ordinal data to numerical data, 4. convert categorical data to numerical data, and 5. ignoring unbalanced questions.

Ignoring Questions: We mainly ignore questions that correspond to free-text answers that cannot easily be converted to any numerical representations. This includes, for example, A14 which asks for “Anything regarding this section you would like to tell us?” We also ignore D1, asking about the current feeling of the respondents.

Handling Unanswered Questions: We handle unanswered questions by replacing them with the following answers, in the given

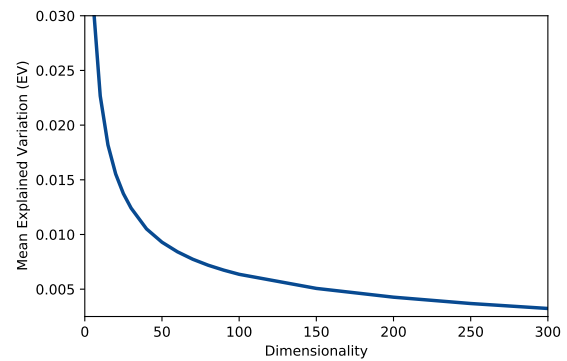


Figure F.1: Mean explained variation (EV) [14] (y-axis) plotted against the dimensionality obtained through PCA (x-axis), see text. EV decreases quickly within the first few dimensions. That is, relatively few dimensions are sufficiently to explain the majority of the variation inherent in the data.

order: “I don’t want to answer this question”, “I don’t know” or simply “No”. This is applied for all questions except F5 (“Have you ever reported a conflict, in terms of a situation where you felt mistreated, with one of the following people to an official third party?”), where we add an additional “Not answered” option.

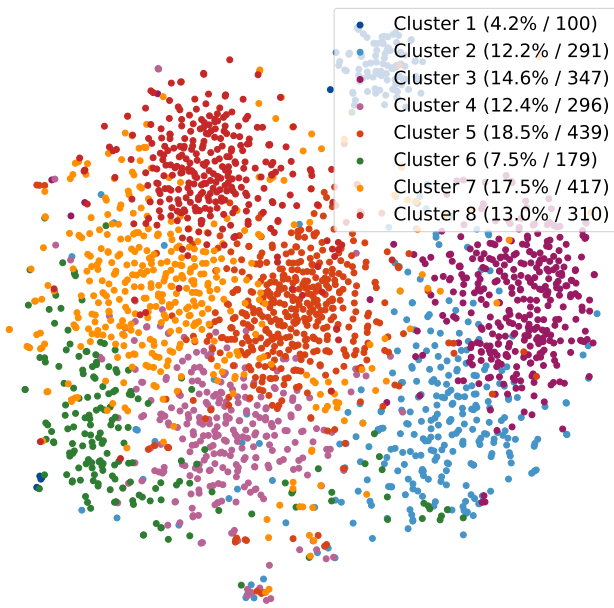


Figure F.2: k -means clustering and t-SNE visualization based on a PCA dimensionality reduction to 100 dimensions, instead of 10 as used in Chapter 7. While more information is preserved after PCA and, thus, available for clustering and visualization, the obtained clusters are more “fuzzy” and overlap more strongly. Clearly, this makes the results significantly less interpretable.

Converting Ordinal Data: We convert any question with clearly ordinal answer options to numerical values. There are generally two cases: questions that correspond to ranges of values, e.g., C4 (“How much do you pay for your rent and associated living costs per month in euros (e.g., heating, gas, water, and electricity)?”), and questions where answers can intuitively be ordered. An example of the latter case is C9 (“In general, how satisfied are you with the following aspects of an academic research career?”). This question has the following possible answers which we convert as indicated by the corresponding number: “Very dissatisfied” = -2, “Dissatisfied” = -1, “Neither/nor” = 0, “Satisfied” = 1, “Very satisfied” = 2. The remaining answers “Does not apply” and “I don’t want to answer this question” are also mapped to 0.

Converting Categorical Data: All remaining questions correspond to questions with answers that have no inherent ordering. Mostly, these are “Yes”-“No” questions (op-

tionally with a “I don’t know” or “I don’t want to answer this question” option). We convert these answers as follows: “No” (i.e., negation) = -1, “I don’t know”/“I don’t want to answer this question” = 0 and “Yes” (i.e., confirmation) = 1.

Unbalanced Questions: Throughout our analysis, we found that few questions are extremely unbalanced. We define a question as unbalanced if all respondents have the same answer except for 20 or less.

These five steps ensure that we obtain an entirely numerical dataset of responses. In particular, we end up with 2379 rows of data, i.e., respondents, and 362 columns of data, i.e., questions. As most clustering methods assume significantly more rows than columns, i.e., respondents \gg questions, we emphasize that this dataset can be considered challenging. However, these steps also mean that clustering analysis will not account for all questions and answers, e.g., those in text form.

F.4.2 Data Standardization

We experimented with two methods for standardizing the data, i.e., making sure the obtained numerical values are comparable across questions: scaling and whitening. With scaling, we refer to scaling all values to $[0, 1]$, while whitening transforms the data to have zero mean and unit standard deviation. For this, we subtract the mean, and divide by the standard deviation. By sorting out unbalanced questions (see above), we make sure that the standard deviation is non-zero.

F.4.3 Dimensionality Reduction

We use two methods for dimensionality reduction: First, we need to reduce the data to two dimensions for visualization purposes. For this purpose, we use the t-distributed stochastic neighbor embedding (t-SNE) [10, 17]. Second, for later clustering as well

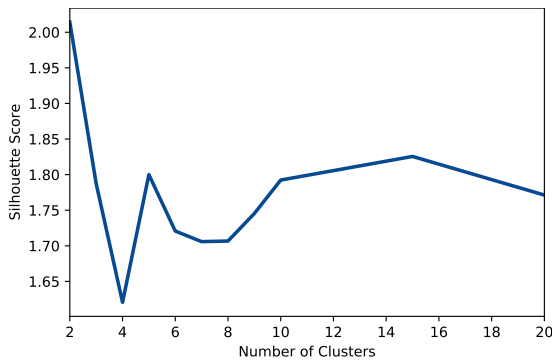


Figure F.3: Davies–Bouldin index [6] (y-axis) plotted against the number of clusters k used in k -means. A lower index (i.e., lower y-values) indicates a better clustering. Clearly, the best clustering is obtained for $k = 4$. However, there is another local minimum at around $k = 8$. Figure F.4, however, shows that $k = 4$ clusters are not sufficient to take many important characteristics of DRs into account.

as for t-SNE visualization, we use principal component analysis (PCA) [24] as pre-processing. In particular, we use PCA to reduce the data from 362 to 10 dimensions. Our choice of using 10 dimensions is informed by considering explained variation [14]: While explained variation starts to plateau around 50 dimensions, see Figure F.1, the most significant decrease in explained variation is already obtained for 10 dimensions. Additionally, we found 10 dimensions to reduce the impact of outliers significantly. Especially for the t-SNE visualization, as demonstrated in Figure F.2.

F.4.4 Clustering

For clustering, we use k -means [18] with k -means++ initialization [1] and cluster the (pre-processed) data into $k = 8$ clusters. The Davies–Bouldin Index [6], indicating clustering quality (i.e., lower index means better clustering). As shown in Figure F.3 (left), the index reaches low values at $k = 4$ and, again, around $k = 8$, before increasing again. Figure F.3 (middle and right), however, shows that the clustering for $k = 4$ (or smaller) is very coarse, e.g., not taking into account important characteristics such as supervision as discussed in Chapter 7.

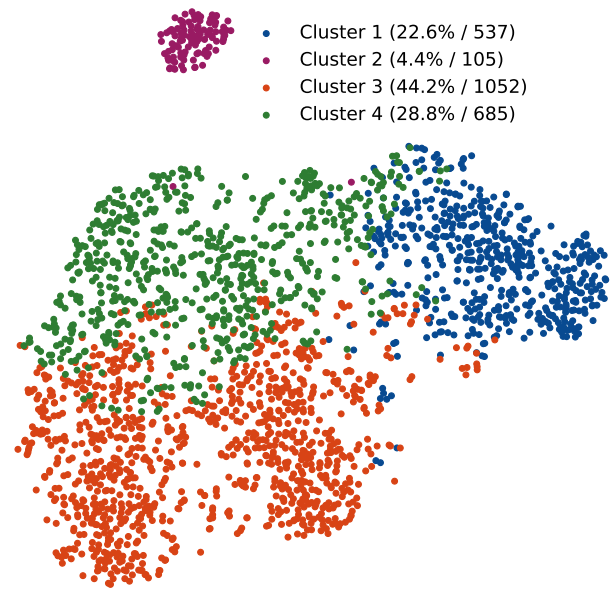


Figure F.4: Obtained k -means clustering, visualized using t-SNE after a dimensionality reduction to 10 dimensions using PCA, for $k = 4$ clusters, also cf. Figure 7.1 for $k = 8$. Following the discussion in Chapter 7, important characteristics such as nationality and supervision are ignored by this clustering. This prevents us from identifying to what extent these characteristics align with, e.g., satisfaction or well-being.

F.4.5 Visualization

For visualization, we use t-SNE [10,17] to reduce the (pre-processed) data to 2 dimensions. The t-SNE hyper-parameters were chosen visually. As clustering is not based on the t-SNE reduced data and t-SNE has the sole purpose of visualization, we found this approach to be the most appropriate. In particular, we use a perplexity value of 50. Visualization using a perplexity of 10 or 100 as well as an alternative visualization using PCA is shown in Figure F.5.

Reading t-SNE Visualizations: When visualizing clusters or individual questions using t-SNE, it is important to note that actual distances cannot be interpreted reasonably. t-SNE is specifically designed for visualization. As result, distances between clusters might be under-estimated while distances within clusters are over-estimated to create meaningful visualizations. Thus, we explicitly hide the axes in our t-SNE visualizations. We refer

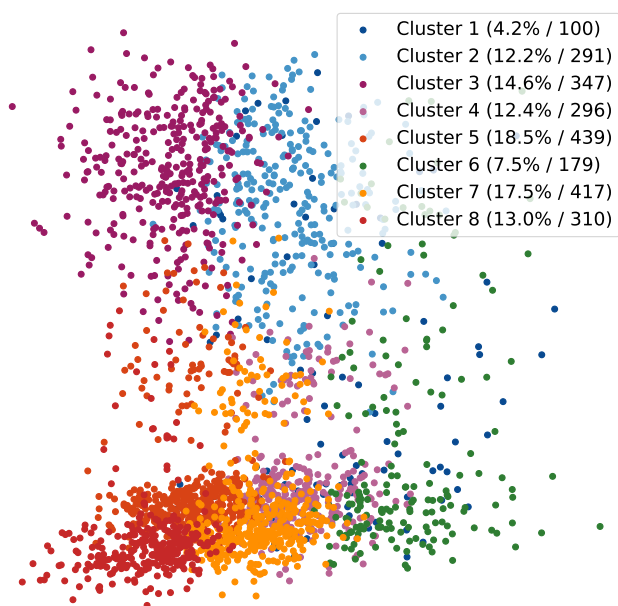


Figure F.5: Visualization using PCA: the k -means clustering is based on a PCA dimensionality reduction to 10 dimensions. The clusters are then visualized using a PCA reduction to 2 dimensions. Compared to Figure 7.1, PCA clearly results in a less interpretable visualization for cluster analysis.

to [28] for further details.

F.4.6 Implementation

We used the PCA, t-SNE and k -means implementations provided by scikit-learn [25].

F.5 Regression Analysis for the net-income

In the following we describe the analysis of the net-income in chapter 4.

First we convert the categorical answers provided to the question “Right now, what is your monthly net income for your work at your research organization?” into numbers by taking the mid-point of each categories, except for the first category (< 500), for which we set the value to 500, and the last (> 2500) for which we set the value to 2500. The “I don’t know” and “I don’t want to answer” responses have been removed from this set of analysis.

Then, we consider the following covariates: gender, section, field of work, type of work, ethnicity and year of PhD. Gender is categorized in Man, Woman and Other/no answer. For this analysis we decided to put together the category Other with the missing answers to allow for more statistical power in the model. However, we will not comment on the estimated values for this category.

Field of work is aggregated in bigger categories as follow: biomedical (biology-related and medicine-related), chemistry-related, physics-related, technology-related, math-related, humanity classical (history-related, language and literature related and philosophy-related), humanity social (law/economics-related and social cultural studies-related) and, finally, Other/no answers (Others and I don’t want to answer this question).

Type of work is categorized in: computational work, field work, laboratory work, library/chronicle work, theoretical/methodological work and Other/no answers (Other and I don’t want to answer this question).

The variable ethnicity has the following categories: European/Caucasian, African, Carribean, East Asian/Southeast Asian, Latino/Hispanic, Middle Eastern, Mixed, South Asia and No answer.

The variable contract situation distinguishes among Contract, Stipend, Multiple Options, Unpaid and No answers. The variable contract type, instead, is categorised as follow: Doktoranden Fördervertrag (support contract), TVöD / TVL 50%, TVöD / TVL 65%, TVöD / TVL other percentages, Other (Completion grant, Guest contract and Other) and no answer (missing answers and I don’t want to answer this question).

Finally, we categorised the year of phd into first year and all other years.

We consider a linear regression model for the net income where all the covariates above are introduced linearly and no interactions are considered between the variable gender

and the other control variables. This model is the result of a model selection process, which assessed the contribution of the interactions between gender and other relevant control variables, and finally selected for a model without interactions.

The estimated coefficients from the model are reported, together with their SE and p-values, in the Supplementary Table B.1. From the estimated coefficients, we calculated the predicted net-income for men and women in the different sections, by field of work and by type of work, and we plotted these predicted values together with the predicted confidence intervals.

F.6 Overall satisfaction

The overall satisfaction was computed by converting the results for each aspect in question C1 to a scale from 1 to 5 ("Very satisfied" = 5, "Very dissatisfied" = 1). No answers or "Does not apply" were set to zero and not taken for the normalisation count. The sum of all satisfaction factor was normalised by the non-zero counts and rounded to the nearest integer values. Afterwards the integer values were converted back to the original satisfaction scale.

Appendix G

Acknowledgements

During this lengthy work, we have received numerous support to push this report to the public.

Firstly we would like to thank the PhDnet steering group 2019/2020 (led by Lindsey Bultema) and 2020/2021 (led by Lea Heckmann), who were involved in all stages of decision making, in setting up the main topics of the survey, and continuous support in optimizing the report.

Secondly, Linda Olsthoorn and Lea Heckmann, the coordinators of PhDnet Survey Group 2020, initiated the 2021 work, and generously offered a lot of support on settling the work stream besides their great coordination in the beginning.

Thirdly, the PhDnet Equal Opportunity Group had close collaboration with us and offered their ideas on designing questions on gender identity, discrimination, and microaggression.

Big thanks to Zhen Zeng, Pouria Mazloumi, Maxime Borry, and other group members, who have put a lot of effort in designing the survey, analysing the data, and sharing their expertise to the group.

We greatly appreciate the constructive feedback from Ilka Schiessler, Fabian Ochsenfeld, Verena Mauch, Stefanie Unger, and Nikolai Hörmann and Alexander Filippi.

Besides, we would like to thank the help from the Secretary Group for updating the institute representative list, the Webgroup for their support on the administration of mailing list and updating our webpage, and the external representatives and IMPRS coordinators for providing most updated e-mail addresses and promoting the survey.

Last but not least, thank you all who participated in the survey, shared your stories and ideas in the comments, and the Max Planck Society for financial support of the PhDnet.

Appendix H

About the authors



Paul-Georg Majev

I work as a PhD Student at the Max Planck Institute for molecular Biomedicine in Münster where I am using single-cell sequencing tools to study characteristics of bone resident cells important for the progression of diseases such as Osteoporosis.

As one of the four coordinators of the PhDNet Survey 2020, I was mainly responsible for establishing the framework for our internal collaboration, coordinating the different analyses as well as conducting data clean-up and, among others, the analysis of demographics and working conditions of DRs in the Max Planck Society. I am happy, that with this years survey we were able to present a more detailed look at these key topics than ever before, in the hopes that they will support positive change.

Renee Marie Vieira



I'm a doctoral researcher studying ion channels and neurotransmitter receptors in the visual system of the fly, where I have developed new genetic techniques for visualizing these membrane bound proteins. So, in essence, I work in the exciting field of fly feeding, flipping, and fluorescing! All of which I do at the Max Planck Institute for Neurobiology. Before this my path to becoming a doctoral researcher has not been the most linear: I've worked as an outdoor educator, climbing instructor, and photographer. When I am not in the lab you can find me in the mountains, at my shared garden or building something somewhere.

As the veteran survey wrangler and coordinator (one of four) I have helped develop the survey questions, steer the analysis, and write the report. I'm also the resident editor-in-chief, Slack bot master, and Zoom planner. As well as being part of the PhDnet equal opportunity working group, I am happy to have spearheaded the addition of topics related to discrimination to the survey for the first time. As an advocate for better representation within STEM, I think it is important to highlight the barriers diverse scientists face when within academia, so they can be torn down.

Angela Carollo



I am a PhD Student in Statistics at the Max Planck Institute for Demographic Research in Rostock and at the University of Leiden (the Netherlands). Before that, I worked as statistical analyst at the same Institute and at the University of Southern Denmark, after having obtained both my bachelor and master degrees in Statistics at the University of Palermo (Italy). My PhD project aims at building a framework of analysis for time-to-event data recorded over multiple time scales. In general, I am very interested in understanding how much time is elapsed from the moment in which a process starts, until the moment in which a process ends. Therefore, for this year's survey I was happy to apply methods of time-to-event data analysis to understand how long do DRs at the MPS take to complete their PhD projects.

Besides being a Statistician, I am also a mother of a 7 months old boy. In the little free time that I have left after caring for him, I like to knit, to binge a tv series, to cook or to think about food.

Hang Liu



A usually enthusiastic but sometimes rather introverted person. Work on the epigenetic regulation of heart development in Bad Nauheim and relish the blended world of mathematics, physics, and biological phenomena (though not so good at math and physics).

My focus this year is to determine what are the key supports needed for DRs in MPS. The discovery spans through five topics: General support structure, Improvement of supervisory relationships, Career development, Extra support for international students, and Diversity and conflict solution.

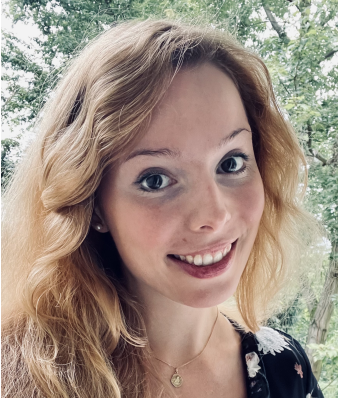
Besides cell babysitting, solution mixing, and keyboard knocking, I like some random thinking, bouldering, book collecting, and floating in the swimming pool like an after-meal sea otter. From time to time I try to pick up my lost piano pieces as well as finish the macrame project started numerous years ago.

David Stutz



I am a PhD student at the Max Planck Institute for Informatics in Saarbrücken. Previously, I studied computer science at RWTH Aachen University and worked on my master thesis at the Max Planck Institute for Intelligent Systems in Tübingen. Throughout my studies, I also worked for Google DeepMind, Microsoft, Fyusion and Hyundai MOBIS, among others. My PhD research focuses on robust and trustworthy artificial intelligence. Personally, I blog at davidstutz.de, believe in open source, play guitar (e.g., in the Saarland Mandolin Orchestra), or enjoy video games.

As part of the PhDNet survey group, I conducted and wrote the cluster analysis in Chapter 7. Doctoral researchers are an integral part of Max Planck Society and I hope that this year's report draws attention to various issues that doctoral students face throughout their PhD.

Alina Fahrenwaldt

I'm a psychologist and DR at the MPI for Research on Collective Goods (Bonn), where I'm doing experimental research on the drivers of moral perception, judgment and decision making. Before, I worked at the MPI for Human Cognitive & Brain Sciences (Leipzig) and the University of Oxford (England). In my free time, I produce art and dream of a world where societal and working structures promote rather than impede moral integrity and mental health. Apart from that, I'm PhD representative at my institute and on the organizing team for this year's N^2 -event focused on sustainability in research and career choices (of Max Planck, Helmholtz and Leibniz DRs).

For this year's PhDnet survey, my contributions spanned from survey design and implementation to data cleaning and analysis, and finally report writing and editing. Together with Nik, I was responsible for the analyses related to the three mental health indicators (depression, state and trait anxiety). Together with Hang, I created all info content on the survey group's webpage, in the hope that our work attracts future generations of DRs. I'm glad we were again able to collect so much data and hope that our report can help to raise awareness of important barriers to a healthy and sustainable scientific career.

Nik Drummond

I am currently a PhD student at the Max Planck Institute for Neurobiology, trying to quantify and model dendritic growth in *Drosophila* neurons, trying being the key word. Previously I have worked as a researcher at the University of Cambridge in the *Drosophila* Connectomics lab, and The University of Oxford within the Memory Research Group. The former working on generating and analysing detailed morphological image data from *Drosophila*, and the latter working on human clinical neuroimaging. I've had a fairly eventful path to get to a PhD, including a few years as a bar tender, but now I'm here, I'm keen to improve things where we can!

I am PhD representative at the MPI for Neurobiology, as well as being a member of the Mental Health Collective, and a member of the LeTSGEPs working group, pushing for inclusion and equality within the MPI. I feel Mental Health is a staggering issue in modern society, and needs to be talked about more. Contributing to the mental health analysis as part of this report is one of the ways I hope to encourage that, and hope to continue doing so while at the MPI.



THANKS FOR DOING SUCH WORK AND TAKING CARE OF US!

I REALLY APPRECIATE THE SURVEYS AND YOUR EFFORT,
THANKS!

THANK YOU FOR BEING PERSISTENT AND FIGHTING TO MAKE
NOT ONLY THE LIFE OF DOCTORAL RESEARCHERS EASIER BUT
ALSO FOR CHANGING THE CURRENT ACADEMIC CULTURE!

THANK YOU VERY MUCH FOR THE HARD WORK ON DESIGNING
THIS EXCELLENT SURVEY.

KEEP UP THE GOOD WORK! IT CAN FEEL UNDERAPPRECIATED
BUT YOU ARE REALLY HOLDING IT TOGETHER!

THANKS FOR HAVING THIS SURVEY! IT IS NICE TO KNOW THAT
SOME PEOPLE CARE.

I THINK THESE SURVEYS ARE REALLY IMPORTANT AND QUITE
TO THE POINT, THANK YOU.

THANKS FOR DOING THESE, I THINK IT IS VERY IMPORTANT!

THE QUESTIONS SEEM TO BE CAREFULLY CONSTRUCTED AND I
APPRECIATE THAT.

I FOUND THE SIDE NOTES PROVIDING DEFINITIONS VERY
USEFUL.

GOOD JOB IN INCLUDING CORONA RELATED ISSUES!
KEEP ON GOING!

I'M VERY HAPPY TO RECEIVED THE EMAIL ABOUT THIS SURVEY.
PLEASE DO MORE!

