HELMHOLTZ
Juniors

SURVEY REPORT 2019

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SURVEY REPORT 2019 SUMMARY

General information

In 2019 the first ever joint survey of the N² network was conducted. 29.6 % of doctoral researchers (DRs) of participating Helmholtz centers took part in the survey.

HELMHOLTZ Juniors

Demographics

Participation almost equal

We are diverse!
58.0% German, 16.1% from EU
24.5% from outside of EU

Satisfaction

What is attractive at Helmholtz?
92.2% interesting work
67.5% service to society

What is unattractive at Helmholtz?
66.8% availability of permanent contracts
48.8% process of applying

Doctoral researchers are satisfied with: office and lab equipment, social life, work environment and atmosphere

Doctoral researchers are unsatisfied with: salary and benefits, career development, bureaucracy and administrative support

Quitting?
48.9% rarely/occasionally consider it
10.8% often consider it

Working Conditions

Contract holders ↑
Stipend holders ↓

Working Hours
95.0% 20-40h/week contracts

Types of contracts
42.8% 65% TVÖD/L
23.7% 50% TVÖD/L
23.7% other
10.9% Guest

Actual working time
62.7% 40-60h/week
4.0% 60-80h/week

Extensions
45.5% get it if needed
18.4% don't
35.4% unsure

Holidays
61.9% feel free to take vacation days
33.4% don't because of high workload
11.2% don't because of pressure from supervisor

Supervision

Supervision Agreement: 68.8%; written project outline 58.8%; Thesis Advisory Committee: 56.6%, only 5.4% do not any of these

Communications with the supervisor
Actual: 58.4% daily/weekly
Desired: 70.5% daily/weekly

Satisfaction with the supervision
73.0% very-rather satisfied
25.3% rather-very dissatisfied

Graduate Schools

81.2% of doctoral researchers are registered
16.9% are no GS member
only 35.0% of non-GS members think they would benefit

Types of support
Financial support, support for publications, DR organized events

SURVEY REPORT 2019 SUMMARY

HELMHOLTZ Juniors

Integration

German as a language for non-German DRs
15.2% don't speak German at all
41.4% beginners
28.2% intermediate
14.9% fluent/native speaker

Language: an obstacle at work?
5.7% very problematic
39.7% to some extent
54.3% no obstacle

Support for internationals
45.5 % satisfied
more support needed for: university enrollment, finding accomodation, translation of important documents

Mental Health

based on the STAI questionnaire

Depression
77.9% no to minimal/mild depression
22.1% moderate to severe depression

Anxiety
26.7% no to minimal state anxiety
69.5% moderate to high state anxiety

Career development

Required scientific output
60.5% poster at a conference
43.7% talk at a conference
31.2% article in peer-reviewed journal

Future perspective
57.8% prefer non-academic scientific research
50.3% want to stay in academia

Research stay abroad
18.2% stay abroad
56.5% don't, but would get support
16.3% don't and don't get support

Career development options at the centers
soft skill courses (35.0%),
practical courses (23.5%),
language courses (17.6%)

Family planning

Children
89.0% don't have children
8.7% have/expect children
only 15.7% plan to have (more) children during their projects

Daycare
21.7% of centers offer daycare
20.2% mobile working options
only 11.8% have a general parent-friendly environment

Support from the center for raising a child
11.6% feel sufficiently supported
23.4% do not feel supported sufficiently
62.4% do not know

Power Abuse

Knowledge of conflict resolution instances
69.6% DR representatives
49.3% center ombudspersons
26.3% works council
19.8% medical services and counceling

Report of conflicts
80.3% never had one
11.3% had and did not report
5.1% had and reported

Satisfaction with conflict resolution
majority unsatisfied
21.6% were satisfied-very satisfied

Cases of power abuse reported
256 cases of bullying or sexual abuse were reported in this survey

1. Introduction

The Helmholtz Association of German Research Centres (Helmholtz-Gemeinschaft Deutscher Forschungszentren, Helmholtz) is the largest non-university research organization in Germany. As of 2019, there are over 8000 Doctoral Researchers at 19 Helmholtz Centres with distinct research topics in highly heterogeneous research fields. The scientific findings from doctoral research projects contribute immensely to the scientific excellence and international reputation of Helmholtz.

The Helmholtz Juniors (HeJu), founded in 2005, represent Doctoral Researchers conducting research at one of the 19 Helmholtz Centres and pursuing a doctoral degree at a university, regardless of their contract or funding situation. Their aim is to catalyze scientific exchange and solidarity among Doctoral Researchers as well as between the 6 research fields of Helmholtz: Energy, Earth & Environment, Health, Aeronautics, Space and Transport, Matter, and Key Technologies.

Since 2008, the HeJu have been conducting biannual surveys amongst the Doctoral Researchers of Helmholtz. These surveys give detailed insights into Doctoral Researcher living and working situation. The survey data serves as the base for all HeJu actions and projects to improve Doctoral Researcher situation. Doctoral representatives at all Centres strive to improve the interests of their peers, supporting their claims on the survey data. This empirical basis enables purposeful and constructive discussions to develop solutions for both Helmholtz-wide topics and centre-specific challenges.

This large-scale survey was conducted among the Doctoral Researchers of Helmholtz in November 2019, in close collaboration with the Doctoral Researcher organizations of Max Planck PhDnet and Leibniz PhD Network. Together with the HeJu these initiatives form the N² network of networks, representing the interests of ca. 18.000 Doctoral Researchers, pursuing a doctoral degree under similar circumstances, in three of the four non-university research organizations in Germany.

The questionnaire for the 2019 survey was developed during a 1.5-year collaboration in a N² joint survey working group and combines multiple questionnaires from past surveys of the three Doctoral Researcher organizations, creating a uniform survey basis for all three initiatives, thereby facilitating the comparison of results. The questionnaire is composed of 10 modules covering relevant topics of Doctoral Researchers in day-to-day life (e.g. working conditions, supervision, family and integration).
16 out of 19 Helmholtz Centres took part in the survey 2019 (**Figure 1**) and 1287 complete datasets (= 29.6%, according to numbers provided by the respective centres) were obtained. The Helmholtz Juniors Survey 2019 (*Appendix A Methodology*) provides the valuable opportunity, to present results for which we assume a high degree of representativity for the situation of Doctoral Researchers within Helmholtz, based on single-case comparisons with existing and obtained demographical data. In addition, statistical significance calculations were done assuming a number of ca. 8000 Doctoral Researchers in Helmholtz (95% confidence interval, 5% error margin, *Appendix A Methodology*).

For any questions regarding the survey please contact Carsten Peukert (carsten.peukert@helmholtz-hzi.de) or the Helmholtz Juniors Survey Group (hejusurvey@helmholtz.de)

2. Results

2.1 Demographics

This year 16 out of the 19 Helmholtz Centres participated in this first-ever Helmholtz Juniors' survey in the framework of N^2, which accounts to a maximum-possible response rate of ca. 4000 Doctoral Researchers. Based in this assumption, participation of 1533 Doctoral Researchers from 16 centres accounts to a total participation rate of 32.2% before data cleaning and 29.6% after data cleaning (1287 participants with complete answer sets) (**Figure 1**).

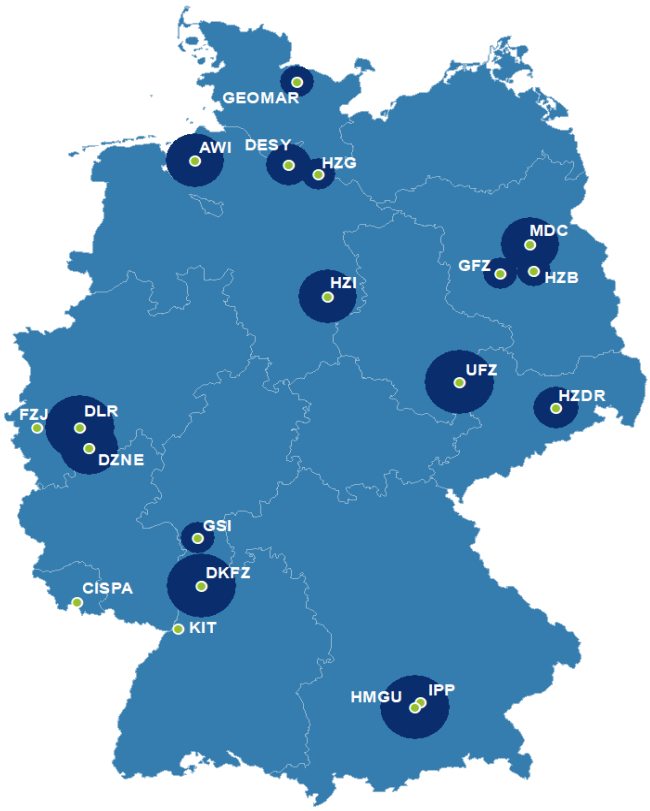


Figure 1: "Which Helmholtz Centre are you associated with?" Distribution of relative participants' responses from Helmholtz Centres across Germany - increasing circle size corresponds to increased participation percentages. AWI - Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research, CISPA - Helmholtz Centre for Information Security, DESY - German Electron-Synchrotron DESY, DKFZ - German Cancer Research Centre, DLR - German Aerospace Centre, DZNE - German Centre for Neurodegenerative Diseases, FZJ - Research Centre Jülich, GEOMAR - GEOMAR Helmholtz Centre for Ocean Research Kiel, GFZ - Helmholtz-Centre Potsdam GFZ German Research Centre for Geosciences, GSI - GSI Helmholtz-Centre for Heavy Ion Research, HMGU - Helmholtz-Centre Munich German Research Centre for Environmental Health, HZB - Helmholtz-Centre Berlin for Material and Energy, HZDR - Helmholtz-Centre Dresden-Rossendorf, HZG - Helmholtz-Centre Geesthacht Centre for Materials and Coastal Research, HZI - Helmholtz-Centre for Infection Research, IPP - Max Planck for Plasma Physics, KIT - Karlsruhe Institute of Technology, MDC - Max Delbrück Centre for Molecular Medicine in the Helmholtz Association, UFZ - Helmholtz-Centre for Environmental Research

In chapter *2.1 Demographics*, we present the demographics data, that illustrate Helmholtz as a diverse and international community. The participants divide nearly equally between male (46.9%) and female (50.3%) (**Figure 2A**). We acknowledge that all gender-related questions offered a non-binary response option. Due to the low response rate of self-classified non-binary participants, these fractions do neither provide sufficient data for comparisons nor correlation analysis and is neglected in the following. The age of the participants is determined according to the stated year of birth. (**Figure 2B**). The age of Doctoral Researchers in Helmholtz, based on their stated year of birth, ranges from 23 to 34 years, a significant difference regarding age between male and female Doctoral Researchers is not found. 19.0% of Doctoral Researchers select "I don't want to answer" for these questions. German Doctoral Researchers form the largest fraction (58.1%) within Helmholtz, followed by those from outside the EU (24.5%) and finally by those with EU citizenship (16.1%) (**Figure 2C**).

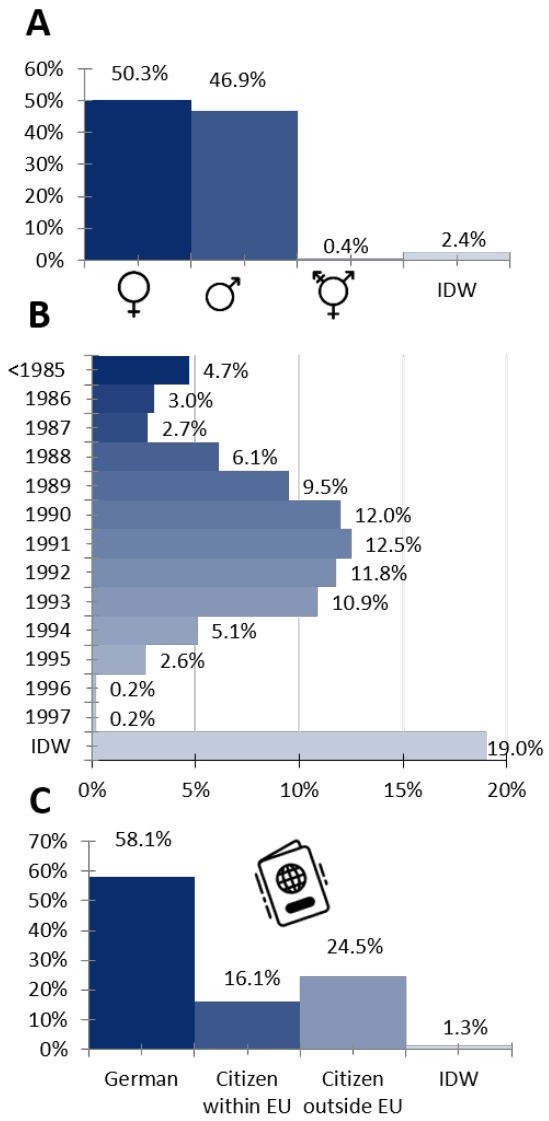


Figure 2: (A) "To which gender do you identify most?" **(B)** "What is your year of birth?" and **(C)** "What's your citizenship?" - relative fractions are shown. IDW = I don't want to answer, percentages of single groups are indicated on the respective bars.

88.7% start their doctoral research project between 2016 and 2019 (**Figure 3A**). In turn, 81.6% expect to submit their thesis between 2020 and 2022 (**Figure 3B**). However, most people state in the free text answer option, that they receive only temporary contracts and the actual date of finishing their thesis remains unknown. Herein, it is important to clarify that the project or contract length introduces a bias to the given answers. Most common mentioned reasons from the free text answers that could lead to an extended doctoral research project are supervision issues, maternity leave, publication pressure, institute switch as well as unclear financing situations. Doctoral Researchers show homogeneous distribution between male and female, with less than 3% declaring non-binarity or not replying to the question

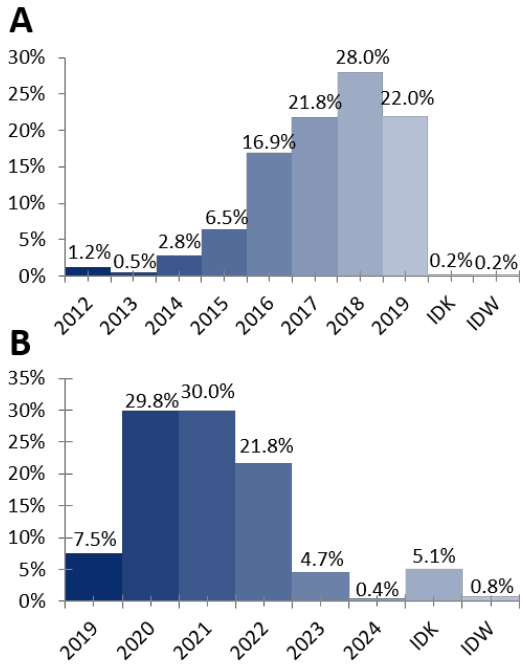


Figure 3: The results for **(A)** "Which year did you start your PhD thesis?" and **(B)** "Which year do you expect to submit your PhD thesis?" are shown with their relative response rates for each group. IDK = I don't know. IDW = I don't want to answer.

- Approximately 80% of Doctoral Researchers are between 23 and 34 years old
- Most Doctoral Researchers are German citizens, followed by citizens from outside and within the EU

2.2 Working conditions

Doctoral Researchers are outstandingly contributing to the quantitative and qualitative scientific output of Helmholtz (Helmholtz Doctoral Guidelines). Therefore, it is especially important that they receive appropriate compensation for their work. This section displays Doctoral Researchers' funding situation, their working hours, attributed vacation days, as well as received or possible contract extensions.

- TVöD = Tarifvertrag für den Öffentlichen Dienst (TVöD) - collective agreement for employees in the public sector.
- E# Step 1 = remuneration group E13 with a distinct monthly wage, with step x referring to an increase in wage over time (step 1-3).
- E13 50% = 50% position with ca. 20 hours working time per week.

A majority of 84.2% of Doctoral Researchers in Helmholtz are contract holders, which marks a welcomed and necessary shift to a smaller fraction of stipend holders compared to the past years (**Figure 4A**, Survey 2019: 13.2% stipend holders, Survey 2017: 20% stipend holders Figure 2.27). 2.4% of the Doctoral Researchers are at the time of the survey not being paid. This could be due to a writing-/wrap-up phase at the end of the doctoral research project on unemployment benefits or similar support. Among the Doctoral Researchers with a contract, 42.8% receive a TVöD/TVL 65% contract, followed by 21.1% who receive a TVöD/TVL 50% contract.

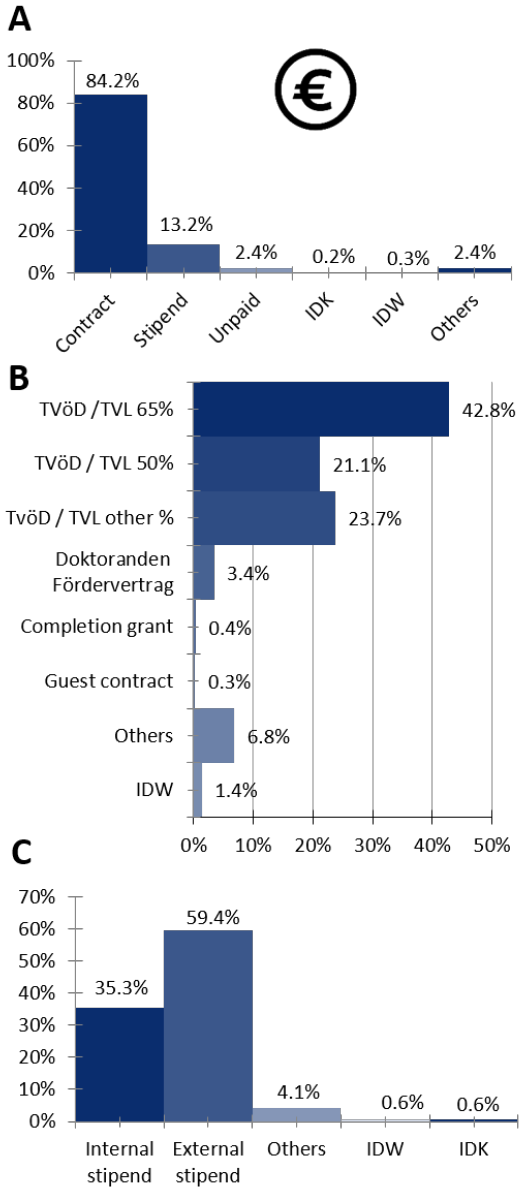


Figure 4: (A) "What kind of contract do you have?" If you have multiple contracts, please select 'other' and give details." **(B)** "How is your doctoral research currently financed? (multiple answers possible)" and **(C)** "What kind of stipend do you have?" Relative answers displayed by answer option - IDW = I don't want to answer, IDK = I don't know.

Other TVöD/TVL contract models with other percentages summed up to 23.7%. 10.9% receive either a guest contract, completion grant or other non-mentioned contract models (**Figure 4B**). Furthermore, free text answers mention a recognizable number of contracts in which certain percentages were paid by centres, graduate schools or other partners. For all

stated hybrid-funded exceptions, the minimum wage was 50% or higher, as stated in the free text options. Stipend holders receive their funding mostly from external funding bodies (59.4%), while Helmholtz-internal stipends come in second place with 35.3% (**Figure 4C**). Other alluded stipends contain mixed forms of contracts and stipends, also from non-EU funding agencies, as stated in the free text answers.

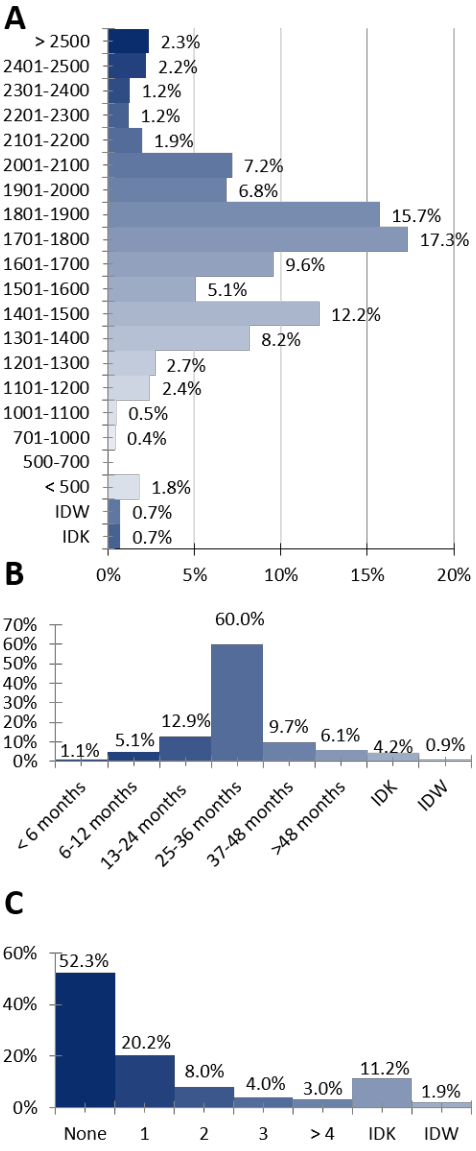


Figure 5: (A) "Right now, what is your monthly net income for your work at your research organization?" **(B)** "What was or is the longest duration of your contract or stipend related to your PhD project?" and **(C)** "If any, how many extensions or additional contracts/stipends did you get during your PhD?" are shown with their relative response rates, with IDW = I don't want to answer, IDK = I don't know. NONE = no extensions received.

There are still substantial variations regarding the monthly net income that Doctoral Researchers received for their work. The latter was defined as the amount of money transferred to their bank account every month, not including bonuses. 2.2% received 1000 € or less for their work, and are considered to live close to poverty limit compared to German living standards [1] (OECD: average household net-adjusted disposable income per capita is USD 34 297/year) and their educational level regardless of the region these Doctoral Researchers live in. 26.0% of Doctoral Researchers salaries range from 1001-1500 €, while the largest fraction (47.7%) of salaries lies within 1501 € to more than 1900€ (**Figure 5A**). Aside from the monthly net income, the contract duration and possible contract extensions present valuable information on the employment situation of Doctoral Researchers. Roughly 60% receive contracts with a duration of 25 to 36 months, followed by two smaller fractions of 13-24 months (12.9%) and 37-48 months (9.7%) (**Figure 5B**). Deducted from this, a shift from short term contracts to contracts covering minimum two years of project time, could be observed (**Figure 5C**), compared to the last survey, where 56% of Doctoral Researchers received an initial contract of minimum two years (Helmholtz Juniors Survey 2017, 2.6.3. Initial duration of funding and potential extensions, Figure 2.33). However, 14.4% of Doctoral Researchers in Helmholtz received two to more than four contract extensions during their project.

There are common reasons that Doctoral Researchers in Helmholtz would get an extension of their contract/stipend. 45.5% state that they can get an extension when more time is needed to complete their project, 18.4% would not get an extension and 35.6% are unsure whether

they could get any extension if needed (**Figure 6A**). Concerning parental leave, 32.4% can get an extension, 13.8% cannot obtain an extension and the majority (52.9%) does not know whether they can get an extension for parental leave. A similar picture is drawn concerning an extension for a wrap-up phase after the doctoral research project is finished. The majority (51.3%) of Doctoral Researchers does not know whether an extension would be possible, 32.2% would get an extension and 16.0% know no extension is possible.

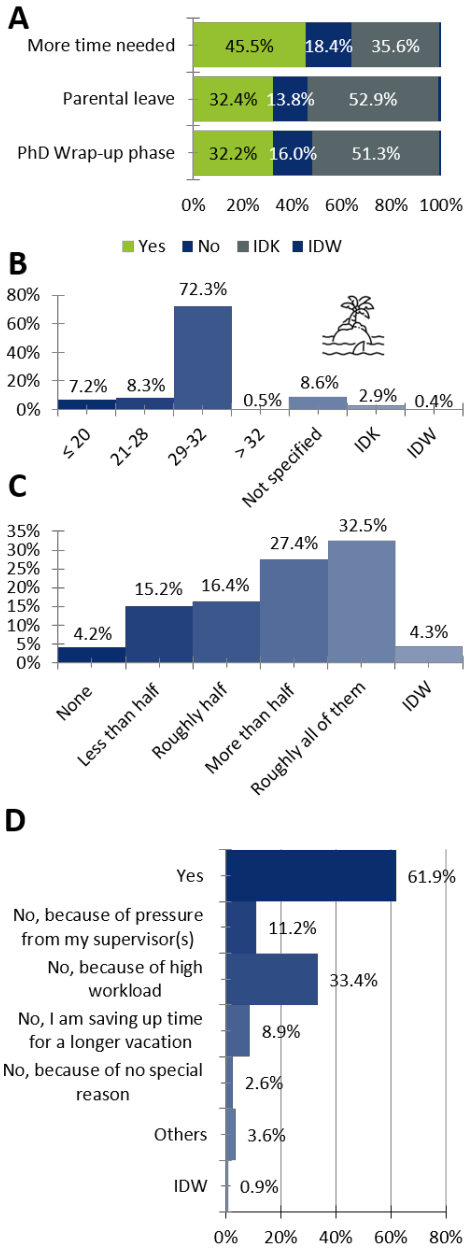


Figure 6: (A) "Would it be possible for you to extend your current contract/stipend for the following reasons (multiple answers possible)?" **(B)** "How many holidays per year can you take according to your contract or stipend?" **(C)** "How many days of your entitled holidays did you take in the past year?" **(D)** "Do you feel free to take days off? (multiple answers possible)" - relative answers are shown either grouped or by answer option. IDK = I don't know and IDW = I don't want to answer.

When asked about the number of holidays the majority (72.3%) Doctoral Researchers are entitled to 29-32 days of holidays per year according to their contract or in accordance with the most recent BMBF recommendation from 2019 (**Figure 6B**). However, a smaller fraction of centres within Helmholtz seems not to follow the BMBF guidelines to implement the recommended 30 days of vacation in 2019 (21-28 days: 8.3% and less than 20 days: 7.2%). Specific centres are mentioned repeatedly in the free text answers. In some cases (8.6%), the contract does not specify the number of holidays, e.g. for stipends. The majority of Doctoral Researchers, when asked for the fraction of used vacation days, either take all (32.5%) or more than half (27.4%) of their holidays (**Figure 6C**). The majority (61.9%) of Doctoral Researchers feel free to take their vacation days, while still a considerable number of Doctoral Researchers have issues with taking time off. The results show that the reasons for Doctoral Researchers not to take days off are either because of high workload (33.4%) or because of pressure from their supervisor (11.2%, **Figure 6D**).

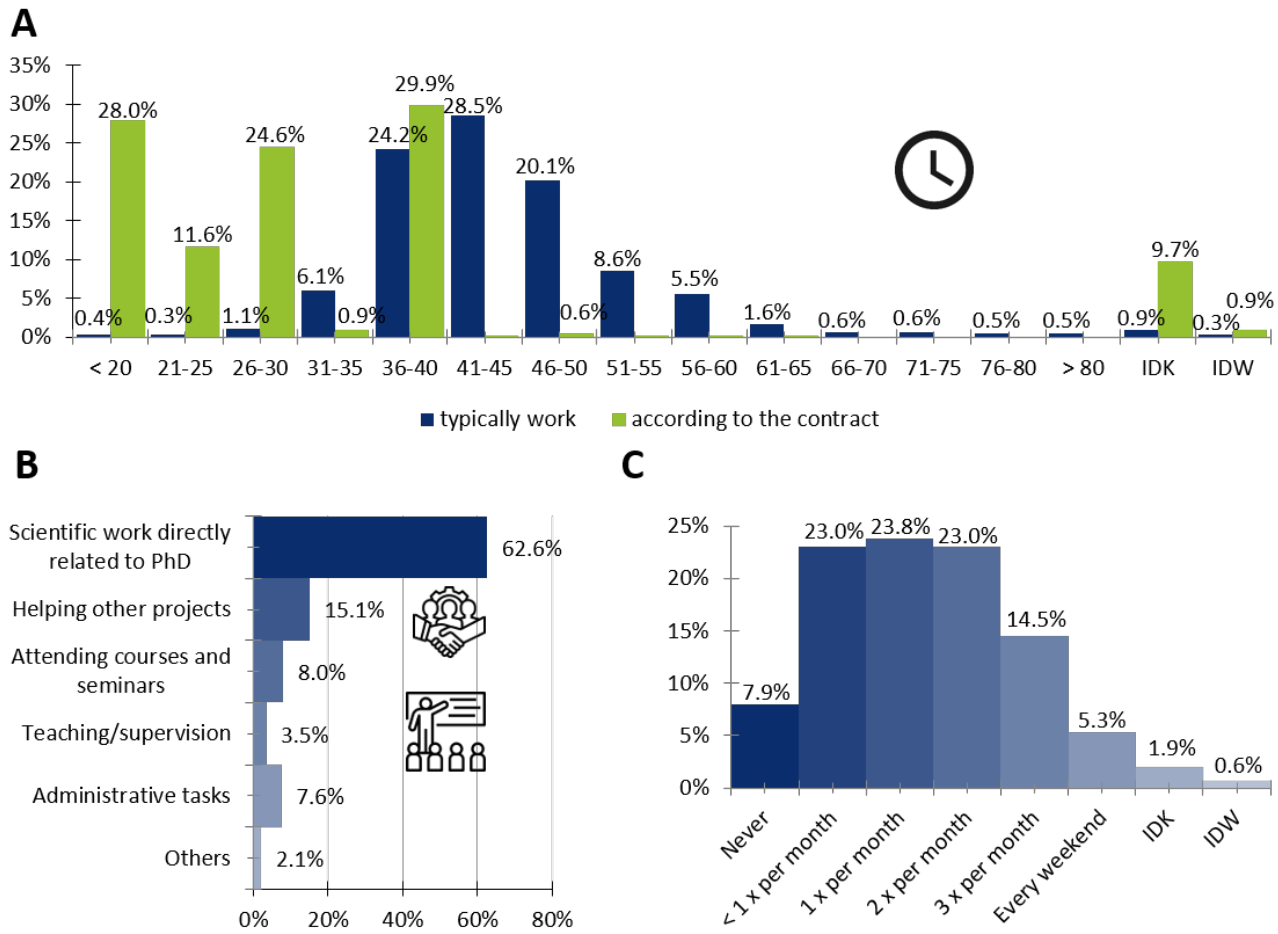


Figure 7: (A) "How many hours per week are you expected to work according to your contract?" and "On average, how many hours do you typically work per week in total?" are shown in **Figure 7A** as relative values, grouped by answer hour range. **(B)** "What percentage of your working time do you currently spend on average on the following tasks?" **(C)** "How often have you worked during weekends or public holidays in the past year? This question asks for work related to your PhD. It is place-independent and includes all work done at your Centre, your home or any other location. It does not include an additional part-time job or other work which is unrelated to your PhD." Relative answers displayed by answer option - IDW = I don't want to answer, IDK = I don't know.

Elusive free text answers in this survey imply self-pressure, dependencies on experiments and peer-pressure as recognizable reasons.

The majority (approx. 95%) of Doctoral Researchers states that according to their contracts they are expected to work 20 - 40 hours per week (**Figure 7A**). Probed for their actual working hours, 32.1% work 40 hours per week or less, a major fraction of 62.7% works 40 - 60 hours and 4.0% work more than 60 hours to more than 80 hours a week, displayed in **Figure 7A**. We found no difference between genders (data not shown).

A high workload may require working on weekends and public holidays. Work on weekends related to the thesis is defined as place-independent and includes all work done at the centre, at home or any other location. It does not include an additional part-time job or other work which is unrelated to the thesis. Most Doctoral Researchers work at least once per month on weekends (less than once per month 23.0%, once per month 23.8%, twice per month 23.0%, three times per month 14.5%), some even work every weekend (5.3%). Only 7.9% of the Doctoral Researchers never work on weekends (**Figure 7C**).

Participants spend 62.6% of their working time on scientific work directly related to their doctoral research project. 14.3% of their work is not related to the doctoral research project but rather include e.g. helping other projects and maintenance (**Figure 7B**). On average, 8.0% of the working hours are spent on attending courses and seminars, 7.6% on administrative tasks, 3.5% on teaching and supervision, and 2.1% on other, not further specified, tasks.

In **Figure 8** the answers from the optional free text section are displayed. Among the most mentioned terms Doctoral Researchers spend their working time except their thesis, were “Teaching”, “Lab maintenance”, “IT and Technical Support” as well as “Helping others” and “Doctoral Representation”.

Less mentioned items but hence providing valuable insight were 'Personal Development', 'Private Activities' but also 'Procrastination' and having an 'Additional Job'.

- Approximately 85% of Doctoral Researchers stated to hold a contract, mainly TVöD/TVL
- The main funding source of stipend holders is external, followed by Helmholtz-internal funding sources
- Most Helmholtz Centres embrace the recent BMBF guidelines regarding holidays for contract holders (30 days per year)
- Generally Doctoral Researchers work more than stated in their contracts

Figure 8: In the free text answer section, Doctoral Researchers indicated more tasks that they spend their working time on which are displayed here in a word cloud. The larger the item, the more often it was named by the Doctoral Researchers. More detailed information on the frequency of free text answers is given in 7. Appendix D. Tables free text answers.

2.3 Satisfaction

Before looking at reasons Doctoral Researchers feel satisfied or dissatisfied with their project as well as with their work environment, it is crucial to know why they started their a doctoral research project at a specific Helmholtz Centre in the first place. A majority of 69.5% (**Figure 9**) states that interest in the topic or research field at the institute was their main driver, followed by the scientific excellence of the institute (47.0%). Other reasons are the equipment and working facilities (36.4%), a structured PhD program (28.3%), working with a specific scientist (22.7%), and attractiveness of salary and benefits (16.2%).

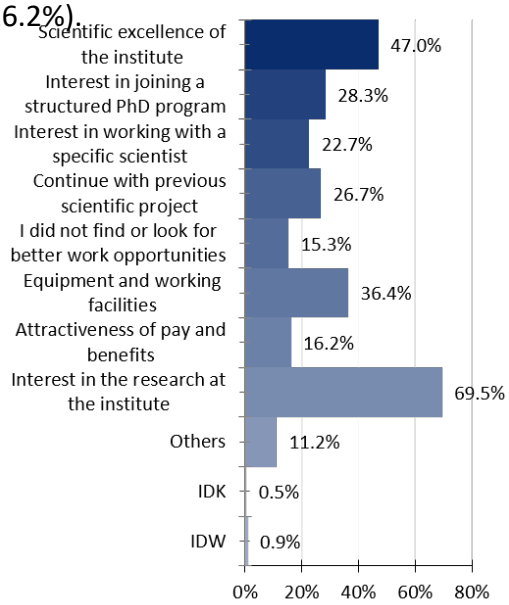


Figure 9: "Why did you start your work on your doctoral thesis at your research centre/institute (multiple answers possible)?" IDK = I don't know and IDW = I don't want to answer.

Some Doctoral Researchers decided to commit to their doctoral research project because they continued a previous research project (26.7%) or got this single opportunity (15.3%). In the free text answer option, some Doctoral Researchers gave additional reasons for committing to their thesis and stated they "personally like the supervisor" or "their colleagues", "the location", "the flexibility of being a Doctoral Researcher" as well as "the career options". Fewer Doctoral Researchers mention disappointing experiences in combination with choosing their thesis in the free text answers.

Once the Doctoral Researchers start their doctoral research project, most of them identify with their research centre (very much 27.6% or a bit 49.3%), but less with Helmholtz (not quite 33.8%, not at all 16.9%) (Figure 10A). Moreover, 77.2% of the Doctoral Researchers state to know their Doctoral Researcher representatives (77.2%) and the HeJu (57.1%). The rather new Network of Networks, N^2, however is less well known (33.2%, **Figure 10B**).

Income itself is important, but the contentment with the income also depends on the living expenses, especially when living expenses are high and no additional support is available [2]. For this reason, the contentment with the income has an influence on general-life satisfaction. Doctoral Researchers were asked how much they pay for living costs, including rent and associated living expenses per month (e.g., heating, gas, waste and electricity) in Euros.

Figure 11A shows that 80.2% of Doctoral Researchers have living costs between 301-800 € (301-400 € 12%, 401-500 € 18.3%, 501-600 € 19.7%, 601-700 € 17.3%, 701-800 € 12.7%). To cover these costs most Doctoral Researchers do not get any external financial support (75.2%, **Figure 11B**), either because they do not need it or because it is not available. If Doctoral Researchers do get additional income, the sources are various: E.g. by parents, partners, additional job(s), savings, grants, stipends or government funding, such as unemployment money. In some cases (**Figure 11C**), Doctoral Researchers even spend parts of their salary for implements exclusively used for work. These costs range from 1 to more than 300 €.

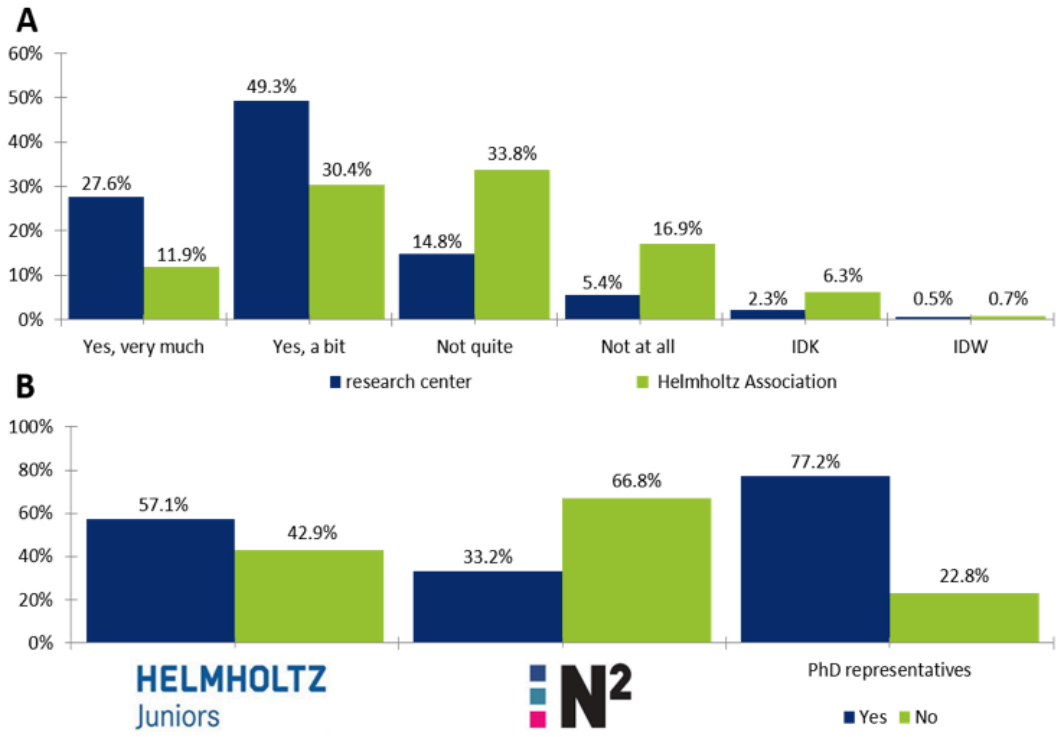


Figure 10: (A) "Do you identify with your research Centre?", and "Do you identify with your research organization: Helmholtz Association?", relative answers grouped by answer possibility. **(B)** Relative results are shown for "Do you know HeJu, the N^2 network or your local PhD representatives?", grouped by question - IDK = I don't know and IDW = I don't want to answer.

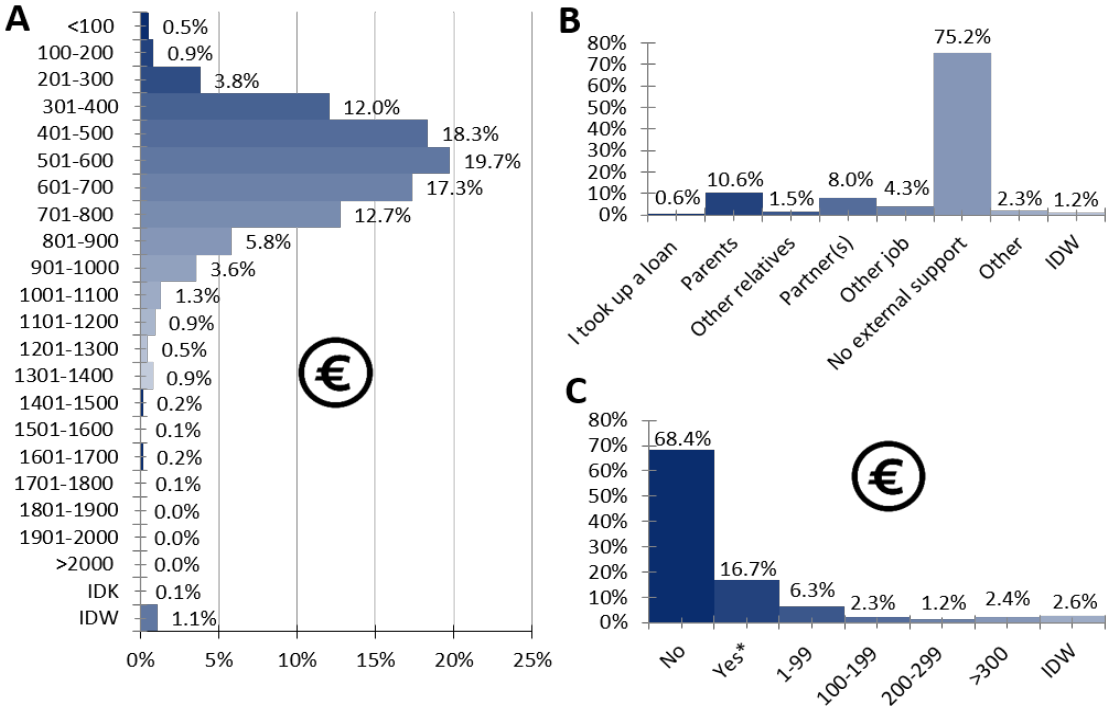


Figure 11: The monthly net income distribution, as well as external financial support and private spendings for work are shown in **(A)** "How much do you pay for your rent and associated living costs per month in euros (e.g., heating, gas, waste, and electricity)?" **(B)** "Do you get external financial support to cover your living expenses besides your salary?" and **(C)** "Did you spend parts of your salary on items you exclusively used for work in the past year?", IDW = I don't want to answer and IDK = I don't know.

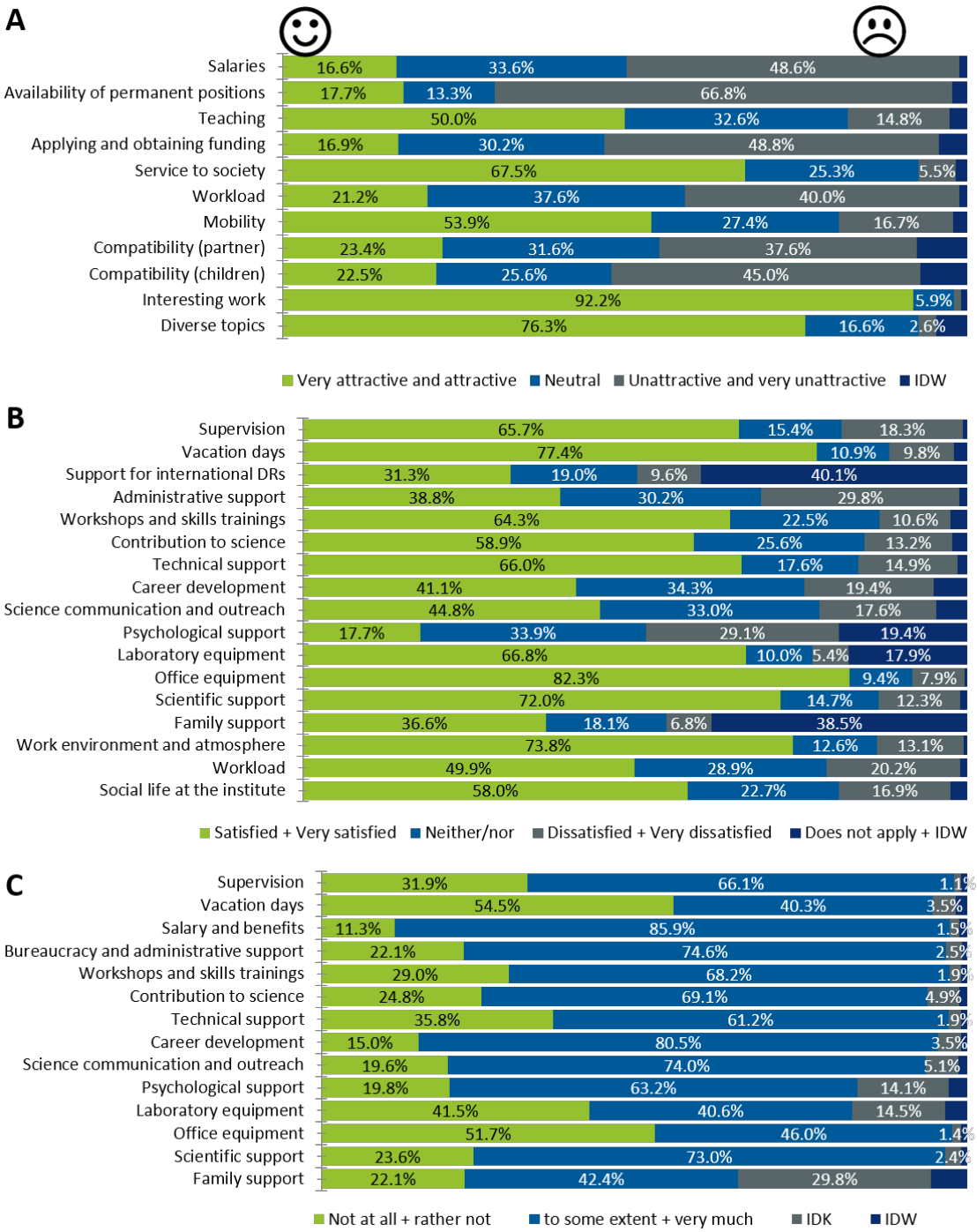


Figure 12: Participants were asked **(A)** "In general, how do you judge the following aspects of an academic research career?", **(B)** about their satisfaction with work related aspects "If you think about your own situation as a Doctoral Researcher, how satisfied are you with the following aspects?" **(C)** and "Which of the following aspects of your work as a doctoral researcher would you like to be improved?"- Answers options "very attractive" and "attractive" as well as "unattractive" and "very unattractive" were combined for better readability. IDK = I don't know and IDW = I don't want to answer.

The most attractive aspects of an academic research career at Helmholtz for Doctoral Researchers are the interesting work (92.2%), the service to society (67.5%), the mobility (53.9%) and teaching (50.0%). Marked as unattractive are lack of permanent positions (66.8%), process of applying and obtaining funding (48.8%), salary (48.6%) and compatibility with having children (45.0%), as shown in **Figure 12A**.

In general, Doctoral Researchers within Helmholtz are rather satisfied (satisfied or rather satisfied) with their working environment e.g. office (82.3%) and laboratory (66.8%) equipment, work environment and atmosphere (73.8%) and social life at their Centre (58.0%). Also, the supervision (65.7%), scientific support (72.0%) and workshops and skills trainings (64.3%) satisfy most Doctoral Researchers. Yet they are less satisfied with the support for international Doctoral Researchers (31.3%), families (36.3%), bureaucratic and administrative tasks (38.8%), and especially the psychological support, which only satisfies 17.7% of the Doctoral Researchers (**Figure 12B**). More than 60% of the Doctoral Researchers state that the following fields need improvement, either to some extent or very much: salary and benefits (85.9%), career development (80.5%), bureaucracy and administrative support (74.6%), science communication and outreach (74.0%) (**Figure 12C**). Apart from this also interesting are: scientific support (73.0%), contribution to science (69.1%), workshops and skills trainings (68.2%), supervision (66.1%), psychological support (63.2%) and technical support.

Moreover, Doctoral Researchers report in the free text answers on issues concerning support with career development, difficulties with the administration, insufficient salary to live and immense overtime for the planned project. Alarming situations with discrimination and harassment, as well as racism, are mentioned repeatedly in the free text option. A significantly lower number of Doctoral Researchers reports a high grade of satisfaction with all aspects of their life as a Doctoral Researcher in Helmholtz.

Figure 13A shows that 38.1% of the Doctoral Researchers never considered quitting their doctoral research position. Yet, almost half (48.9%) of the Doctoral Researchers thought rarely or occasionally, and 10.8% thought often about quitting their doctoral research position. Reasons for quitting are diverse (**Figure 13B**), but most prominent are no academic results (32.8%), unattractive career perspective (30.2%) and self-doubts (30.2%).

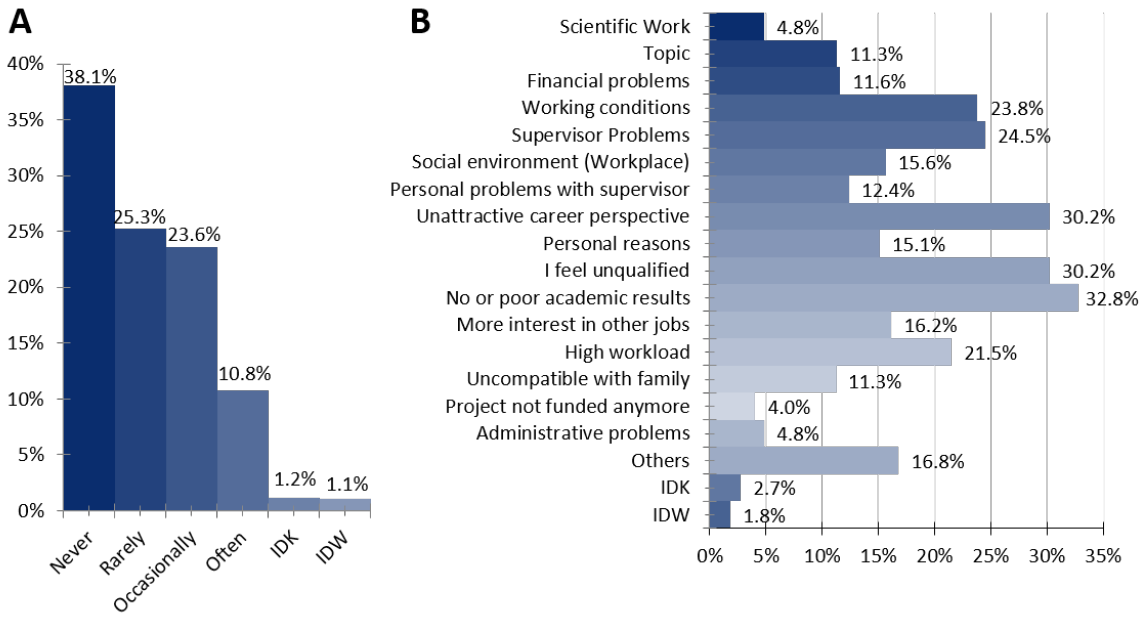


Figure 13: Participants were asked **(A)** "Have you ever considered quitting your PhD?" and furthermore for the reasons behind **(B)** "What was/were the reason(s) for considering quitting your PhD?" - answers are displayed as percentages by answer option. IDK = I don't know and IDW = I don't want to answer.

Figure 14: Results of the free text answer option of "What was/were the reason(s) for considering quitting your PhD?" - size corresponds with the frequency of answers from the respective category. More detailed information on the frequency of free text answers is given in 7. Appendix D. Tables free text answers.

Other major reasons to think about quitting are poor supervision (24.5%), working conditions (23.8%) and high workload (21.5%). Additional reasons for considering to quit the doctoral research position are mentioned in the free text answers (**Figure 14**). Despite the difficulties and discontentment, most Doctoral Researchers (67.0%) recommend starting or continuing a research project at their Centre (**Figure 15**).

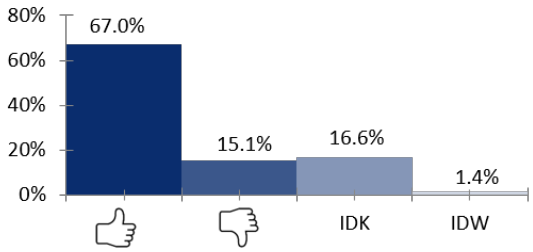


Figure 15: Participants were asked "Would you recommend doing a doctoral research project at your Centre?" - IDK = I don't know and IDW = I don't want to answer.

Ultimately, most of Helmholtz Doctoral Researchers start their doctoral research projects because of interest in the topic, a specific research field at the Centre or the scientific excellence of a specific centre (**Figure 9**). Most of them identify with their research centre and they know their doctoral representatives (**Figure 10**). As people have a continuous need for affiliation, an identification with the values and image of their workplace might have a positive impact on their life and general satisfaction.

- Doctoral Researchers mainly decided to research at a Helmholtz Centre based on the interesting research and excellence of their Centre.
- Academic research is attractive to Doctoral Researchers because of the interesting work, the service to society, the mobility and the teaching opportunities.
- Doctoral Researchers are generally satisfied with their working conditions, but improvements could be achieved in support for international Doctoral Researchers, families, bureaucratic and administrative tasks, and especially the psychological support.

2.4 Supervision

In this section, the Doctoral Researchers were asked about the supervision and related issues of their doctoral research project. Topics like project outline, progress review or frequency of meetings with primary supervisor were probed in this chapter. At the end, the Doctoral Researchers were asked to rate their supervisor on e.g. how they are being treated, the availability of their supervisor for consultation and the support by their supervisor with professional development.

The Doctoral Researchers were asked to mention what type of agreement exists with their primary supervisor. The options included terms which are defined as:

- **Supervision agreement**: A written agreement between the formal/primary supervisor and the Doctoral Researchers outlining their responsibilities from the beginning of the PhD project until the completion of their doctoral thesis.
- **Project outline:** Preliminary project plan defining the objectives of the PhD project, as well as the methodology to achieve them within a given period as a doctoral research project.
- **Training plan:** It contains the details about the courses that are mandatory for the completion of the doctoral PhD project.
- **Thesis advisory committee (TAC):** Group of two or more independent researchers (including the primary supervisor). The Doctoral Researcher meets with the TAC on a regular basis and gets advice on how to progress and successfully complete their PhD project.

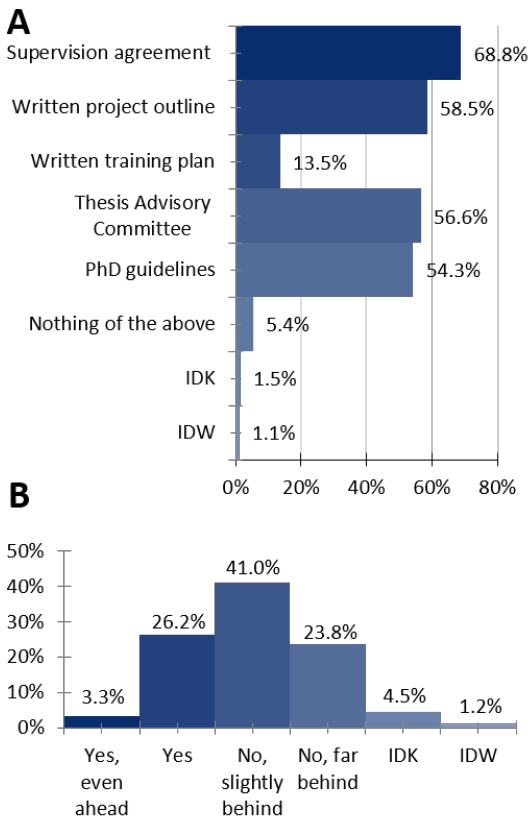


Figure 16: Participants were asked **(A)** "Do you have one of the following?" and **(B)** "Is your project according to your (reviewed) project plan?", relative percentages are shown by answer option, IDK = I don't know, IDW = I don't want to answer.

Most of the Doctoral Researchers have some form of written agreement for their doctoral research project. More specifically, 68.8% of have a supervision agreement with their supervisor and 58.5% of them even have a written project outline. 13.5% of Doctoral Researchers have a written training plan. 56.6% of them stated that they have a thesis advisory committee (TAC) and 54.3% have PhD guidelines. Only 5.4% do not have any of the above (**Figure 16A**). Only about 26.2% are progressing according to their actual plan and few say they are even ahead of their plan (3.3%). A majority of Doctoral Researchers, 64.8%, are behind, out of which 23.8% say that they are lagging far behind (**Figure 16B**). Only 23.8% of the Doctoral Researchers meet with their TAC twice a year or more often.

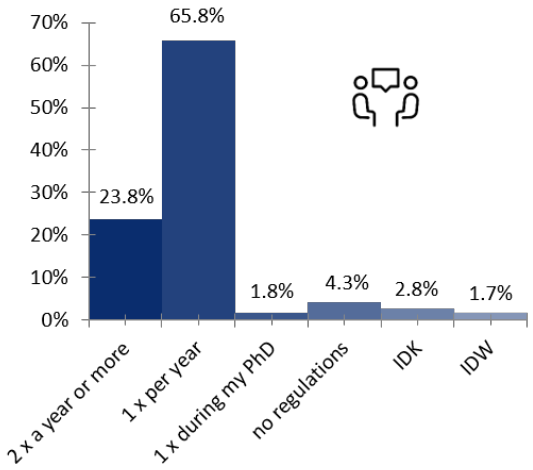


Figure 17: Participants were asked "How often do you meet your thesis advisory committee (TAC)?" IDW = I don't want to answer, IDK = I don't know.

A majority of the participants mention that they meet with their TAC once a year (65.8%). A very small percentage (1.8%) say they meet their TAC only once during their doctoral research project and 4.3% do not have any regulations at all (**Figure 17**).

For about 41.0% of the Doctoral Researchers, their primary supervisor is also their direct supervisor, but more than half of the survey participants (50.5%) have a direct supervisor who is not their primary/formal supervisor. 5.7% of the Doctoral Researchers do not have a direct supervisor and only 1.5% of the participants said that they do not have a primary supervisor yet (**Figure 18**).

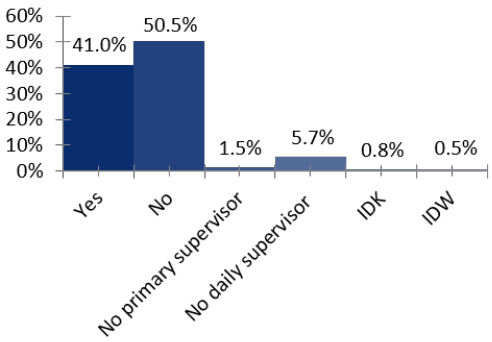


Figure 18: Participants were asked "Is your formal/primary supervisor your daily/direct supervisor?" IDW = I don't want to answer, IDK = I don't know.

The Doctoral Researchers were asked about the real as well as about the desired communication frequency with their daily/direct supervisor. 23.3% of the Doctoral Researchers mention to counsel with their daily/direct supervisor every day. About the same fraction (22.7%) of Doctoral Researchers would like to meet with their daily/direct supervisor every day. A majority of the participants stated that they would like to meet with their direct supervisor on a weekly basis (47.2%). However, just 35.7% of the participants actually meet with their daily supervisor on a weekly basis.

When it comes to the meetings with the primary/formal supervisors, only 6.2% Doctoral Researchers would like to have a meeting every day. Doctoral Researchers would like to meet with their primary/formal supervisors weekly (21.2%) or monthly (24.3%). Bi-weekly and quarterly meetings are desired by 15.9% and 14.1% respectively (**Figure 19B).** About 12.7% of Doctoral Researchers would like to meet their primary/formal supervisors once in six months or less. A smaller number of Doctoral Researchers (3.4%) do not know how often they would like to meet their primary/formal supervisor.

The Doctoral Researchers were asked how satisfied they are with their supervision in general. More than half of the Doctoral Researchers are satisfied (19.7% very satisfied, 29.2% satisfied and 24.1% rather satisfied). About 12.4% are rather dissatisfied with their supervision. Roughly 6% of the Doctoral Researchers are either dissatisfied or very dissatisfied with their supervision (**Figure 20**).

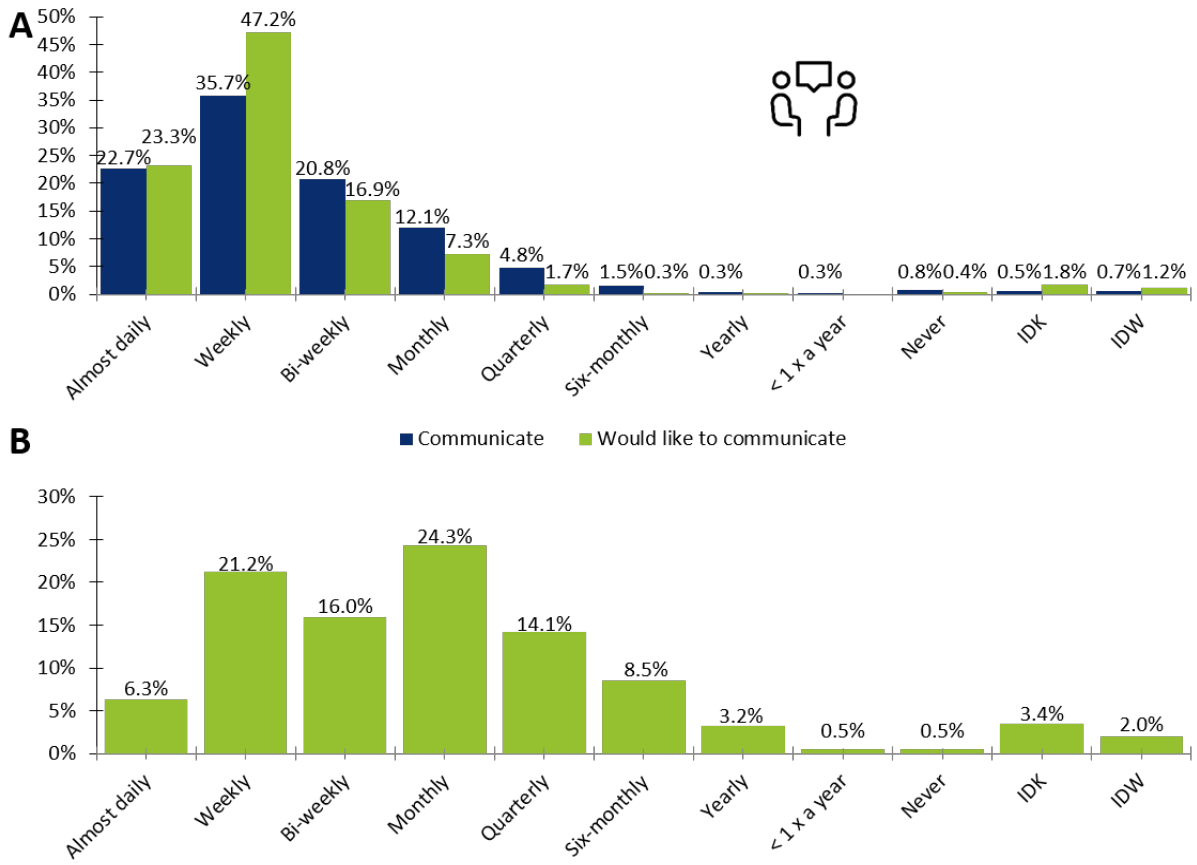


Figure 19: (A) Participants were asked "How often do you communicate on average with your daily/direct supervisor about your PhD project?" (blue) and "How often would you like to communicate with your daily/direct supervisor about your PhD project?" (green) **(B)** "How often would you like to communicate with your formal/primary supervisor about your PhD project?" -IDW = I don't want to answer, IDK = I don't know.

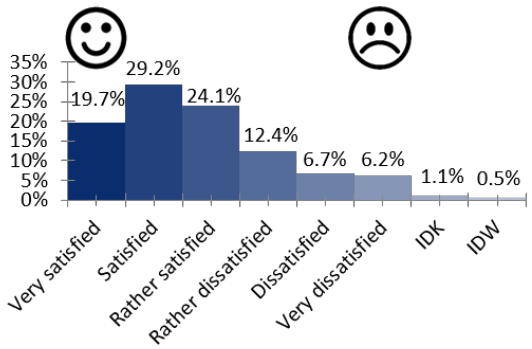


Figure 20: Participants were asked: "How satisfied are you with your PhD supervision in general?" answers are displayed as percentages by answer option - IDW = I don't want to answer, IDK = I don't know.

The Doctoral Researchers were then asked to rate different aspects of the supervision. The question includes aspects such as (**Figure 21**):

- availability for advice
- giving constructive feedback
- openness for new ideas

Overall, the supervision by the primary/formal supervisor rated positively. Outstandingly well rated statements include "My supervisor treats me politely" (87.4%, fully agree + partially agree), "My supervisor treats me professionally" (83.5%, fully agree + partially agree) and "My supervisor encourages me to work independently" (fully agree + partially agree, 79.6%).

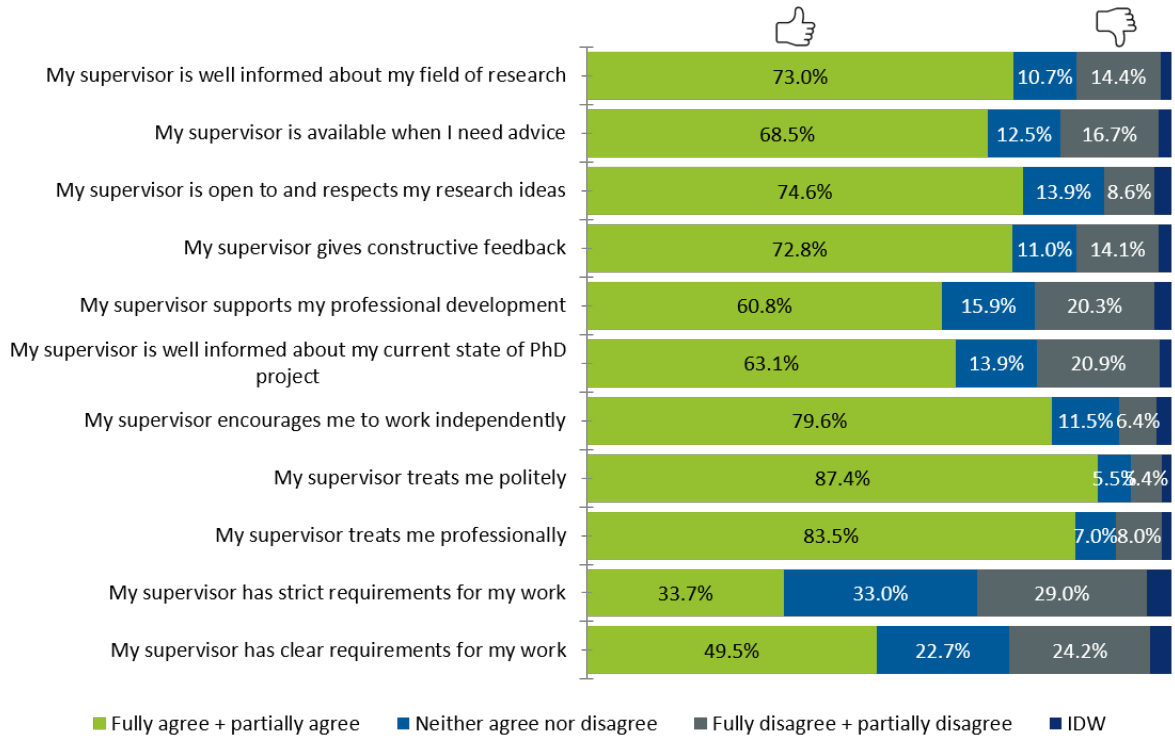


Figure 21: "Please rate the supervision provided by your formal/primary supervisor." asked the participants to rate 11 statements about their formal/primary supervisor, relative percentages of selected answer categories are given grouped by statement. IDW = I don't want to answer.

Rather mixed ratings could be observed for "My supervisor is well informed about my current state of PhD project" (63.1%, fully agree + partially agree), "My supervisor supports my professional development" (60.8%, fully agree + partially agree), "My supervisor has clear requirements for my work" (49.5%, fully agree + partially agree) and "My supervisor has strict requirements for my work" (33.7%, fully agree + partially agree).

Finally, the Doctoral Researchers were asked about common problems faced with supervision during their thesis (**Figure 21**). There are two extremes: respondents either state, that there are too few (22.4%) or too many (7.2%) meetings. Participants mention a limited availability of experienced colleagues available for advice (29.1%). 21.3% of the Doctoral Researchers find that their supervisor(s) are "not experienced enough in their field". One quarter of Doctoral Researchers are "not receiving enough feedback (23.5%) or encouragement (24.1%)" from their formal/primary supervisor.

About 10.5% of Doctoral Researchers have disagreements between supervisors and 25.5% did not encounter any problems regarding their supervision at all (**Figure 22**). Stated in the free text answers, Doctoral Researchers encounter problems regarding supervision because of e.g. not having enough contact with the supervisor or poor management.

Specifically, insufficient leadership skills of the supervisor as well as miscommunication and unprofessional behaviour, yielding potential conflicts with supervisors or colleagues are described.

In particular, misconduct and harassment by supervisors in variable situations are mentioned multiple times. Even more often, a lack of knowledge of the primary/formal supervisor on the project background is reported. Doctoral Researchers, complain repeatedly to not obtain any supervision, advice and support at all form their supervisor(s). Few Doctoral

Researchers confess the communication problems with the supervisor are based on their own behaviour and for some cases, participants reported their supervision improved after problems were communicated and action was taken.

- Most Doctoral Researchers have a written agreement for their doctoral research project
- Most Doctoral Researchers are satisfied with their project supervision
- It was suggested supervision could be improved mainly by including experts in their research group, and by increasing scientific discussion and encouragement from the supervisor(s)

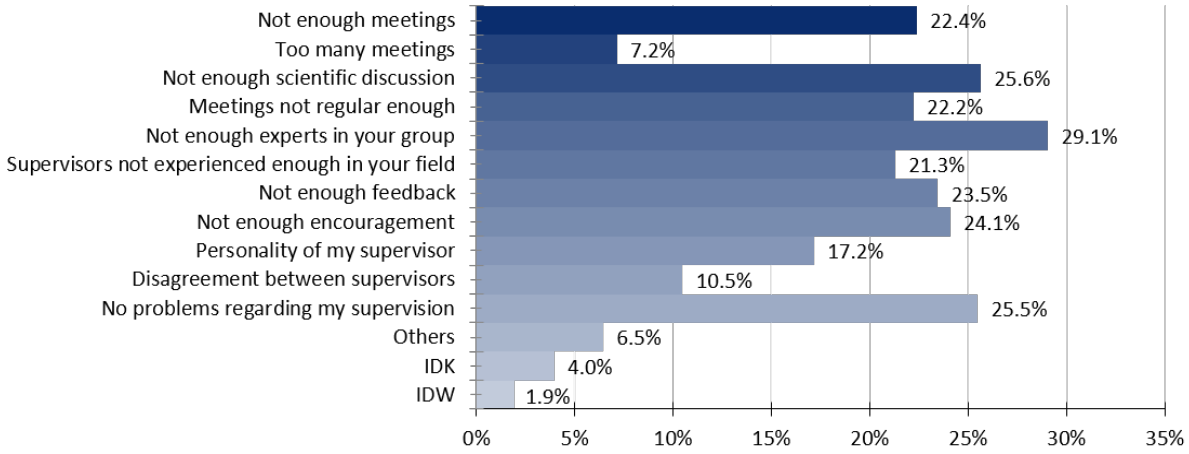


Figure 22: Participants were asked "Did you ever encounter problems regarding your supervision?" - multiple answers possible. Relative percentages of answer possibilities are given, with IDK = I don't know, IDW = I don't want to answer.

2.5 Graduate Schools

Graduate schools are programs that coordinate and support Doctoral Researchers. Apart from offering specific lectures and seminars, they may provide interdisciplinary transferable skill courses and if necessary financial support for research stay abroad and international conferences.

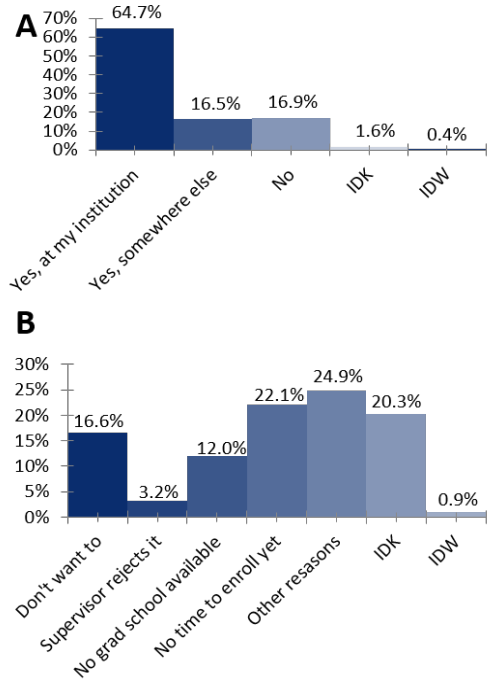


Figure 23: (A) Doctoral Researchers were asked "Are you currently registered in a graduate school?", IDK = I don't know, IDW = I don't want to answer. Answers are plotted as percentages by answer option. **(B)** "Why are you not enrolled in a graduate school?"- answers are displayed as percentages by answer option IDW = I don't want to answer, IDK = I don't know.

81.2% of the Doctoral Researchers are registered in a graduate school. 64.7% of the Doctoral Researchers are registered in a graduate school at their own institution and 16.5% are subscribed in graduate schools elsewhere. Only 16.9% of the Doctoral Researchers are not registered in any graduate school (**Figure 23A**). Furthermore, when Doctoral Researchers were asked regarding their expectations to profit from their enrolment for their personal and career development, most replied positively (74.4%). Only 14.6% Doctoral Researchers mentioned not expecting to profit from their enrolment in a graduate program (**Figure 24A**). Doctoral Researchers were asked about their reasons for not enrolling in a graduate school or structured graduate program. 16.6% simply do not want to enrol in a graduate school, while 3.2% say that their supervisor does not support it. 12.0% have no graduate school available and 22.1% state that they had no time to enrol yet (**Figure 23B**).

The Doctoral Researchers, who are not enrolled, were asked to rate the expected benefit from enrolment in a graduate school. This 'group' includes those who do not want to enrol, those who are 'not allowed' and those who had not time yet. 44.7% selected the answer option "I don't know". 35.0% thought to benefit and only roughly 18.9% do not think to profit from a graduate school enrolment (**Figure 24B**).

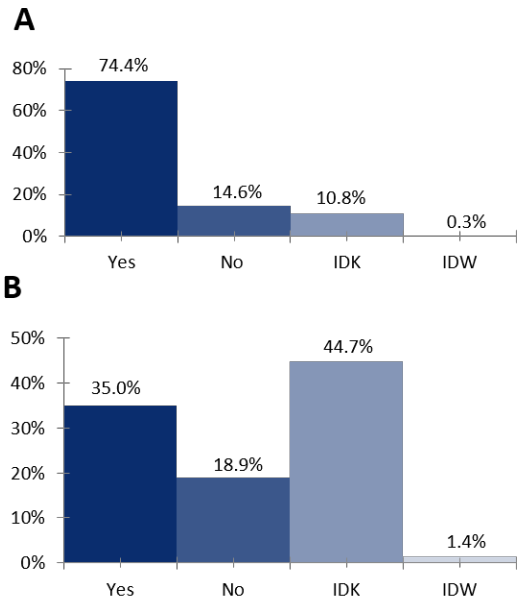


Figure 24: (**A)** Participants were asked "Do you think you profit from enrolment in your graduate school?" with IDK = I don't know, IDW = I don't want to answer. Relative fractions plotted by answer option. **(B)** "Do you think you would profit from enrolment in a graduate school?" answers are displayed as percentages by answer option - IDW = I don't want to answer, IDK = I don't know.

The Doctoral Researchers state to receive support on various issues from their graduate school or centre. Financial support is granted for a whole range of requests, such as conferences/travel (71.3%), equipment (19.4%), publication (23.3%) as well as PhD organized events (46.1%), to mention a few of the supported events by graduate schools. Methods courses are offered for 66.3% of Doctoral Researchers by their graduate schools. 11.3% of Doctoral Researchers do not know the specific support or courses offered by their structured graduate program. 5.6% of Doctoral Researchers mention other offers, which included training, seminars, workshops on soft skills and career planning, social and networking meetings, summer schools, retreats, language and sport activities (**Figure 25**).

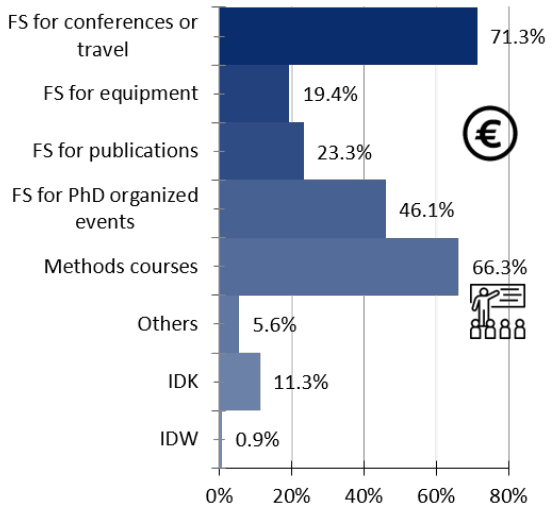


Figure 25: "Which of the listed items are offered to you either by your centre or graduate school? (multiple answers possible)" - answers are displayed as percentages by answer option - FS = Financial Support, IDW = I don't want to answer, IDK = I don't know.

Problems with graduate schools are mostly connected to the offered courses, regarding quantity, quality and location. In addition, participants often mentioned a tremendous lack of sufficient financial support for the graduate schools by their Centre. Some participants reported insufficient support for problems of international Doctoral Researchers or for on problems with supervision. Problems with graduate school infrastructure included e.g. inadequate amount of personnel and organization of the graduate programme by the centre. Some Doctoral Researchers are associated with more than one graduate school, yielding problems on feasibility and approval between the different programs to the disadvantage of the Doctoral Researchers.

- Most Doctoral Researchers are enrolled in a graduate school, either at their own institution or somewhere else, and take profit from the different offers
- Improvements to the graduate schools were suggested, regarding an increasingly continuous budget for the graduate schools, more financial support for conferences and travels, as well as an increased offers of method courses and soft skill courses.

2.6 Integration

Doctoral Researchers were inquired in this section on their opinion on the integration at their respective Helmholtz Centres in terms of language barriers, social integration and support with administrative tasks as well as in everyday life. Integration of Doctoral Researchers at their centre remains key to a successful doctoral research time within Helmholtz. This holds especially true for international Doctoral Researchers who not only face the challenges of their doctoral research project but also adapting to a new culture, unfamiliar administrative hurdles, and finally feeling accepted and welcome at their centre.

39.1% of the Doctoral Researchers receive support in enrolling at university, 38.6% in applying to a graduate school. 14.6% and 15.9% state to receive help in finding an accommodation or with the registration at their local resident registration office (**Figure 26**).

At the same time, 27.9% said they did not receive support for the mentioned items. Overall, Doctoral Researchers need more support with their university enrolment (22.8%), finding an accommodation (20.7%), or the translation of the working contract and relevant documents (10.2%). In general, percentages indicating that Doctoral Researchers receive support are higher than those that state to have needed more support.

Language can be a first, big barrier in terms of integration, when Doctoral Researchers move to a new location for their doctoral research project. Of the non-German Doctoral Researchers, 15.2% stated to speak no German at all. The majority speaks German at beginner (41.4%) or intermediate level (28.2%), while 9.7% and 5.2% are fluent or native German speakers, respectively (**Figure 27A**). These diverse German levels are also reflected in the answers on whether language is an obstacle for communicating with people at their centre. 5.7% Doctoral Researchers state to find it very problematic, while 39.7% find it "to some extent" an obstacle at their centre.

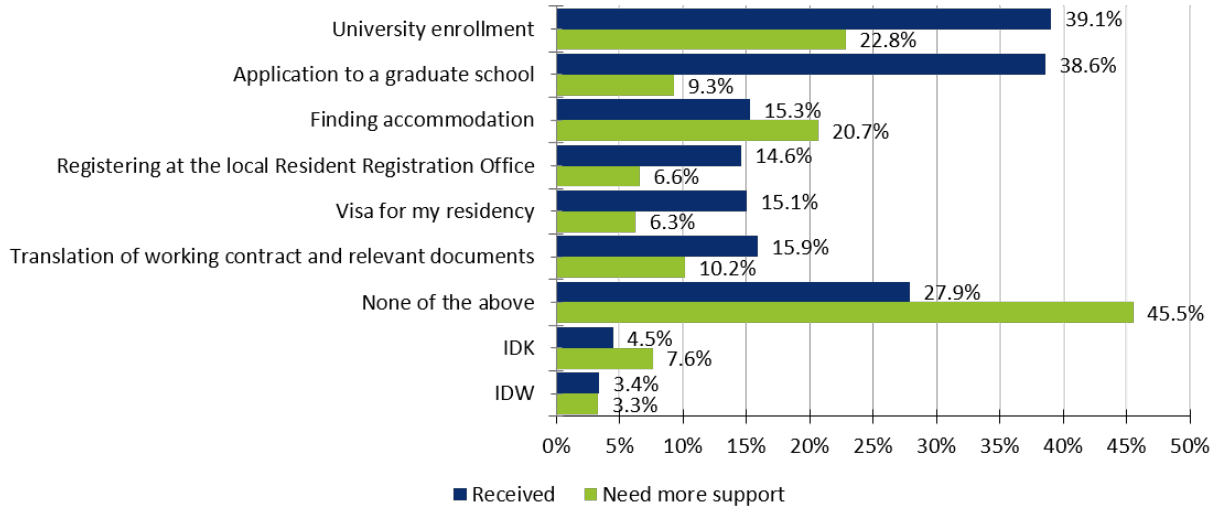


Figure 26: "For which of the following aspects did you receive support from your institute and for which of the following aspects would you have needed more support from your institute (multiple answers possible)?" Explanation of 'support' was given as: You may have received support to fulfill different administrative tasks and to give you guidance in the process. This support may have been in the form of an information document, personal e-mail or oral correspondence and has been given to you directly or at least upon request.

Only 54.3% state that there is no obstacle at all for communication at their centre (**Figure 27B**). Just 37.9% of the Doctoral Researchers find all the important information (contract, stipend, group-related and administrative information) in an understandable language. For 59.5% "some of the information" is available in an understandable language. In 1.3% of the cases none of the important information is available in a generally understandable language (**Figure 27C**). Lastly, 54.5% of Doctoral Researchers take no German classes and 44.0% engage in learning German either within or outside of their centre (**Figure 27D**, referring only to non-Germans).

Besides the language barrier, social integration into a group of peers remains highly important. In sum, almost 80% of the Doctoral Researchers state that regular social activities take place in their group or at their centre. The majority of the Doctoral Researchers attend these social activities, while 6.0% attend them always, 23.8% attend them often and 30.2% attend them sometimes. At the same time, 14.7% attend these activities rarely and 4.7% do not attend at all.

Despite the overall positive response on the attendance of social gatherings, still 15.7% report no social activities take place in their group or at their Centres (**Figure 28**).

Doctoral Researchers allude in the optional free text answers to receive support from their Centre concerning child care, finding accommodation and regarding administrative tasks (travel forms, stipend applications, staying abroad). Some mention they neither requested nor needed support and for some there was no support at all from the Centre.

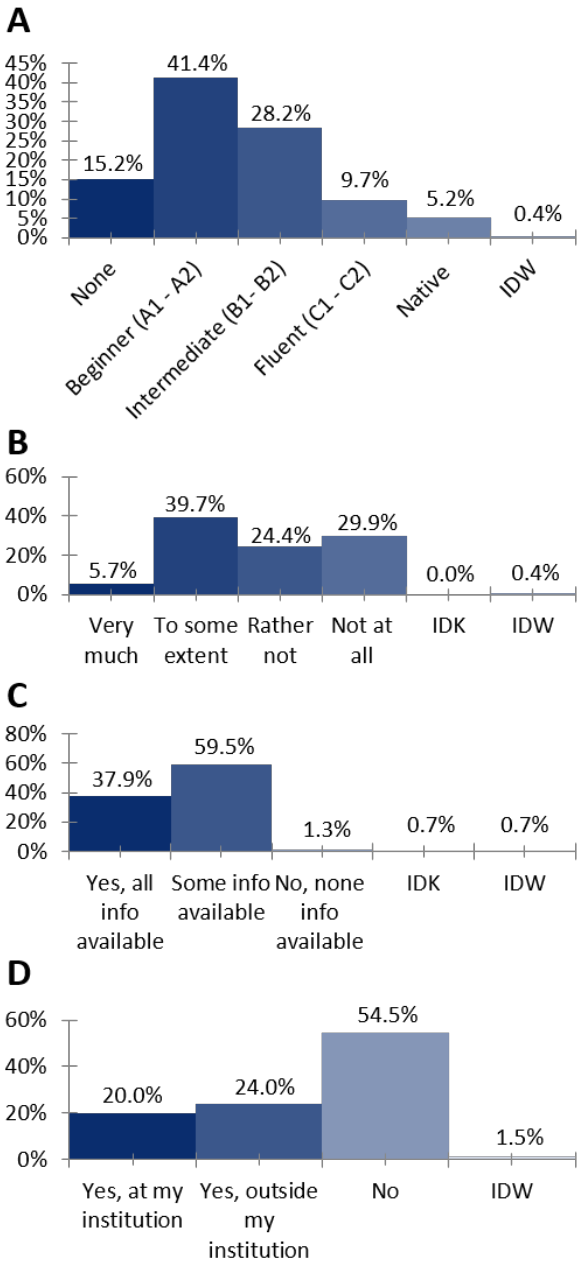


Figure 27: Data for the survey question regarding language problems and language courses. (clockwise from top left); **(A)** "Do you speak German? (filtered for Non-Germans)", **(B)** "Is language an obstacle for communication with people at your centre?", **(C)** "Is all the important information (group internal, administrative, your contract/stipend) available in a language you understand?", **(D)** "Are you currently taking German language classes?" relative outcomes are displayed by answer option. IDW - I don't want to answer, IDK = I don't know.

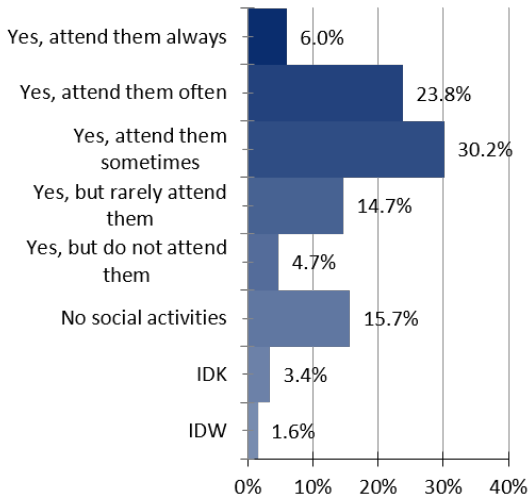


Figure 28: "Are there regular social activities in your group or at your institution (e.g. sports events, going out for dinner/drinks, discussion forums, movie nights etc.)?", relative outcomes are displayed by answer option, IDK = I don't know, IDW = I don't want to answer.

All in all, Doctoral Researchers would appreciate additional support from their Centre mainly concerning the following:

- Administrative tasks
- Travel arrangements
- Insurance
- University enrolment
- Funding and scholarship
- Thesis submission

Those facing problems with integration reported the language barrier especially from administration units (emails only being in German, information distributed only in German) as a huge issue and mentally challenging. Problematic situations occur regarding German classes (time of the day and total number) and social activities, being either too far away, rarely organized or unattractive regarding their topic or content.

2.7 Career development

The doctoral research project time is highly important for developing scientific and personal skills that go beyond the specific project requirements. This personal growth shall be based on personal engagement and milestones during the project time but can also be fostered significantly by career development measures offered by the individual centres. Part of the thesis is to generate scientific output and to develop and enhance transferable skills. The overall currency in science is the number of publications. The possible publication types from Doctoral Researchers vary from first author and co-author peer reviewed journal publications to other publications, and scientific presentations, talks, and posters at their own institute, centres or conferences.

The number of required publications by the Centre or university varies between 0 and 5. 20.4% of Doctoral Researchers do not know if they need a first author publication and 35.7% do not know if they require a co-author publication for finishing their thesis. For other publication types, most of the Doctoral Researchers are either not specifically required to have e.g. a co-author publication etc.

At the time of the survey, several scientific outputs have been delivered already, especially poster presentations (60.5%) and scientific talks (43.7%) at international conferences and also articles published in peer-reviewed journals (31.3%). 25.1% answer to have not published any output yet (**Figure 29B**). In the free text answer section, Doctoral Researchers emphasize that they already delivered contributions at conferences or other scientific meetings such as talks, posters, conference abstracts and further submitted or published software, tools, models or methods, reviews or other publications.

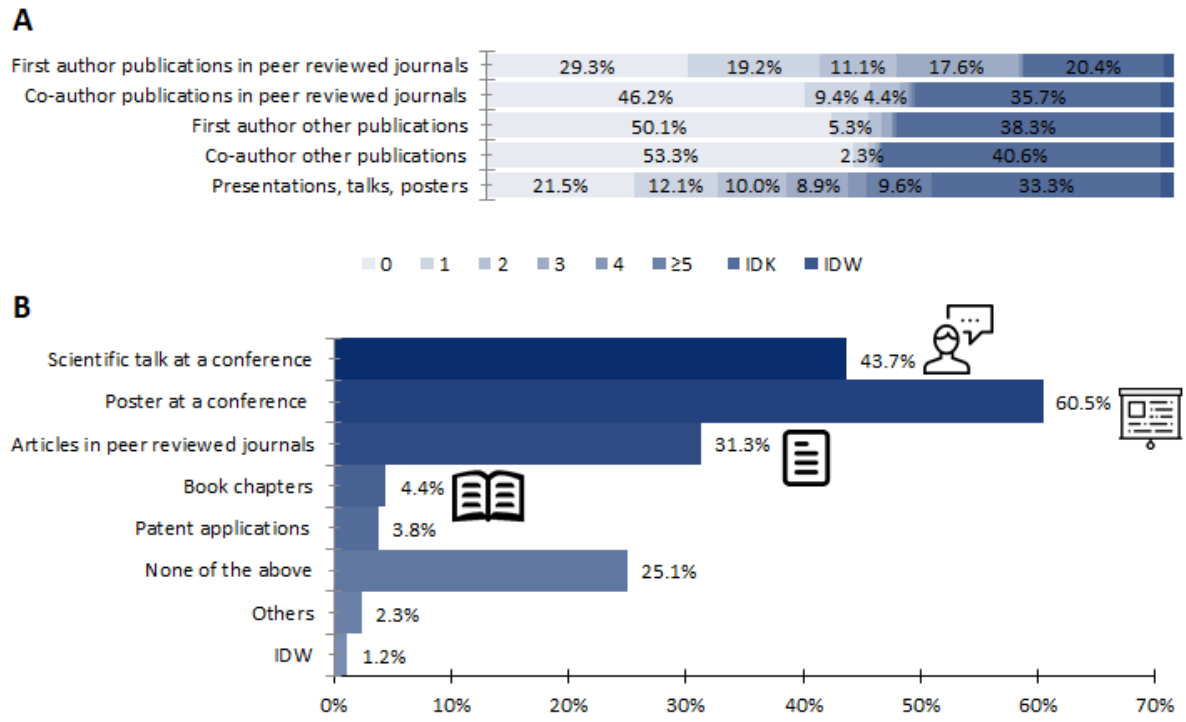


Figure 29: (A) "Please specify the number and kind of publications your institute/university requires you to obtain your PhD." - IDW = I don't want to answer, IDK = I don't know. **(B)** "Which of the following types of scientific output have you published so far during your doctoral research (multiple answers possible)?" - IDW = I don't want to answer.

Some Doctoral Researchers have co-authorships or have publications unrelated to their thesis topic. Another beneficial personal and scientific development step is to do a research stay abroad, to perform research tasks at another Centre for a period from a few weeks to several months.

18.2% Doctoral Researchers do a research stay abroad. The remaining Doctoral Researchers do not conduct a research stay abroad. However, 56.5% state that their Centre supports a research stay, opposed to 16.3% that state their centre does not support such a stay (**Figure 30**).

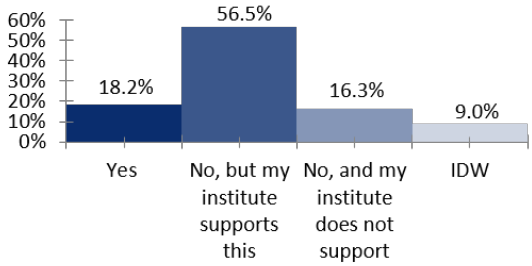


Figure 30: "Have you ever been on a research stay abroad?" -relative answers are displayed by answer option, IDW = I don't want to answer.

When thinking about their future work environment, most Doctoral Researchers state to work in non-academic scientific research, in academia, and in science related topics, either in the public or private sector.

The less popular options were further education and starting their own business (**Figure 31**). 57.8% and 50.3% state they find it to work in non-academic scientific research (NASR-72.1%) and academia (52.1%) after finishing their doctoral research project respectively, in a science-related job in the private sector (PrSSJ-32.2%) or in the public sector (PSSJ-27.4%). 24.2% of the participants think they will work in a non-scientific job and 11% think they will take an extended break (**Figure 32A**). In the optional free text section, Doctoral Researchers further specify that they see themselves working also in the medicine / pharma sector, industry, science communication / graphic design, federal / public institutes, as high-school teachers or in a start-up. Location-wise, the Doctoral Researchers would mostly like to work in Germany or Europe in the future, with 38.3% and 36.8%, respectively. 7.3% would like to work outside of Europe and 16.8% do not know yet (**Figure 32B**). Part of the centres, task is to offer further career development measures ranging from method-oriented courses, soft skill courses to language classes, as stated in the Helmholtz Doctoral Guidelines.

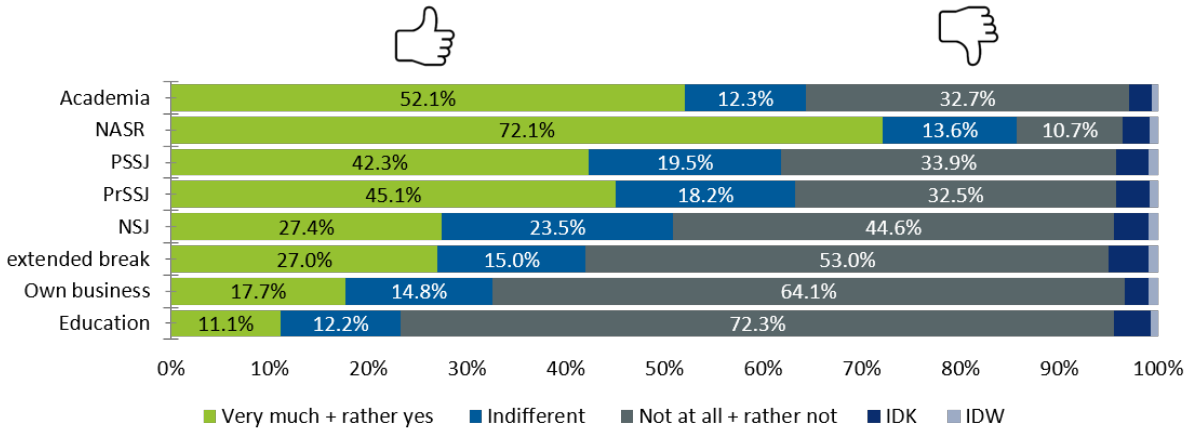


Figure 31: "How much would you like to work in the following fields after completing your PhD?" - NASR = Non-academic scientific research, PSSJ = Public sector science-related job, PrSSJ = Private sector science-related job, NSJ = Non-scientific job, IDK = I don't know, IDW = I don't want to say.

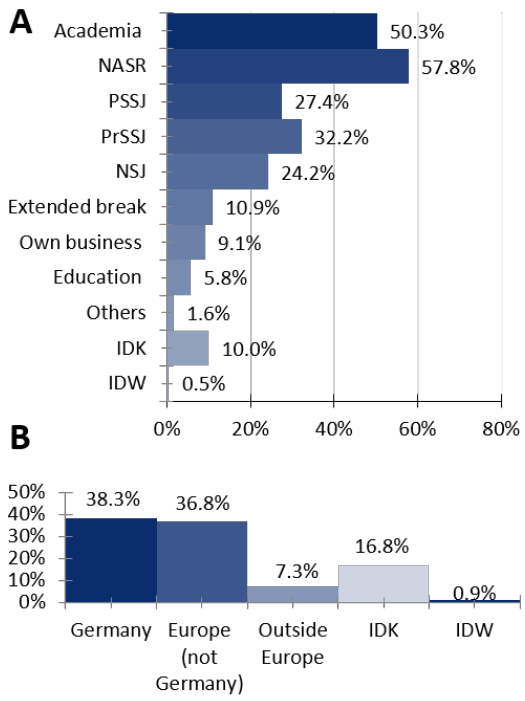


Figure 32: **(A)** "Which field do you think you will work in after your PhD (multiple answers possible)?" - IDW = I don't want to answer.

(B) "Where would you like to work after you complete your doctoral degree (multiple answers possible)?"- NASR = Non-academic scientific research, PSSJ = Public sector science-related job, PrSSJ = Private sector science-related job, NSJ = Non-scientific job IDK = I don't know, IDW = I don't want to answer.

The Doctoral Researchers state that their centres mainly offer career development support related to soft skills, practical courses, mobility period and language classes (**Figure 33A**). In particular, "learning German" is supported by centres via German courses (45.4%, **Figure 33B**). Fewer Doctoral Researchers select that their centre offers financial support for courses and allows the attendance during working hours.

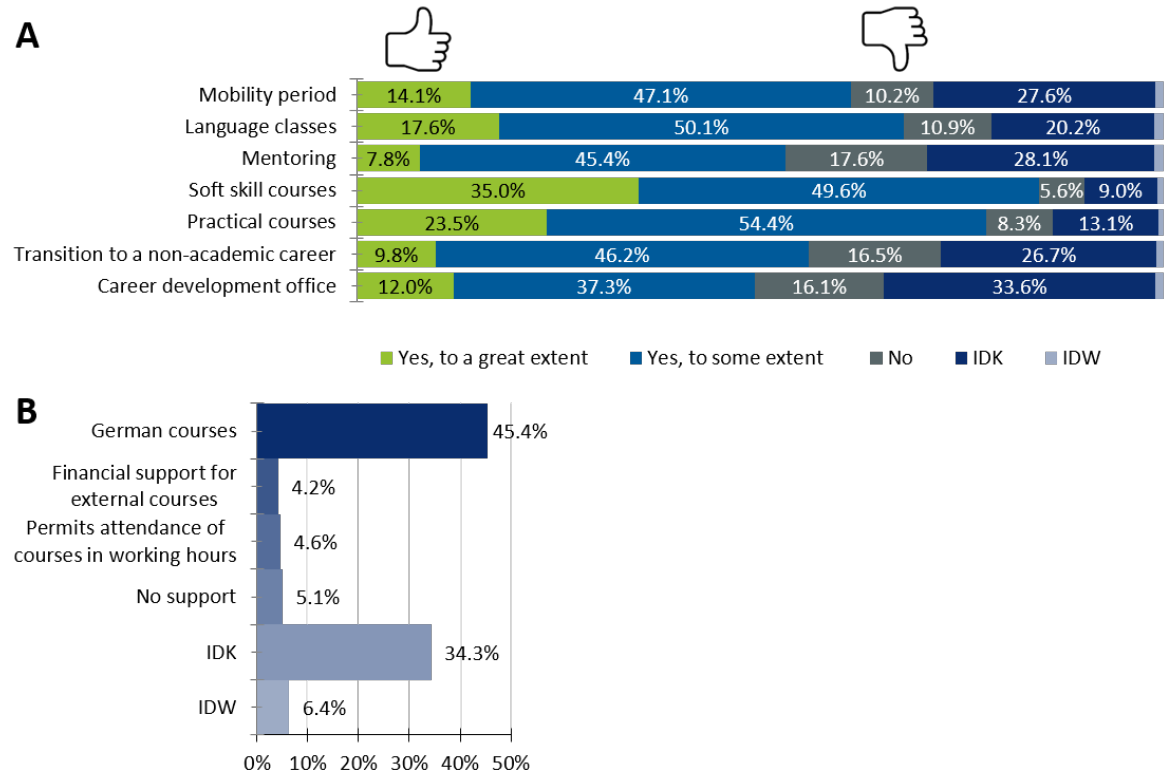


Figure 33: (A) "Which of the following measures for your career development are supported by your Centre?", **(B)** "How does your institute support you in learning German? (multiple answers possible)" - IDK = I don't know, IDW = I don't want to answer.

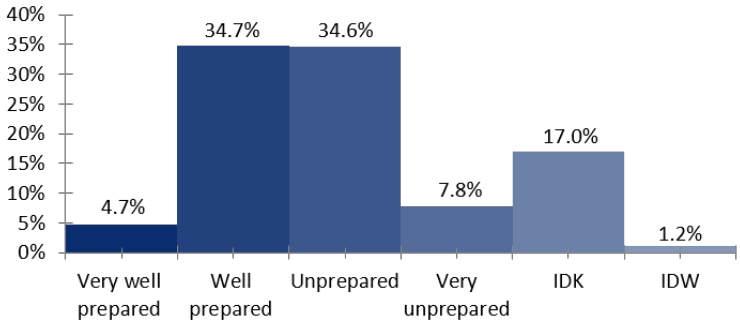


Figure 34: "Do you think that you are well trained for a job outside science?" - IDK = I don't know, IDW = I don't want to answer.

The Doctoral Researchers feel divided whether they are prepared to work outside of science. 39.5% stated to feel very well or well prepared, contrary to that 42.4% felt very unprepared or unprepared to work outside of science (**Figure 34**).

Ultimately, Doctoral Researchers specify in the free text answers that they are facing low quality German courses, unclear regulations about the number of publications required for their doctoral degree, supervisors are discouraging on career development, lacking preparation for work outside of academia by their Centres and working conditions in academia that are discouraging to pursue an academic career. Interestingly, Centres in Helmholtz with clear regulations about the number of publications and better support in career development are noticed by Doctoral Researchers from other Centres. Some suggest courses on career development, such as courses for computational researchers, regular alumni talk, project management, leadership and grant application workshops.

- Doctoral Researchers at Helmholtz generally have clarity regarding the scientific output that is expected as part of their doctoral research project
- Most Doctoral Researchers would like to continue in science-related fields, either in or outside academia, preferably in Europe
- Heterogeneous opinion regarding the feeling of readiness of Doctoral Researchers for a non-scientific job

2.8 Family

In this section, we ask questions related to family life while conducting the doctoral research project. We are interested in whether the Doctoral Researchers have children and how families are supported by their Centre in terms of childcare, organizational and financial aspects.

For many Doctoral Researchers, the timing of their doctoral project coincides with the chapter of their life to start a family. Both, a thesis and a family, are time consuming endeavours and therefore they could possibly clash with one another. The survey results support this. 89.0% of the participants have no children and merely 8.7% have or currently expect children (**Figure 35A**). This is a small increase compared to previous HeJu surveys: In 2017 about 7% [3] and in 2014 about 7.2% [4] of the HeJu survey participants were parents.

Making a decision on whether to have a family during one's doctoral research time can be supported by the availability of childcare services, which helps to reconcile a family life with the scientific work. However, 61.4% state that they do not know whether their centre offers childcare services. Other survey participants state that their centre offers access to day-care (21.7%), the possibility of home office or mobile work (20.2%), a general parent-friendly work environment (11.8%), or child-friendly work environment (5%). In contrast to that, 46.5% would use access to day-care if their centre offered it. Furthermore, 42.0% say they would use reimbursements for day-care during business travel, 35.2% use financial support for day-care, 26.3% want a parent-friendly work environment, 21.5% a child-friendly work environment (**Figure 36A**).

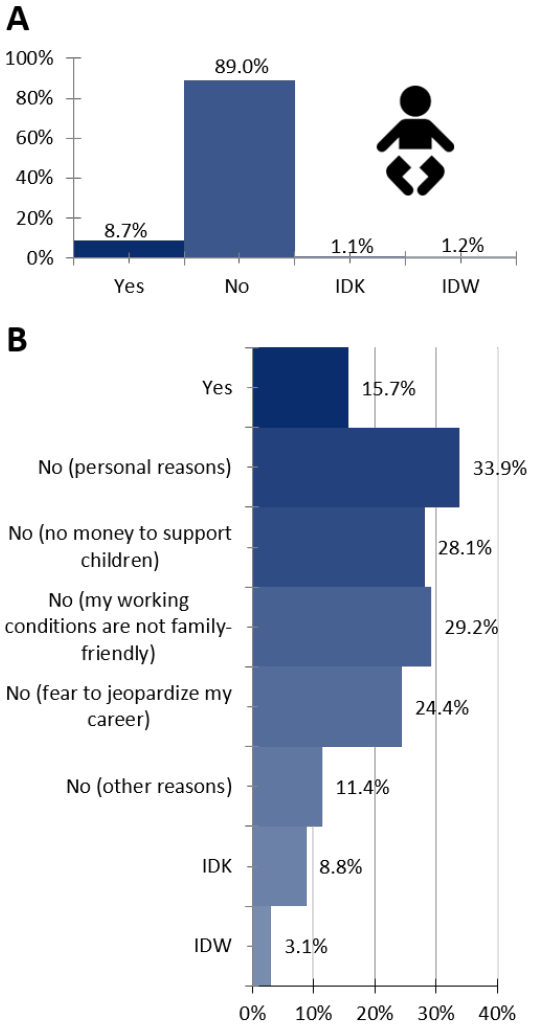


Figure 35: (A) "Do you have or are you currently expecting children?" **(B)** "Would you consider having (more) children during your doctoral research project (multiple answers possible)?" relative percentages are shown by answer group - IDK = I don't know, IDW = I don't want to answer.

The previous answers are also emphasized by the free text answers for this section. Doctoral Researchers underline that they would use childcare or other support, such as financial support, assistance, advice and family-friendly working conditions by their centres. At the same time, 36.1% say they would not use any of the mentioned childcare services even if they are offered by their Centre.

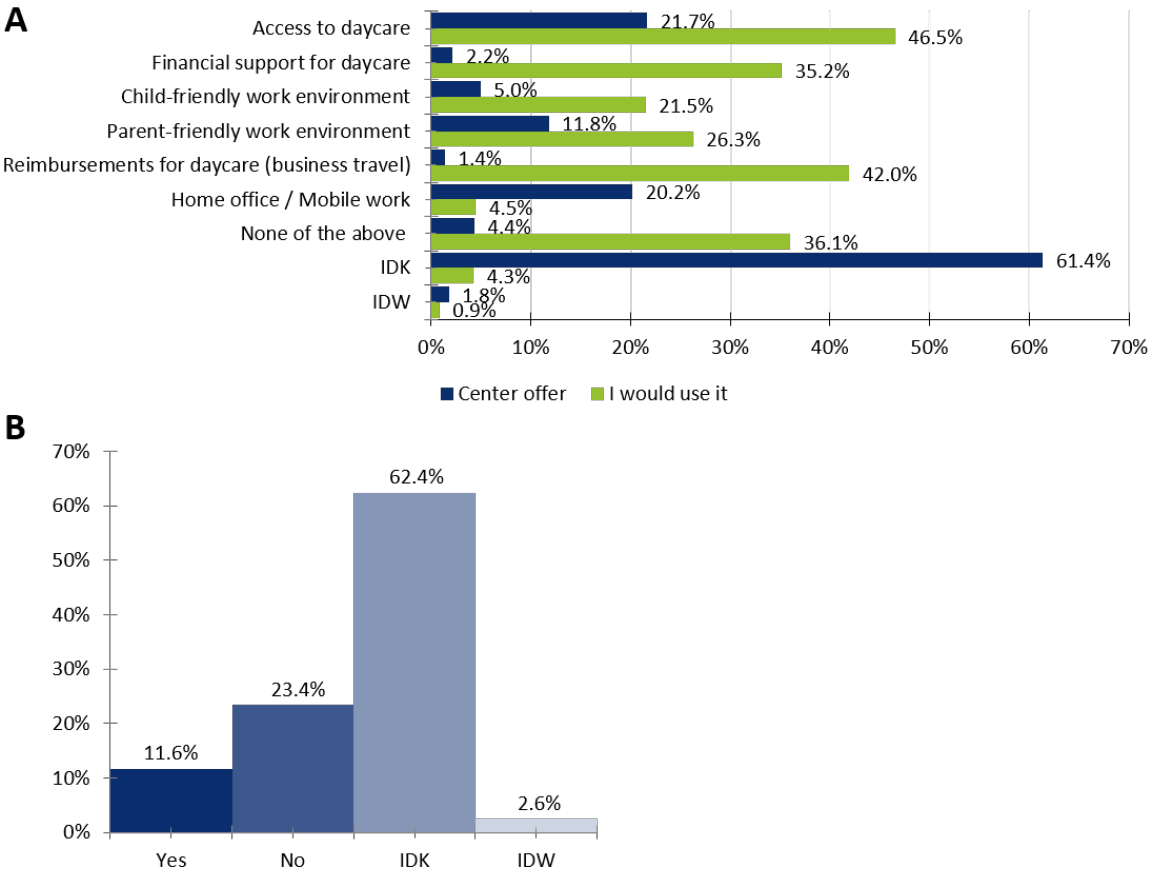


Figure 36: (A) "Does your institute offer support in childcare services (multiple answers possible)?" (blue bar); "If your Centre offers childcare support do/would you use it (multiple answers possible)?" (green bar). **(B)** "Do you feel that there is sufficient support (financial and organizational) from your institute for raising a child?" - relative answers shown by answer possibility or grouped. IDK = I don't know, IDW = I don't want to answer.

Overall, 11.6% of the Doctoral Researchers say that they feel sufficiently supported financially and organizationally by their centre for raising children (**Figure 36B**). 23.4% see this differently and say that they do not feel supported sufficiently. At the same time, 62.4% say that they do not know whether they feel supported sufficiently.

In the free text answers, Doctoral Researchers explain the reasons for not having children. In particular, because of their project, bad attitude by colleagues or supervisors towards children, limited information on family support, administrative difficulties, temporary contracts and unclear funding, too-short day-care offerings, not enough places, no financial child support, no childcare offered or cancelled child support.

Some hope for better working conditions at later career stages and suggest ideas for better working conditions for better family support (home office, indefinite contracts, flexible working hours). Only very few Doctoral Researchers mention their positive experiences while having children during their thesis.

- Majority of Doctoral Researchers do not consider their doctoral research project to be compatible with family life.
- Working conditions, such as fear to jeopardize their career, not enough income, and non-compatibility of both
- Doctoral Researchers are not aware of the options offered by their centres to support family life.

2.9 Power abuse

The young Doctoral Researcher Tao Chongyuan, ended his life with a fatal leap from the sixth floor of his dormitory at the Wuhan University of Technology (WUT). As reported by the international press reported in 2018, this event was preceded by yearlong confrontations with his supervisor, full of power abuse and constraint. Similar incidents all over the scientific community gain more of their deserved attention, including the situations at German research Centres (e.g. settlement of a patent dispute between doctoral candidates and their group leader, or repeated cases of sexual harassment).

Hierarchical structures in academia can promote situations of Power abuse by a superior [5, 6, 7]. Superiors in a working context hold a power position over the people they have authority on, for example influencing the success of the academic career or prolongation of working contracts. Abuse of power describes the behaviour of a superior using their power to the disadvantage of the inferior (N² Power Abuse Position Paper [8]).

This section is meant to estimate the status of conflicts Doctoral Researchers experience during their thesis, mechanisms for conflict resolution at their centre and the satisfaction with the resolution of these conflicts.

In addition to relative percentage we show absolute numbers as each case poses a source of concern. In particular, power abuse can include bullying and/or sexualized harassment:

- **Bullying** here denotes repeated and persistent negative behaviour directed towards one or several individuals, which creates a hostile work environment, including gender, cultural or religious discrimination.
- **Sexualized harassment** by a superior includes e.g. sexist remarks, different treatment because of gender (etc.), as well as unwanted attempts regarding a romantic/sexual relationship, touching, different treatment for refusing to engage in a such romantic/sexual relationships or implication of career advantages as a consequence of a romantic / sexual relationship.

In case of a conflict, it is important to know the support mechanism each Helmholtz Centre offers. **Figure 37** shows that the most important conflict resolution instances are the PhD representatives (69.6%) and the centre ombudsperson (49.3%). Other important institutions are the Centres' work council (26.3%), the Centres' equal opportunity office (22.9%), medical services and counselling (19.8%) and the sections' ombudsperson (11.2%).

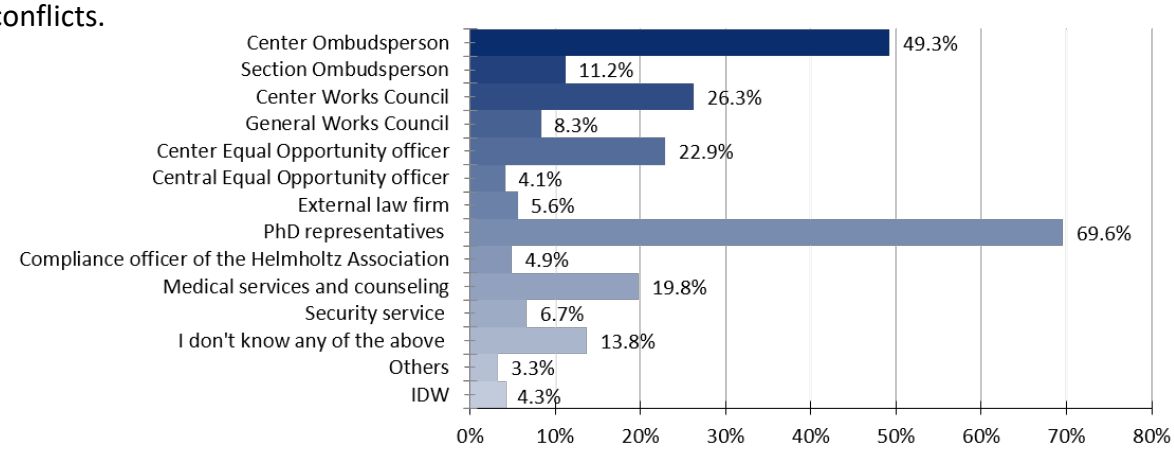


Figure 37: Participants were asked "Which of the following mechanisms are you aware of that can help you in case of a conflict with a superior?" relative answers are shown by answer option - IDW = I don't want to answer and IDK = I don't know.

Institutions for conflict resolution with less than 10% of answers are the general works' council (8.3%), security services (6.7%), external law firms (5.6%), the compliance officer of Helmholtz (4.9%) and the central equal opportunity officer (4.1%). A minor fraction of Doctoral Researchers (3.3%) stated in the free text option, in case of a conflict with a superior, they would contact mainly the graduate school, also as support in conflict resolutions in general. Doctoral Researchers further mention the doctoral research officer, external mentors, their group leader, colleagues, TAC members, working council or the psychological support at the centre. The results indicate that centralized and external institutions play a minor role in conflict resolution.

Figure 38A shows that the majority, more than 80.3% (=1043 cases) of Doctoral Researchers have never experienced a serious conflict with a superior. 11.3% (=145 cases) of the Doctoral Researchers had a conflict, but did not report it. A minor fraction of 5.1% (=65 cases) of the Doctoral Researchers experience a conflict and reported it to one of the institutions named above.

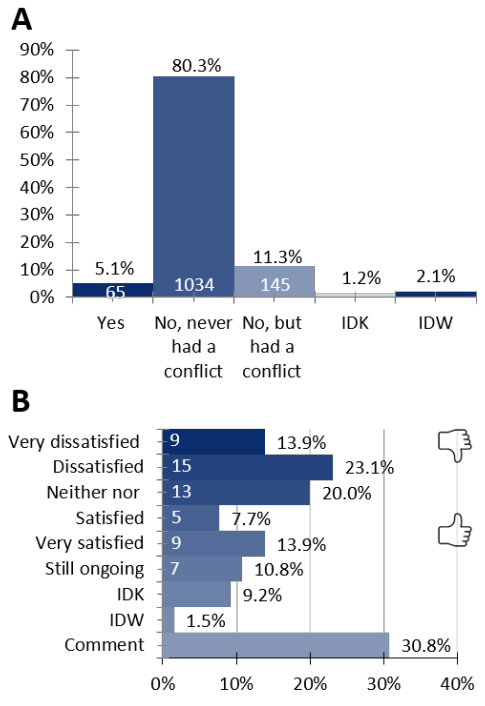


Figure 38: The report of a conflict is shown in **(A)** "Did you ever report a conflict with a superior to one of the institutions above?" and details on the consequences of the report are shown in **(B)** "Please indicate the level of satisfaction with the consequences of your report." - IDW = I don't want to answer and IDK = I don't know, white numbers indicate absolute numbers of cases.

For those Doctoral Researchers (**Figure 38A**, 65 cases) who reported their conflict to one of the above conflict resolution institutions, the satisfaction with the report was low overall (**Figure 38B**). The majority of the Doctoral Researchers are dissatisfied or very dissatisfied (13.9% = 9 cases "very dissatisfied", 23.1% = 15 cases "dissatisfied") with the consequences of their conflict report. 20% (= 13 cases) of the Doctoral Researchers are neither satisfied nor dissatisfied with the consequences of their conflict report. 13.9% (= 9 cases) of the Doctoral Researchers are satisfied and 7.7% (= 5 cases) are very satisfied with the resolution of their conflict. For 10.8% (= 7 cases) the process of conflict resolution is still ongoing.

In the free text answers, Doctoral Researchers report they either witnessed or experienced cases of power abuse, including cases on racism and sexualized harassment. Some Doctoral Researchers state to not have reported their case because they were fearing the dependency on their superiors, possibly failing their thesis as a consequence, which was also reported in a survey conducted by Nature 2019 on this topic [9].

For other Doctoral Researchers, the reporting of their cases showed no effect and did not change the situation because the helping institution (ombudsperson /mediator/works council) was powerless. Few Doctoral Researchers experienced a positive change of the situation after reporting or they managed to solve the problems alone.

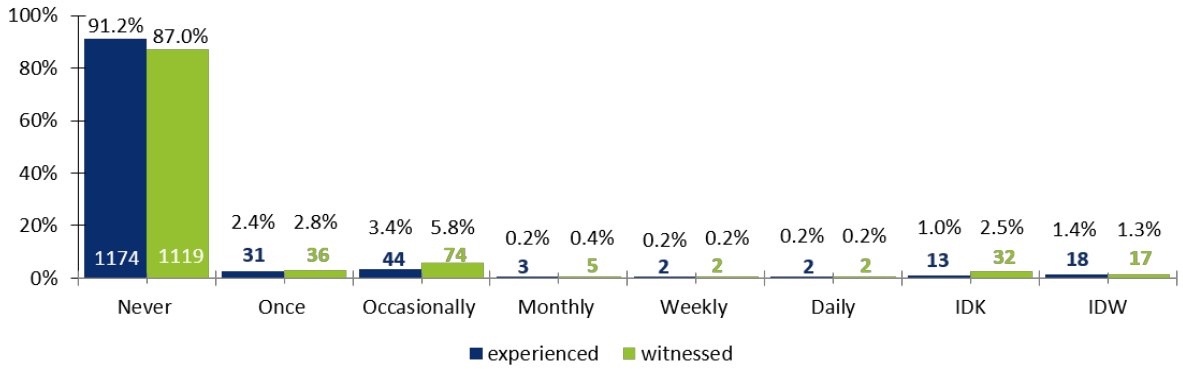


Figure 39: Results are shown in blue for Doctoral Researchers that experienced "sexual harassment" "While working at your Centre, have you at any point experienced unwanted behavior that you would call 'sexualized harassment' from a superior?" and in green for Doctoral Researchers that witnessed "sexual harassment "While working at your Centre, have you at any point witnessed any unwanted behavior towards a colleague that you would call 'sexualized harassment' from a superior?" - IDW = I don't want to answer and IDK = I don't know, white and colored numbers indicate absolute numbers of cases.

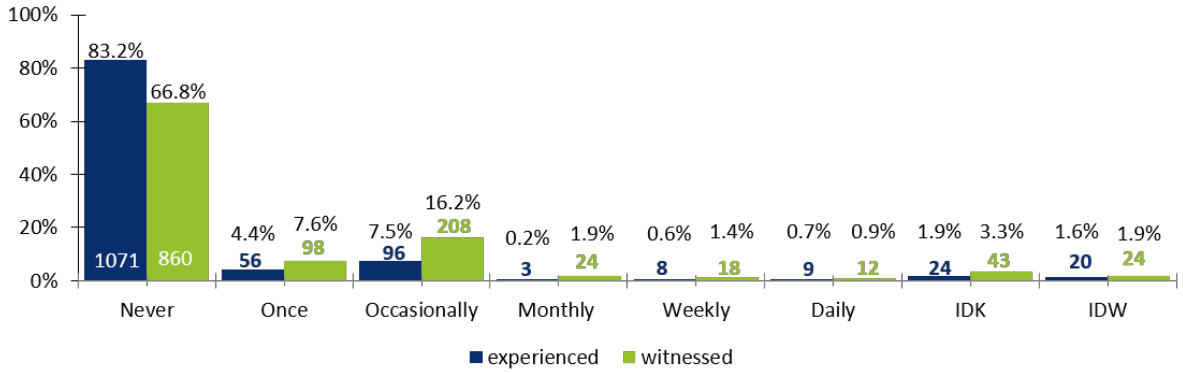


Figure 40: Results are shown in blue for Doctoral Researchers that experienced "bullying" "While working at your Centre, have you at any point been subjected to bullying by a superior?" and in green for Doctoral Researchers that witnessed "bullying" "While working at your Centre, have you at any point witnessed bullying by a superior?" - IDW = I don't want to answer and IDK = I don't know, white and colored numbers

The majority of the Doctoral Researchers, with 91.2% (= 1174 cases), never experienced sexualized harassment from a superior (**Figure 39**). Others experience it once (2.4% = 31 cases) or occasionally (3.4% = 44 cases). Less than 1% of the Doctoral Researchers experience sexualized harassment monthly (0.2 = 3 cases), weekly (0.2% = 2 cases) or daily (0.2% = 2 cases). Figure 39 shows that 87.0% (= 1119 cases) of the Doctoral Researchers never witness sexualized harassment. Others witness it once (2.8% = 36 cases) or occasionally (5.8% = 74 cases). Less than 1% of the Doctoral Researchers witnesses sexualized harassment monthly (0.4% = 5 cases), weekly (0.2% = 2 cases) or daily (0.2% = 2 cases).

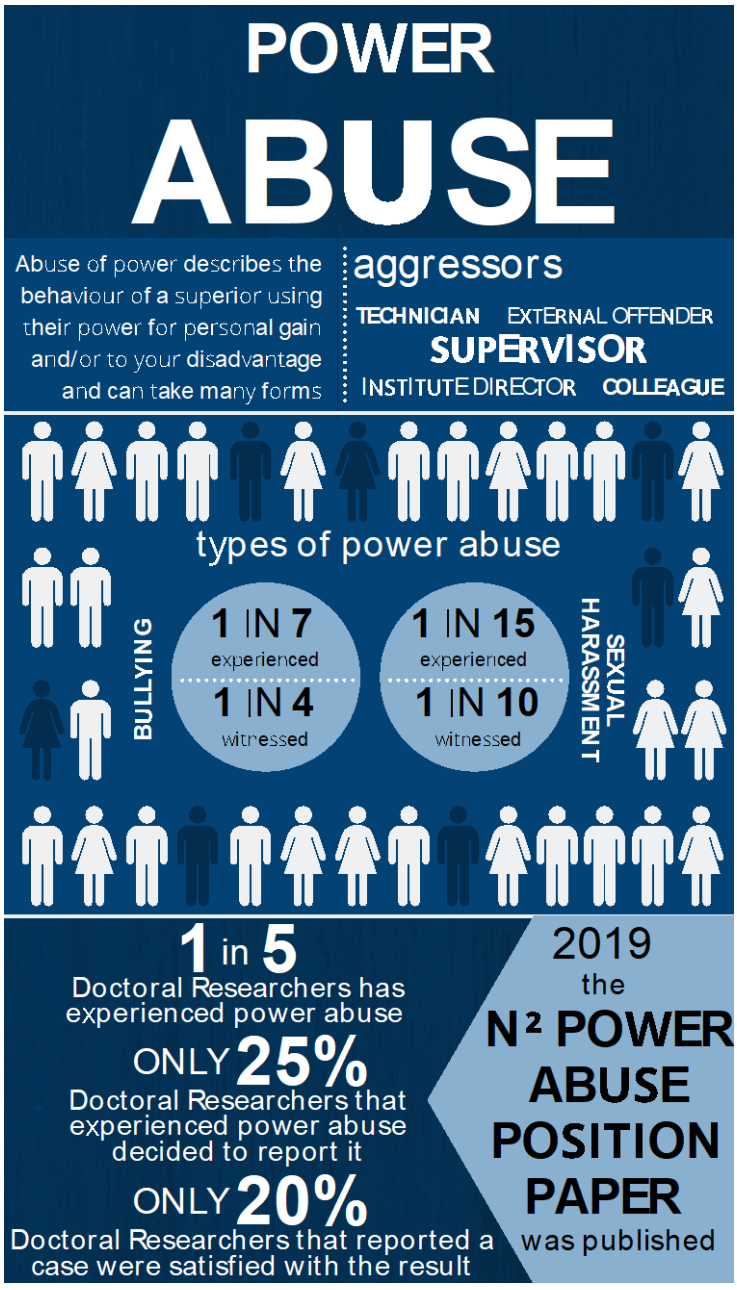
The majority of the Doctoral Researchers, with 83.2% (= 1071 cases), never experienced bullying from a superior (**Figure 40**). Others experience it once (4.4% = 56 cases) or occasionally (7.5% = 96 cases). Less than 1% of the Doctoral Researchers experiences bullying monthly (0.2% = 3 cases), weekly (0.6% = 8 cases) or daily (0.7% = 9 cases). **Figure 40** shows that 66.8% (= 860 participants) of the Doctoral Researchers never witnessed bullying from a superior. Others witnessed it once (7.6% = 98 cases) or occasionally (16.2% = 208 cases). A minor fraction of the Doctoral Researchers witnessed bullying from a superior monthly (1.9% = 24 cases), weekly (1.4% = 18 cases) or daily (0.9% = 12 cases).

In the free text answers, Doctoral Researchers report on several witnessed or self-experienced cases of power abuse where offenders are supervisors or colleagues, external offenders, technicians or the institute director. Some Doctoral Researchers emphasize that the abusive behaviour specifically included sexualized harassment against men, while the correlation data does not show major difference in answers from both genders. As a consequence of power abuse a few Doctoral Researchers quit their doctoral research position

In total, 256 cases of Doctoral Researchers that experienced power abuse (bullying or sexualized harassment) are recorded in this survey. However, the situation is not unique to Helmholtz as shown by popular cases reported from Helmholtz [10, 11] but also from MPI Munich [12] and ETH Zurich [13]. Similar cases are reported also for other research institutions worldwide in a study conducted by Nature with 6300 early-career scientists published in 2019 [14, 15].

These findings emphasize again the need for structures to prevent power abuse, protect victims, implement an arbitration of conflicts by an independent committee and implement consequences for offenders as already postulated in the N² power abuse position paper. Power abuse needs an open discussion to change the academic system in order to prevent power abuse in the future.

- Most Doctoral Researchers do not experience / witness situations of power abuse.
- Current institutions for conflict management at the different Helmholtz Centres do not satisfy Doctoral Researches
- Due to the nature of power abuse, Doctoral Researchers would not report conflicts fearing the consequences it might have on their thesis and career.



2.10 Mental health

Working on a doctoral research project, in a highly diverse and innovative field, requires a certain degree of flexibility and resilience (>40 hrs./week, Figure 7A working conditions). There are many factors making doctoral research time very challenging due to high workload, competition among peers and pressure to publish. In this section, the personal and psychological well-being of Doctoral Researchers is assessed by employing Beck's Depression Scale and the State-Trait-Anxiety-Inventory (STAI) [16, 17].

The assessment is done in the context of the doctoral thesis, acknowledging the obstacles, pressure to perform, as well as the impact the later can have on mental health. The term "mental health" has been explained by various scholars, but can be summarized, according to the World Health Organization (WHO), as "subjective well-being, perceived self-efficacy, [...] and self-actualization of one's intellectual and emotional potential". Adapted from the Patient Health Questionnaire-9 (PHQ-9), the participants' well-being, as well as their emotional state assessed, at the time of the survey [18, 19, 20, 21].

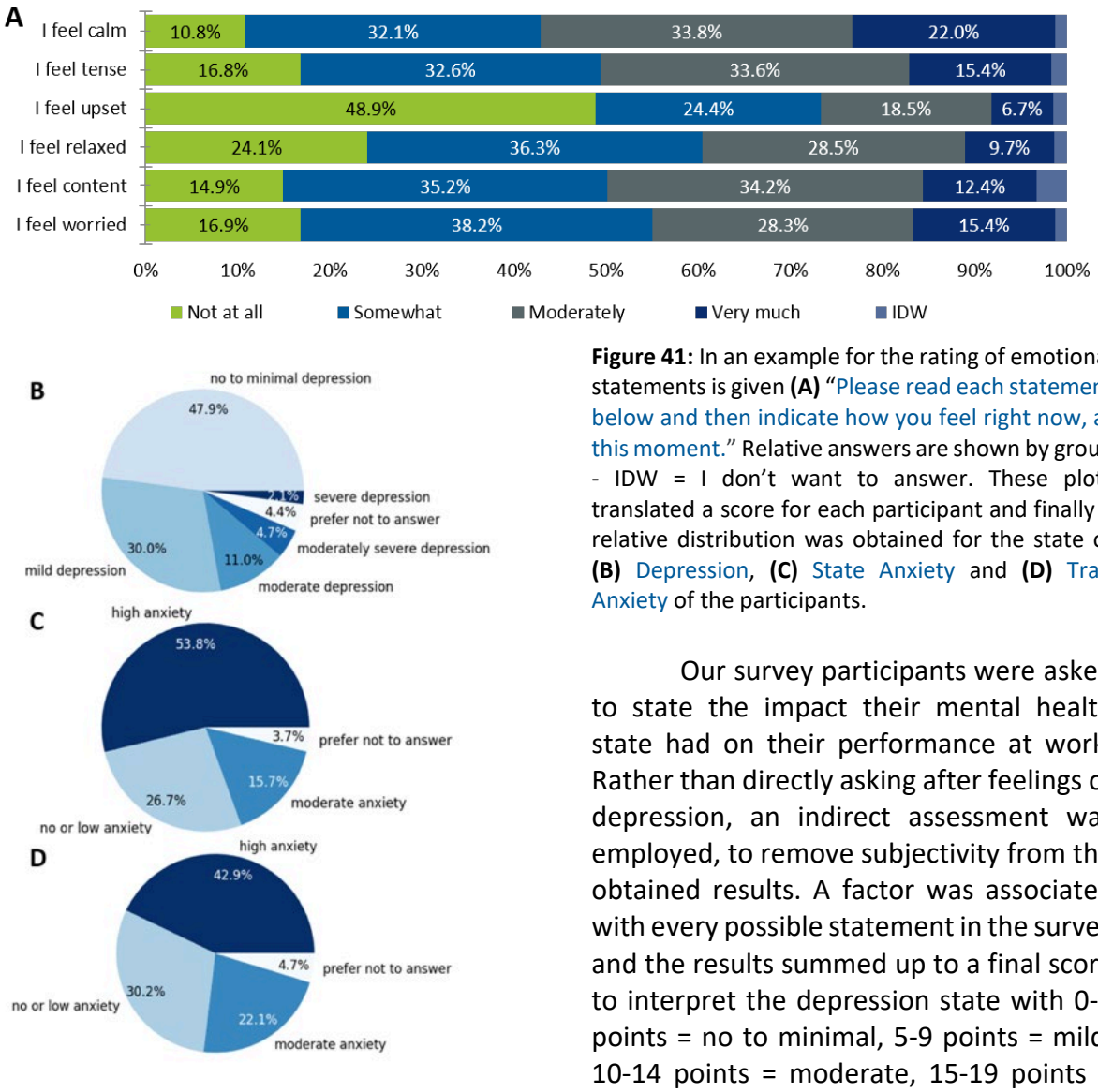


Figure 41: In an example for the rating of emotional statements is given **(A)** "Please read each statement below and then indicate how you feel right now, at this moment." Relative answers are shown by group - IDW = I don't want to answer. These plots translated a score for each participant and finally a relative distribution was obtained for the state of **(B)** Depression, **(C)** State Anxiety and **(D)** Trait Anxiety of the participants.

Our survey participants were asked to state the impact their mental health state had on their performance at work. Rather than directly asking after feelings of depression, an indirect assessment was employed, to remove subjectivity from the obtained results. A factor was associated with every possible statement in the survey and the results summed up to a final score to interpret the depression state with 0-4 points = no to minimal, 5-9 points = mild, 10-14 points = moderate, 15-19 points =

moderate to severe and 29-27 points = severe depression.

An example of rating of the statements is visualized in **Figure 41A** and in **Appendix Figure A5/6**, e.g. for 6 emotional statements, rated from 'not at all' to 'very much' on a 4-point scale for their occurrence in the moment of the survey. The three psychological states, Depression, State and Trait anxiety are defined as follows [22, 23, 24]:

- **Depression** is a mood disorder marked especially by sadness, inactivity, difficulty in thinking and concentration, a significant increase or decrease in appetite and time spent sleeping, feelings of dejection and hopelessness, and sometimes suicidal tendencies.

- **State anxiety** can be defined as a transitory emotional state consisting of feelings of apprehension, nervousness, and physiological sequelae such as an increased heart rate or respiration."

- **Trait anxiety** can be referred to, as "the stable tendency to attend to, experience and report negative emotions such as fears, worries and anxiety across many situations and also manifests by repeated concerns about body symptoms and reporting thereof.

The ratings of the statements in **Figure 41A** and **Figure A5/6** appendix translate to scores and turn into relative distributions for depression, state and trait anxiety for the Doctoral Researchers, (**Figure 41B-D)**. Noteworthy, 77.9% of Doctoral Researchers scored either a "no to minimal" or "mild" depression, and 17.7% of Doctoral Researchers have a "moderate" to "severe" Depression score (**Figure 41B)**. In contrast, 69.5% are suffering from "moderate" to "high" state anxiety, and still 26.7% have "no to minimal" state anxiety (**Figure 41C**). Furthermore, 65% of Doctoral Researchers show "moderate" to "high" trait anxiety, and 30.2% of Doctoral Researchers have "no or low anxiety" (**Figure 41C**).

Both anxiety states can be interpreted to an unusual, alerted state of the individual, which may manifest also in physical symptoms. In this context, it must be acknowledged that stimuli for depression- or anxiety-related states can originate from the private, as well as from the profession-related parts of the participant's life [25, 26].

The numbers from the 2018 annual report of the "German Depression Foundation", translate to about 6% of the German population that are diagnosed yearly with depression. The Doctoral Researchers within Helmholtz experience minimal to severe depression nearly 10 times more often than the average German citizen.

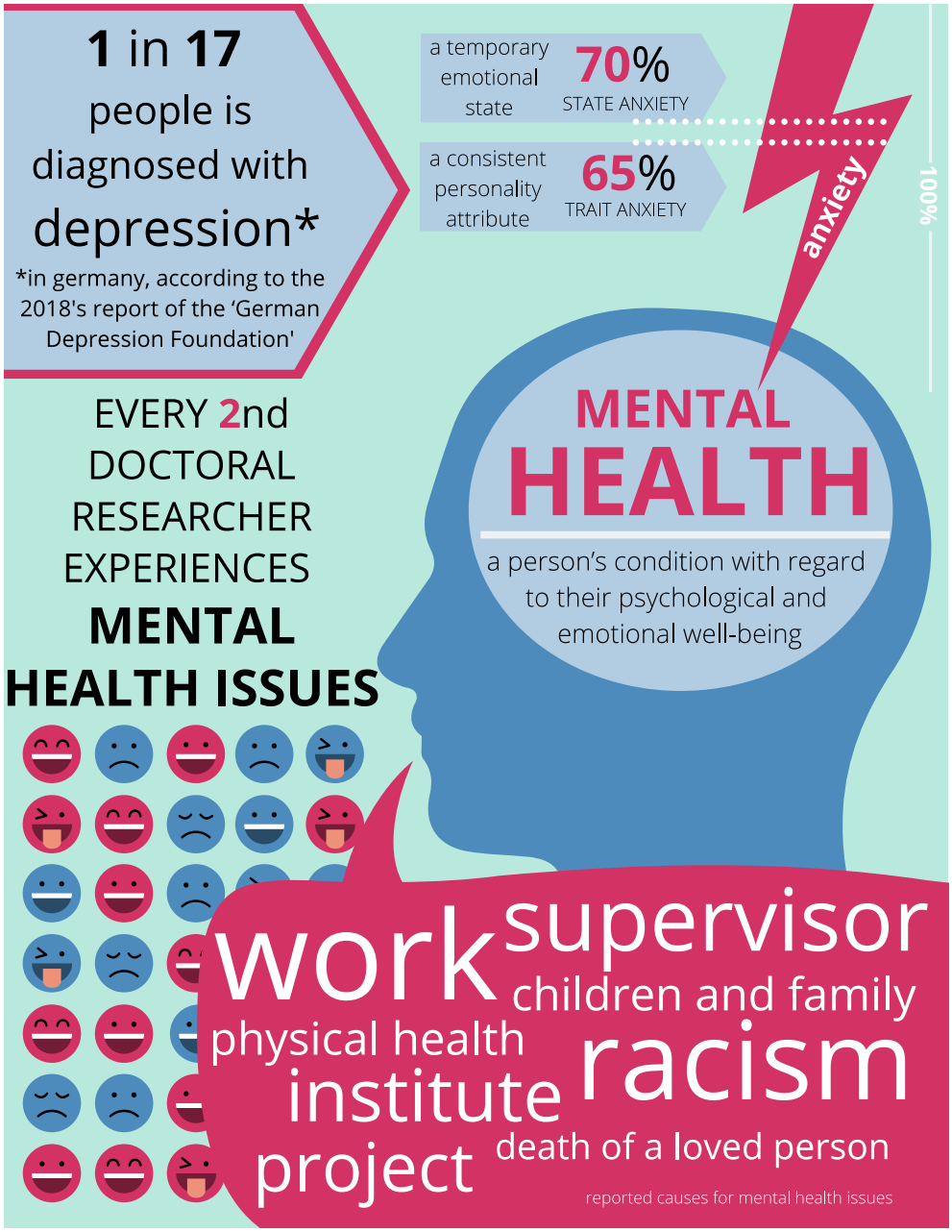
"In total, within a period of 1 year approximately one third of the general population is affected by at least one core symptom that is specific for an anxiety disorder. Especially social anxieties (around 34%) as well as panic attacks and phobic anxieties (24% each) occur frequently.", states the German Anxiety Barometer [27]. Participants experience 'moderate' to 'high state or trait anxiety' with approximately 65 to 69% nearly 2-fold more often than the average German citizen in this context.

In the free text answers, Doctoral Researchers report mental health issues caused by problems related to work, project, supervisor or institute or Centre. Some problems are not related to the project, but related to physical health, children and family, death of a loved person or racism. Some Doctoral Researchers report they are seeing a therapist and/or have a diagnosed mental disorder, also caused by related issues. For few Doctoral Researchers, the mental

health situation improved after they received help.

Further assessment and correlation analysis is done on the data obtained in the mental health and power abuse section with other sections of the questionnaire. These results are displayed and correlated also in the context of results obtained in other Doctoral Researcher - focused surveys in Chapter 4. Correlation – 5. Conclusion.

- According to the STAI classification performed based on this section's
- Doctoral Researchers in Helmholtz scored higher levels of anxiety and depression than the average German citizen questions, most Doctoral Researcher present anxiety



3. Correlation

Working on doctoral research projects represents a challenging and important part of the career of many Doctoral Researchers. Events experienced during this period may impact future, individual decisions. In some cases, a joyful time as a Doctoral Researcher leads to a fruitful and successful scientific career, while stressful and unpleasant situations suppress full potential and may lead to anxiety and depression [28]. In this chapter, results from previous sections were correlated with depression and anxiety scores from *2.10 Mental Health* section, to understand how the different aspects influence the Depression and Anxiety scores. The connection between State anxiety and Depression scores (**Figure 42A**), as well as the Trait anxiety and Depression scores (**Figure 42B**) is presented. The State and Trait anxiety scores each increase with an increasing Depression score. In the following chapter, only the State anxiety score correlations will be shown, as simi
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Working conditions and mental health

Time spent on activities outside of the work environment greatly influences health and well-being. Deficiency of relaxation time has been investigated in different groups of people and it was found it leads to increasing State anxiety and Depression scores [29, 30, 31]. In this section, the correlation between the ability to take vacation days and overworking hours on physical and mental health is investigated amongst Doctoral Researchers.

In **Figure 43A/B** the Depression and State anxiety scores are correlated with increasing working hours from a minimum of 21 to more than 80 hours. A positive tendency can be observed in both cases, meaning that higher numbers of working hours result in increased Depression and State anxiety score. Interestingly, very low working hours contribute to high feelings of anxiety, which could be observed for both probed anxiety types. The higher the weekend working hours the higher the respective Depression and Anxiety scores, in **Figure 43C/D**.

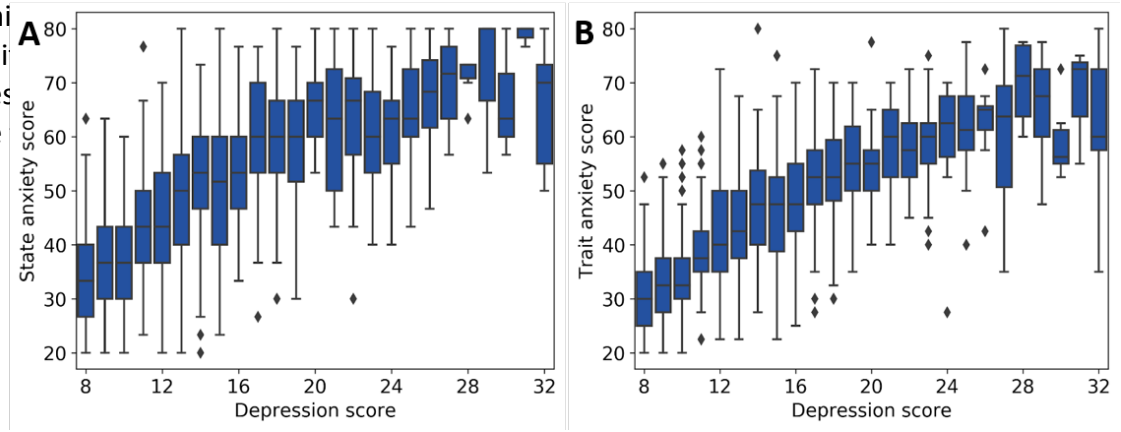


Figure 42: **(A)** The "State anxiety score" correlated to the "Depression score" of Doctoral Researchers; **(B)** The "Trait anxiety score" correlated to the "Depression score" of doctoral researchers in the Helmholtz. The plot displays the variation of results without any assumptions of the underlying statistical distribution of the answers. The blue rectangles represent the first, second and third quartiles of the distribution. Lines extending from the rectangles indicate minimum and maximum values of the distribution. The diamonds show the outliers.

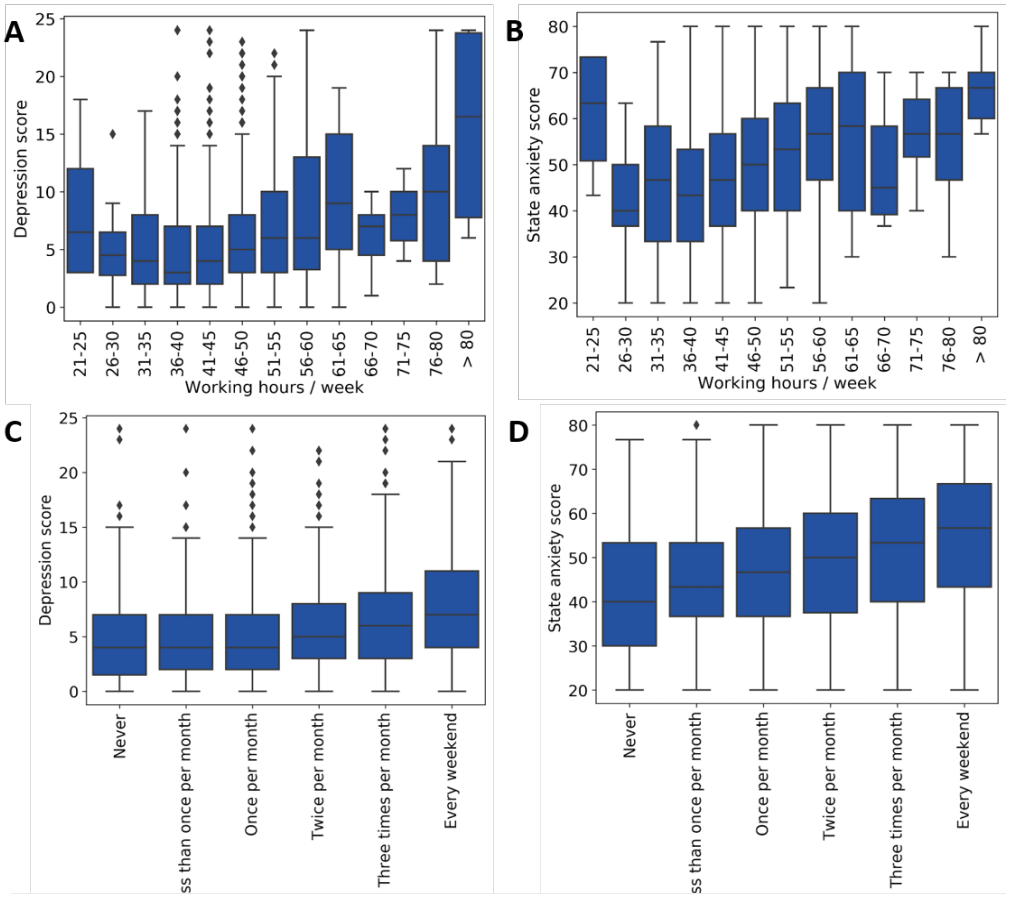


Figure 43: Correlation of "Working hours per week" and **(A)** the "Depression score" and **(B)** the "State anxiety score"; Correlation between "Working during weekends and vacation" and **(C)** the "Depression score" and **(D)** the State anxiety scores. The plot displays the variation of results without any assumptions of the underlying statistical distribution of the answers. The blue rectangles represent the first, second and third quartiles of the distribution. Lines extending from the rectangles indicate minimum and maximum values of the distribution. The diamonds show the outliers.

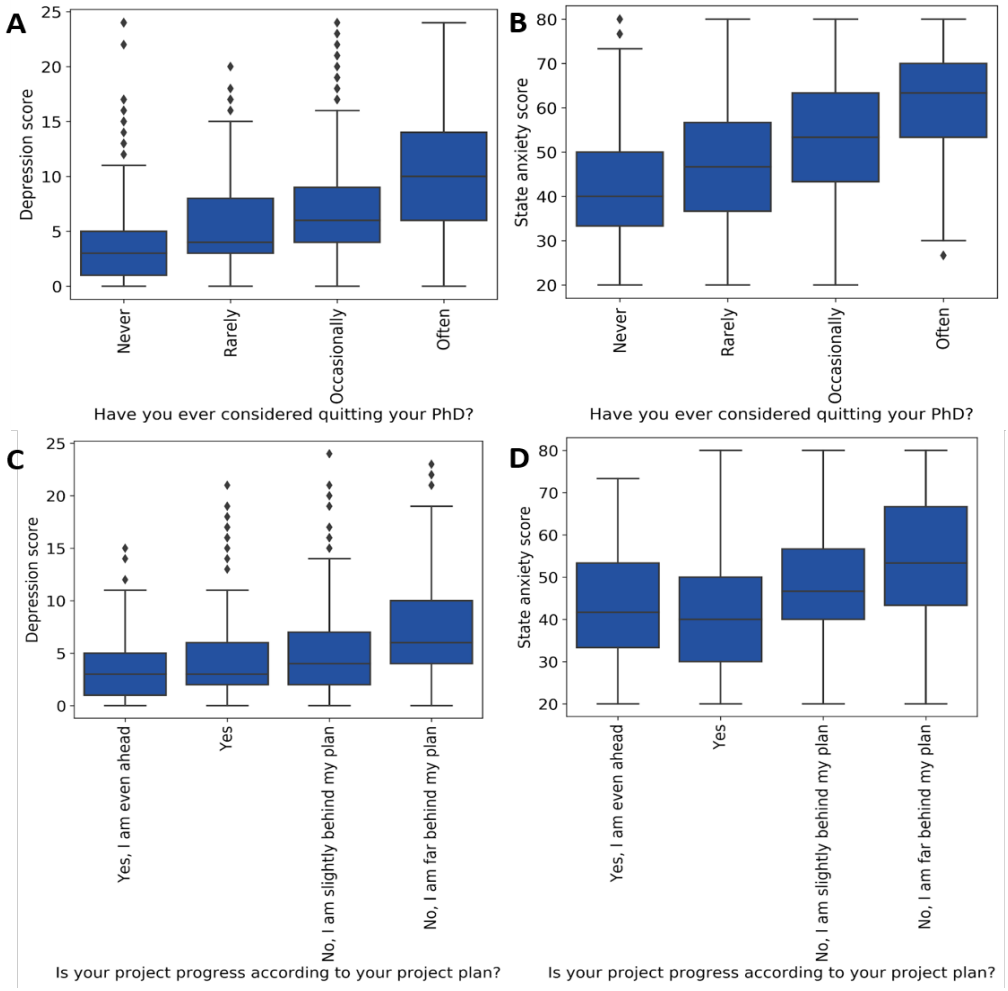


Figure 44: Correlation of "Considered quitting your PhD" and **(A)** the "Depression score" and **(B)** the "State anxiety score"; Correlation between "Being behind or ahead of the project plan" and **(C)** the "Depression score" and **(D)** the State anxiety scores. The plot displays the variation of results without any assumptions of the underlying statistical distribution of the answers. The blue rectangles represent the first, second and third quartiles of the distribution. Lines extending from the rectangles indicate minimum and maximum values of the distribution. The diamonds show the outliers.

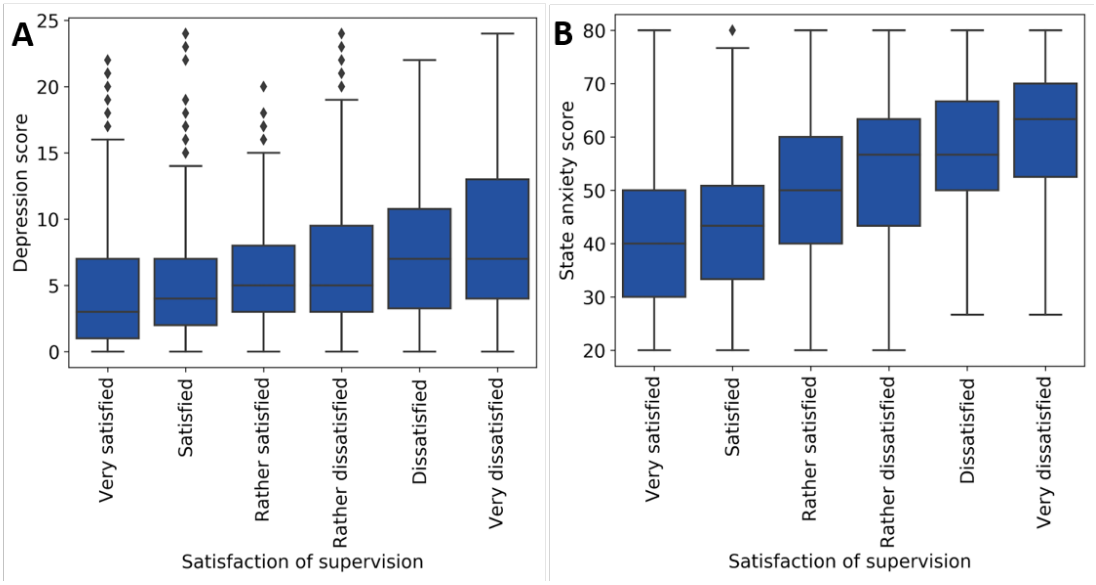


Figure 45: Correlation analysis of "Supervision satisfaction" with **(A)** the "Depression score" and **(B)** the "State anxiety score". The plot displays the variation of results without any assumptions of the underlying statistical distribution of the answers. The blue rectangles represent the first, second and third quartiles of the distribution. Lines extending from the rectangles indicate minimum and maximum values of the distribution. The diamonds show the outliers.

Satisfaction and mental health

In Chapter *2.3 Satisfaction*, quitting and reasons for quitting a doctoral research project were elucidated in detailed manner and concluded to be a multifactorial situation influenced equally by professional and private reasons. An increasing tendency between Depression and State/Trait anxiety scores with the rating "Considered quitting your PhD?" can be found, **Figure 44A/B**. The trend shows that Doctoral Researchers who considered quitting their doctoral research project also experience higher Depression and State/Trait anxiety scores. In **Figure 44C / D** the Depression and State/Trait anxiety scores are correlated with "timely project progress" according to a previously written project outline. Increasing scores and an increasing tendency can be observed for the groups "No, I am slightly behind my plan" and "No, I am far behind my plan" in comparison to the two other groups. Temporal deviation from the project plan translates to increased stress and mental pressure to achieve their milestones in the course of their given contract time.

Supervision and mental health

The professional relationship with their respective supervisor(s) is key for efficient work and communication while conducting the project and consequently determines the outcome and quality of the doctoral research project [32]. Many factors contribute to moderate supervision satisfaction, as illustrated by the data in Chapter *2.3 Satisfaction*. An increased dissatisfaction with e.g. supervision correlates positively with a moderate and more substantial increase in the State anxiety and Depression scores, respectively (**Figure 45A/B**).

Power abuse and mental health

Power abuse has become an emerging issue in the scientific field in the last years. It heavily influences the physical and mental well-being of Doctoral Researchers in their every-day work environment. Power abuse and mental health cases are still immensely stigmatized with negative consequences for the career of junior scientists [33].

In Chapter *2.9 Power Abuse*, the extent of power abuse within Helmholtz is presented. A more detailed analysis of the centre-specific data unveiled cases for sexualized harassment and bullying (witnessed and/or experienced) for each participating Helmholtz Centre (data not shown). **Figure 46A/B** indicates increased depression and anxiety scores with higher exposure to sexualized harassment. A similar, less variable picture can be drawn for the correlation of the extent of bullying with depression and anxiety (**Figure 46C/D**). Even more prominent effects on Depression and State/Trait anxiety scores can be observed for cases that experience power abuse on a weekly basis.

Integration and Mental health

For Doctoral Researchers with immigration background in Helmholtz, issues like loneliness and isolation, intensified by cultural and language differences, can result in feelings of depression and anxiety [34]. This trend is also found in this survey, as EU and non-EU Doctoral Researchers tend to experience higher Depression and State/Trait anxiety scores. No significant differences in mean Depression and State/Trait anxiety scores related to gender can be found. Nevertheless, language can still be an obstacle, as implementation of measures to improve conditions for international Doctoral Researcher varies immensely among Helmholtz Centres. All graphs mentioned in this section are presented in *7. Appendix C.*

4. Comparison to Nacaps

The recently published longitudinal cross-section study, National Academics Panel Study (Nacaps), marks the start of a systematic data collection on highly trained individuals and their career paths, namely Doctoral Researchers and postdocs in Germany [35]. The study was conducted and/or supported by the "Deutsches Zentrum für Hochschul- und Wissenschaftsforschung (DZHW)" and the "Bundesministerium für Bildung und Forschung" (BMBF). The Nacaps study serves to compare the situation of Doctoral Researchers from different origins. The sample size of the Nacaps study consists of 20,000 participants of 53 doctorate-granting institutions across Germany, who participated in this first survey in spring 2019. The "Nacaps Datenportal" serves to show the distribution of influence factors, either for the whole dataset or differentiated by one of the six options (gender, subject, educational background, parents, emigrational background and membership).

Working conditions

In the section addressing working conditions, the data shows that at universities the clear majority of 96.6% of the participants has temporary term contracts, while out of university the numbers change to 55.6% unlimited contracts and a minority of 44.4% with limited contracts. These results are therefore in the agreement with this survey, in which also all participants received temporary term contracts of mainly 25-36 months (60.0%) and a majority of 51.7% not receiving any extensions. In addition, the data shows the volume of employment varies among Doctoral Researchers from different research fields who are employed at universities. 34.0% of the participants at universities occupy full-time positions, while 48.6% at non-university research organizations have a full-time position according to Nacaps. According to our collected data, 63.9% receive a 50%-65% TVöD/TVL contract. In opposition to the above stated results, full positions are non-existent in Helmholtz. Unfortunately, the Nacaps study uses hours per week to assess the working hours. This survey employs a relative measure to probe the working hours. Therefore, a comparison between the two datasets is problematic.

Supervision

A majority of 75.1% of Doctoral Researchers at universities had a supervision agreement with their supervisor to state and maintain certain mutual rights and obligations in both directions. In comparison, 68.8% of Doctoral Researchers in Helmholtz have a supervision agreement. Doctoral Researchers have typically either one (40.0%) or two (40.2%) supervisors, but approximately 19.0% have even two or more supervisors for their doctoral thesis. In Helmholtz, 41.0% have a formal/primary supervisor, who is also their daily/direct supervisor, while 50.5% have a second or third person involved in their daily/direct supervision in the laboratory.

A frequent and dynamic exchange with the supervisor can be seen as an indicator for successful communication. Interestingly, 46.3% of Doctoral Researchers at universities exchange with their supervisor at least several times in the semester, while 8.3% exchange every day or several times a week (16.0%). The remaining 29.4% of Doctoral Researchers exchanged only once or even less than once per semester with their supervisor. In Helmholtz, 58.7% exchange with their supervisor either "almost daily" or at least on a "weekly" basis. The majority of

Doctoral Researchers (63.2%) at universities are satisfied or very satisfied with their supervision situation, while 20.0% are indifferent and 16.0% are not satisfied. In Helmholtz, a majority of 65.7% of Doctoral Researchers is either "satisfied or very satisfied" with the supervision in general.

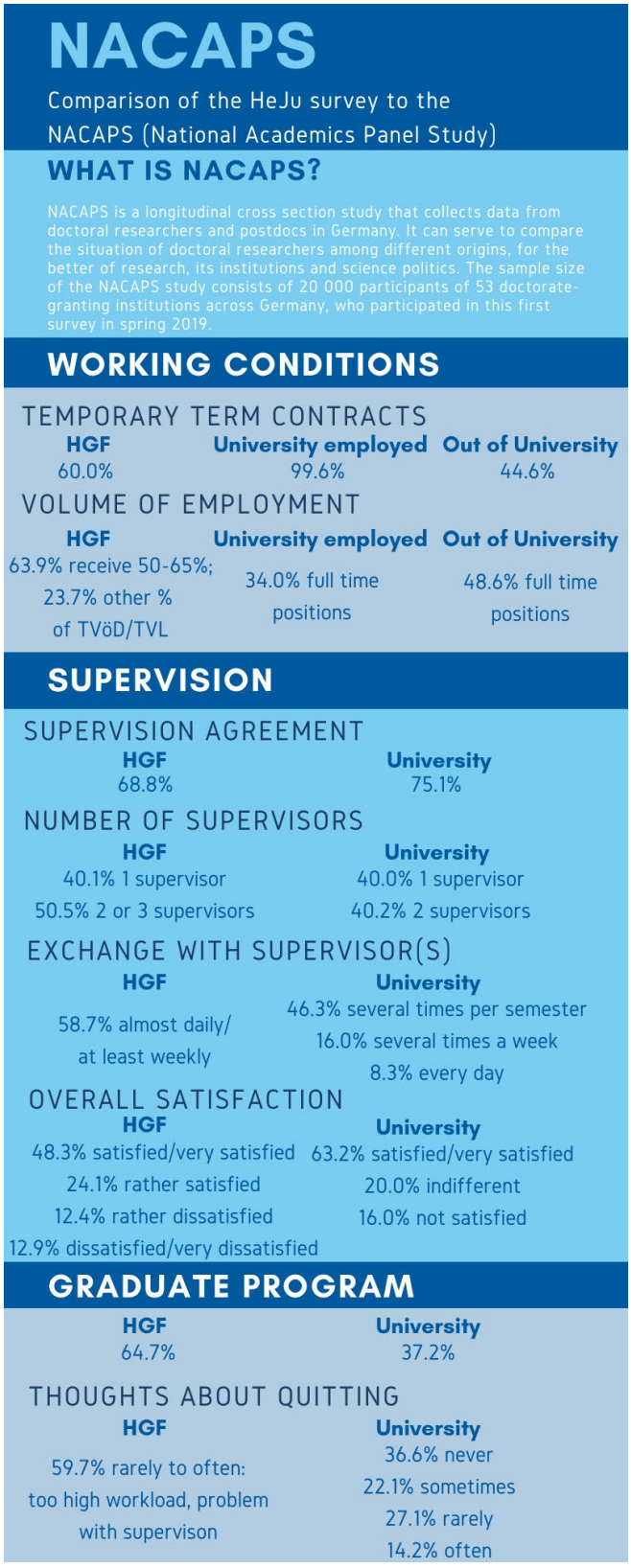
Graduate Schools

Only 37.2% of Doctoral Researchers at universities are a member of a structured graduate program, which stands in sharp contrast to the 64.7% in Helmholtz who are enrolled in a structured graduate program.

Quitting a doctoral research project

Quitting a doctoral research project can be based on a variety of reasons. When Doctoral Researchers at universities are asked for their consideration of "quitting your PhD", 36.6% never considered quitting their doctoral research project. A bigger fraction at least did consider "sometimes" (22.1%) or "rarely" (27.1%) to quit their doctoral research project. Still, 14.2% think often about aborting their doctoral research project. The most mentioned reasons for quitting were "too high workload" or "problems with the supervision" for Doctoral Researchers at universities. In Helmholtz, 59,7% consider "rarely" to "often" to quit.

This section shall not serve as an exhaustive comparison between the Nacaps and HeJu survey 2019, but rather as a starting point for future discussions to improve the conditions for Doctoral Researchers in both populations. A graphical summary, with the most important facts can be found in the next column.



5. Conclusion

This report presents and analyses the results of the 2019 Helmholtz Juniors Survey that was run in the fall of 2019 as part of the N² harmonized survey effort. Out of 19 centres in the Helmholtz Association, 1287 Doctoral Researchers from 16 centres answered the full questionnaire resulting in a participation rate of 29.6% within these 16 centres. It is thereby possible to say that this report gives a representative insight into the current working and living situation of Doctoral Researchers in the Helmholtz Association.

Over the course of 82 questions, the Doctoral Researchers reported on several aspects of their current situation in the Helmholtz Association such as:

- Their general living situation,
- Their work and life at their Helmholtz centre and their satisfaction working there,
- Their supervision situation as well as graduate schools they may be enrolled in,
- Their integration at their Helmholtz Centre, and the support they receive in terms of career development and having a family.

Apart from these questions, which have been asked in comparable fashion in previous surveys, for the first time, this survey included questions about power abuse experienced by Doctoral Researchers, as well as questions assessing their mental health. Although the data from these two sections may not allow the drawing of final conclusions and immediate points of action, it sets a precedent and serves as a basis for further discussion concerning these topics, which have gained attention in- and outside of the academic system.

Looking at the results we find that Doctoral Researchers are generally satisfied with their life and work in the Helmholtz Association. Notable findings, that have improved compared to previous studies and certainly contribute to the good overall satisfaction, include:

- The reduction of Doctoral Researchers holding a stipend (13.2%) compared to a contract (84.2%), with the majority of these contracts now being granted at least 65% pay of TVöD/TV-L E13,
- The increase of vacation days for Doctoral Researchers with subsidiary contract from 20 to 30 days, with now 72.3% of Doctoral Researchers being able to take at least 29 days of vacation,
- The broad enrolment of Doctoral Researchers in a graduate school (81.2%) and 74.4% of enrolled Doctoral Researchers saying they profit from this infrastructure.

Furthermore, the Doctoral Researchers state they are generally satisfied with the work environment, laboratories, supervision, scientific support and workshops or skills training at the individual centres. Areas showing less satisfaction include the support infrastructure for internationals and families, the bureaucratic and administrative structures, and the psychological support (only 17% satisfied) at the centres. Areas where Doctoral Researchers feel the most improvement is needed include:

- Salary or remuneration (85.9%),
- Career development (80.5%),
- Bureaucracy and administration (74.6%),

- Science communication and outreach (74%).

Additionally, the number of Doctoral Researchers who have children (8.7%) or who are considering having (more) children during their time as Doctoral Researcher (15.7%) is strikingly low, which is foremost reasoned with the lack of financial freedom, the general working conditions and the fear of jeopardizing their career.
One finding from the power abuse section of the survey specifically shows the value and good work of Doctoral Researcher representation on centre level and on the association level. While Doctoral Researchers lack awareness of support mechanisms during crisis or a conflict, such as Ombudspersons, Works Councils, equal opportunities officers or medical/counselling services, they are well aware of their Doctoral Researchers representatives at the centres, with almost 70% saying they know them.

For the first time, the findings of the Helmholtz Juniors Survey may be compared with the findings of the survey of the Max Planck PhDnet and the Leibniz PhD network, owing to the harmonized questionnaire developed and provided through the N^2 network. The findings of this survey will serve as a basis for discussion and further initiatives of the Helmholtz Juniors and the N^2 Network and ground for the claims made in the N^2 position paper on Power Abuse and Conflict Resolution.

There is, however, an expectation that this survey cannot fulfil. In addition to the questions answered in the survey, numerous comments were made by participants in free text answer boxes. These comments were analysed, key words identified and presented in this report. However, these comments also included reports about situations of conflict or discomfort that Doctoral Researchers found themselves in during the work on their Doctoral Research project. This shows that there is precedent of conflict situations and unwanted behaviour towards Doctoral Researchers and encourages us to continuously ask for improvements and resolutions for these situations that a considerable number of Doctoral Researchers still find themselves in.

We express our gratitude to all Doctoral Researchers, who took the time to answer this survey and were very open about their work and life as a Doctoral Researcher in the Helmholtz Association. We also express our gratitude to all centres who allow us and cooperated with us throughout the conduction of the survey. Furthermore, gratitude is due to all parties involved during the design, improvement and implementation of this survey and the N^2 harmonized questionnaire.

6. Appendix

A. Methodology

The aim of the survey is to provide the *status quo* on Doctoral Researchers in Helmholtz on the modules stated beneath: Demographics, working conditions, satisfaction, supervision, graduate schools, integration, career development, family, power abuse and mental health.

The survey was hosted on German servers, employing the commercial software solution *LimeSurvey*®. The survey structure was developed equally by all partners of the N^2 network in 2018/2019 and a structure was set-up by Max-Planck PhDnet and shared with Helmholtz Juniors and Leibniz PhDnet subsequently, who adapted it to their needs. The survey was conducted from the end of October 2019 till the 25th of November 2019 by all partners of the N^2 network simultaneously. To access, participants used a unique token system tied to the emails of eligible Doctoral Researchers at Helmholtz Centres across Germany. The survey was advertised by the HeJu Communication group, employing infographics with data from the past surveys, prepared and reviewed by the HeJu Survey Group. After closing, the data was extracted with the LimeSurvey data extraction tool, only including complete datasets (=data cleaning). This xls file provided the basis for the calculation of the STAI scores and on the other hand for visualizing the survey data in plots. These numbers were compared to the numbers and percentages obtained from uncleaned data, processed with the Max-Planck PhDnet Python framework, which delivered the same results. The numbers/percentages were plotted in Microsoft Excel 2016 employing a Helmholtz-corporate design-related colour scheme and incorporated into the report.

The survey was voluntary for all Doctoral Researchers working within Helmholtz. The data provided was evaluated only in aggregated and anonymized form and complies with the General Data Protection Regulation (GDPR) [36]. It is not possible to identify any individual at any moment, as long as people refrain from providing personal data in the free text sections. The data is only accessible to the members of the HeJu Survey Group, who all signed a confidentiality agreement. The raw data is stored password-protected on Helmholtz servers and only the survey group speaker has access to the respective files. Any comments and free text answers were treated with the highest level of confidentiality. Common themes and topics stated in the free text answers were identified and the comments grouped and counted accordingly. The results are only presented in this anonymized form in this report and no word-for-word repetition is included.

Aggregated and anonymized data is shared with the administrative bodies of the Helmholtz Centres and the public in the form of reports. Moreover, detailed analysis of each centre is provided for the administration, graduate schools, PhD representatives and working councils - free text answers are excluded from this form of report.

Methodology for STAI calculations

Depression levels have been defined based on the statements taken from the “Patient health questionnaire-9” [21]. Each answer translated to a point score from 0 to 3. The sum of the points across the statements (from 0 to 27) defines the depression level of the participant: “no to minimal depression" (0-4 points), "mild depression" (5-9 points), "moderate depression" (10-14 points), "moderately severe depression" (15-19

points) and "severe depression" (20-14 points).

Anxiety about an event (State anxiety) and anxiety level as a personal characteristic (trait anxiety) have been defined based on questions from State-Trait Anxiety Inventory (STAI) [37]. The full STAI includes 20 questions for the state and 20 questions for the trait anxieties. An answer for each question can be translated to a score from 1 to 4. The sum of points across the 20 questions (from 20 to 80 points) defines the anxiety level of the participant: "no or low anxiety" (20-37 points), "moderate anxiety" (38-44 points) and "high anxiety" (45-80 points). In our survey, we have reduced the number of questions to 6 for the state anxiety and to 8 for the trait anxiety evaluations. Thus, each participant has from 6 to 24 points and from 8 to 32 points for the state and trait anxiety respectively. To keep the possible points from 20 to 80 and use the point ranges used in literature for anxiety classification, we choose different weights for the answer possibilities (20/6 and 20/8 weights for state and trait anxiety respectively).

The correlation study has been done with collaboration and help of the PhDnet Survey group 2019. The data has been analysed with Python programming language [38] using NumPy [39], Pandas [40] and SciPy [41] libraries. Especially, we want to thank Jana Lasser for sharing with us her code for the Depression, State and Trait anxiety analysis.

Methodology of free text answers

Every topic and some specific questions included a section where people could add or report additional thoughts in the form of free text answers. As not everyone added a free text answer, the evaluation was based on the fraction of participants that gave a free text answer. All answers were categorized according to their content. Some elaborated answers might appear in more than one category. Number of answers for each category can be found in tables in the Appendix. Categories or issues not covered by the plots of each topic were reported in the text of the respective topic.

Data Privacy Statement

Responsible persons and contact data

Carsten Peukert / Speaker Survey Group / Helmholtz Juniors
Chemical Biology/CBIO
Inhoffenstr. 7
38124 Braunschweig

E-Mail address: hejusurvey@helmholtz.de
Data Security Officer Helmholtz: tbd

Purpose of the survey

Through this survey, we want to get a better understanding of the situation of Doctoral Researchers within Helmholtz, and the strengths and weaknesses of their doctoral research and education. The survey creates a basis for HeJu to, in a target-oriented way, represent the interests of Doctoral Researchers and work towards improving their situation in cooperation with the Helmholtz management.

Sovereignty of the participants

Participation in the survey is voluntary and can be cancelled at any time. In this case, the data will not be processed within the survey. By taking part the participant allows the anonymous use and processing of the given data by the up to 10 members of HeJu Survey Group. The members of the survey group handling the raw data have signed Helmholtz-approved confidentiality agreements prior to getting access to the data.

Transparency

The data collected within the survey will be evaluated and summarized in a report that will be handed over to

Helmholtz management the individual centre. The report will be provided to the PhD representatives as well as to all Helmholtz Doctoral Researchers via the HeJu website. The results of previous surveys are available under the beneath link, as well [42].

Data security

The HeJu Survey Group (with up to 10 members) is responsible for the organization of the survey and the evaluation of the generated raw data. The survey is completely anonymized. Date/time and an IP-address will not be recorded. The assignment of data to an individual person is not the purpose of this survey. Nonetheless, based on the individual answers provided by each participant it might be possible that the provided information allows conclusions about the participant. The survey is hosted on Helmholtz servers. Both the download of the raw data and the file itself are encrypted, all PC and storage devices are password-protected. The unencrypted raw data is exclusively handled by the speaker working group "survey", and not circulated to any third party, including other members of Helmholtz. Access can only be granted to further members of the HeJu Survey Group after signing an Helmholtz-approved confidentiality agreement. The data will be kept for a minimum of ten years to enable a time series analysis. The data will be administered by the speaker of the working group "survey". Anonymized, aggregated data however, may be shared between the three doctoral researcher organizations in N^2 for elusive evaluation of the survey results. Appropriate publishing formats will be selected within Helmholtz and between the PhD networks. The survey is conducted by the HeJu, in particular the survey working group – the DSGVO guidelines are respected at any time. For technical implementation of the survey we use a tool by the company LimeSurvey GmbH, which is obligated to comply with the current "European data security laws EU General Data Protection Regulation" (GDPR) and to adopt all measures necessary to save the data from unauthorized access and disclosure, in particular Article 26 GDPR. The survey, run on Helmholtz servers, will be, after the end of the survey, transferred in a password protected file and stored on the encrypted servers of Helmholtz (Helmholtznet). Again, only the speaker of the working group "survey" has access to the data, access of further members to the raw data can only be granted after signing an Helmholtz-approved confidentiality statement.

As the survey relies on informed consent and voluntary participation, especially Art. 6 (1) a DSGVO is valid here, namely:

„Die betroffene Person hat ihre Einwilligung zu der Verarbeitung der sie betreffenden personenbezogenen Daten für einen oder mehrere bestimmte Zwecke gegeben" *(Translation: The involved person has approved the usage of the person-related data for one or more specific issues.)*

According to the GDPR the participant has the right to access, rectification, deletion, limitation, opposition and portability of the data processed. Thank you in advance for your support! The English text is a summary. With respect to German data security policy, please use the German statement as reference. Continue the survey only if you agree with the data privacy statement. Purpose of the survey. The English version of the Code is a translation from the German. The German version shall be binding in the event of a dispute.

Sample size and statistical significance [43]

The sample size refers to the number of complete questionnaires submitted to LimeSurvey, this is the same number that remains after the so-called data cleaning. The name "statistical significance" comes from the fact that it is only a fraction of the total responses, as it only consists of the people that filled the questionnaire to a 100% or that are of interest for your analysis. To understand sample size, three terms need to be understood, the population size, the margin of error and the sampling confidence level.

Population size: The total number of people in the group you are trying to study.

Margin of error: A percentage that tells you how much you can expect your survey results to reflect the views of the overall population. The smaller the margin of error, the closer you are to having the exact answer at a given confidence level.

Sampling confidence level: A percentage that reveals how confident you can be that the population would select an answer within a certain range.

The following formula can be used to verify our calculation of the needed sample size to state significance for the Helmholtz-wide results:

$$\text{Sample size} = \frac{\frac{z^2 \times p\,(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p\,(1-p)}{e^2 N}\right)}$$

N = population size • e = Margin of error (percentage in decimal form) • z = z-score

B. List of Figures

2.1 Demographics:

Figure 1: "Which Helmholtz Centre are you associated with?"

Figure 2: (A) "To which gender do you identify most?" **(B)** "What is your year of birth?" and **(C)** "What's your citizenship?"

Figure 3: The results for **(A)** "Which year did you start your PhD thesis?" and **(B)** "Which year do you expect to submit your PhD thesis?"

2.2. Working Conditions

Figure 4: (A) "What kind of contract do you have?" If you have multiple contracts, please select 'other' and give details." **(B)** "How is your doctoral research currently financed? (multiple answers possible)" and **(C)** "What kind of stipend do you have?"

Figure 5: (A) "Right now, what is your monthly net income for your work at your research organization?" **(B)** "What was or is the longest duration of your contract or stipend related to your PhD project?" and **(C)** "If any, how many extensions or additional contracts/stipends did you get during your PhD?"

Figure 6: (A) "Would it be possible for you to extend your current contract/stipend for the following reasons (multiple answers possible)?" **(B)** "How many holidays per year can you take according to your contract or stipend?" **(C)** "How many days of your entitled holidays did you take in the past year?" **(D)** "Do you feel free to take days off? (multiple answers possible)"

Figure 7: (A) "How many hours per week are you expected to work according to your contract?" and "On average, how many hours do you typically work per week in total?" **(B)** "What percentage of your working time do you currently spend on average on the following tasks?" **(C)** "How often have you worked during weekends or public holidays in the past year? This question asks for work related to your PhD. It is place-independent and includes all work done at your centre, your home or any other location. It does not include an additional part-time job or other work which is unrelated to your PhD."

Figure 8: In the free text answer section, Doctoral Researchers indicated more tasks that they spend their working time on which are displayed here in a word cloud. The bigger the item the more often it was named by Doctoral Researchers.

2.3 Satisfaction

Figure 9: "Why did you start your work on your doctoral thesis at your research Centre/institute (multiple answers possible)?"

Figure 10: (A) "Do you identify with your research centre?", and "Do you identify with your research

organization: Helmholtz Association?", relative answers grouped by answer possibility. **(B)** Relative results are shown for "Do you know HeJu, the N2 network or your local PhD representatives?"

Figure 11: The monthly net income distribution, as well as external financial support and private spending's for work are shown in **(A)** "How much do you pay for your rent and associated living costs per month in euros (e.g., heating, gas, waste, and electricity)?" **(B)** "Do you get external financial support to cover your living expenses besides your salary?" and **(C)** "Did you spend parts of your salary on items you exclusively used for work in the past year?"

Figure 12: Participants were asked **(A)** "In general, how do you judge the following aspects of an academic research career?", **(B)** about their satisfaction with work related aspects "If you think about your own situation as a doctoral researcher, how satisfied are you with the following aspects?" **(C)** and "Which of the following aspects of your work as a doctoral researcher would you like to be improved?"

Figure 13: Participants were asked **(A)** "Have you ever considered quitting your PhD?" and furthermore for the reasons behind **(B)** "What was/were the reason(s) for considering quitting your PhD?"

Figure 14: Results of the free text answer option of "What was/were the reason(s) for considering quitting your PhD?"

Figure 15: Participants were asked "Would you recommend doing a Doctoral Researchers project at your centre?"

2.4 Supervision

Figure 16: Participants were asked **(A)** "Do you have one of the following?" and **(B)** "Is your project according to your (reviewed) project plan?"

Figure 17: Participants were asked "How often do you meet your thesis advisory committee (TAC)?"

Figure 18: Participants were asked "Is your formal/primary supervisor your daily/direct supervisor?"

Figure 19: (A) Participants were asked "How often do you communicate on average with your daily/direct supervisor about your PhD project?" (blue) and "How often would you like to communicate with your daily/direct supervisor about your PhD project?" (green) **(B)** "How often would you like to communicate with your formal/primary supervisor about your PhD project?"

Figure 20: Participants were asked: "How satisfied are you with your PhD supervision in general?"

Figure 21: "Please rate the supervision provided by your formal/primary supervisor."

Figure 22: Participants were asked "Did you ever encounter problems regarding your supervision?"

2.5 Graduate Schools

Figure 23: (A) Doctoral Researchers were asked **"**Are you currently registered in a graduate school?"

Figure 24: (**A)** Participants were asked "Do you think you profit from enrolment in your graduate school?" with IDK = I don't know, IDW = I don't want to answer. Relative fractions plotted by answer option. **(B)** "Do you think you would profit from enrolment in a graduate school?"

Figure 25: "Which of the listed items are offered to you either by your centre or graduate school? (multiple answers possible)"

2.6 Integration

Figure 26: "For which of the following aspects did you receive support from your institute and for which of the following aspects would you have needed more support from your institute (multiple answers possible)?"

Figure 27: Data for the survey question regarding language problems and language courses. (clockwise from top left); **(A)** "Do you speak German? (filtered for Non-Germans)", **(B)** "Is language an obstacle for communication with people at your centre?", **(C)** "Is all the important information (group internal, administrative, your contract/stipend) available in a language you understand?", **(D)** "Are you currently taking German language classes?"

Figure 28: "Are there regular social activities in your group or at your institution (e.g. sports events, going out for dinner/drinks, discussion forums, movie nights etc.)?"

2.7 Career Development

Figure 29: (A) "Please specify the number and kind of publications your institute/university requires you to obtain your PhD." - IDW = I don't want to answer, IDK = I don't know. **(B)** "Which of the following types of scientific output have you published so far during your doctoral research (multiple answers possible)?"

Figure 30: "Have you ever been on a research stay abroad?" -relative answers are displayed by answer option, IDW = I don't want to answer.

Figure 31: "How much would you like to work in the following fields after completing your PhD?"

Figure 32: **(A)** "Which field do you think you will work in after your PhD (multiple answers possible)?" - IDW = I don't want to answer. **(B)** "Where would you like to work after you complete your doctoral degree (multiple answers possible)?"

Figure 33: (A) "Which of the following measures for your career development are supported by your

centre?" **(B)** "How does your institute support you in learning German? (multiple answers possible)"
Figure 34: "Do you think that you are well trained for a job outside science?"

2.8 Family
Figure 35: (A) "Do you have or are you currently expecting children?" **(B)** "Would you consider having (more) children during your doctoral research project (multiple answers possible)?"
Figure 36: (A) "Does your institute offer support in childcare services (multiple answers possible)?" (blue bar); "If your centre offers childcare support do/would you use it (multiple answers possible)?" (green bar). **(B)** "Do you feel that there is sufficient support (financial and organizational) from your institute for raising a child?"

2.9 Power Abuse
Figure 37: Participants were asked "Which of the following mechanisms are you aware of that can help you in case of a conflict with a superior?"
Figure 38: The report of a conflict is shown in **(A)** "Did you ever report a conflict with a superior to one of the institutions above?" and details on the consequences of the report are shown in **(B)** "Please indicate the level of satisfaction with the consequences of your report."
Figure 39: Results are shown in blue for Doctoral Researchers that experienced "sexual harassment" "While working at your centre, have you at any point experienced unwanted behaviour that you would call 'sexualized harassment' from a superior?" and in green for Doctoral Researchers that witnessed "sexual harassment "While working at your centre, have you at any point witnessed any unwanted behaviour towards a colleague that you would call 'sexualized harassment' from a superior?"
Figure 40: Results are shown in blue for Doctoral Researchers that experienced "bullying" "While working at your centre, have you at any point been subjected to bullying by a superior?" and in green for Doctoral Researchers that witnessed "bullying" "While working at your centre, have you at any point witnessed bullying by a superior?"

2.10 Mental Health
Figure 41: In an example for the rating of emotional statements is given **(A)** "Please read each statement below and then indicate how you feel right now, at this moment." Relative answers are shown by group - IDW = I don't want to answer. These plots translated a score for each participant and finally a relative distribution was obtained for the state of **(B)** Depression, **(C)** State Anxiety and **(D)** Trait Anxiety of the participants.

3. Correlation
Figure 42: **(A)** The "State anxiety score" correlated to the "Depression score" of Doctoral Researchers; **(B)** The "Trait anxiety score" correlated to the "Depression score" of Doctoral Researchers in Helmholtz.
Figure 43: Correlation of "Working hours per week" and **(A)** the "Depression score" and **(B)** the "State anxiety score"; Correlation between "Working during weekends and vacation" and **(C)** the "Depression score" and **(D)** the State anxiety scores.
Figure 44: Correlation between **(A)** the "Depression score" and **(B)** the "State anxiety score" with frequency of consideration of quitting one's PhD; Correlation between **(C)** the "Depression score" and **(D)** the "State anxiety score" with project progress.
Figure 45: Correlation analysis of "Supervision satisfaction" with **(A)** the "Depression score" and **(B)** the "State anxiety score".
Figure 46: Correlation between "Sexualized Harassment occurrence" with **(A)** the "Depression score" and **(B)** "State anxiety score"; Correlation of "Bullying occurrence" with **(C)** the "Depression score" and **(D)** "State anxiety score".

C. Additional Figures

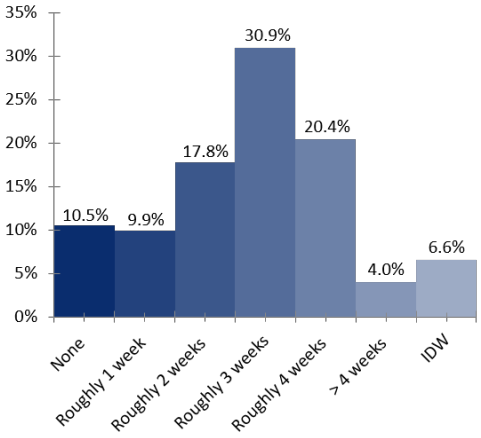


Figure A1: Participants were asked "How many days did you take off in the past year?"

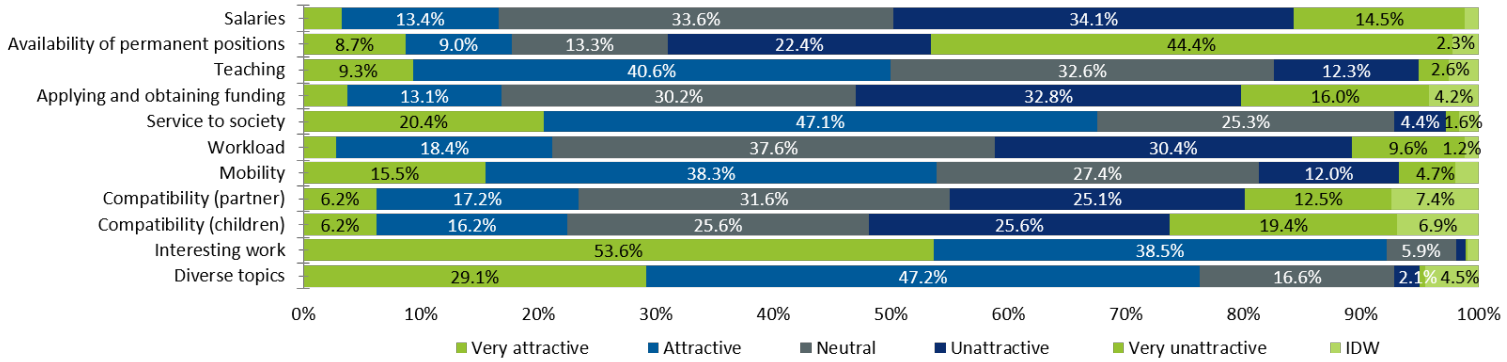


Figure A2: Participants were asked "In general, how do you judge the following aspects of an academic research career?" - IDK = I don't know and IDW = I don't want to answer.

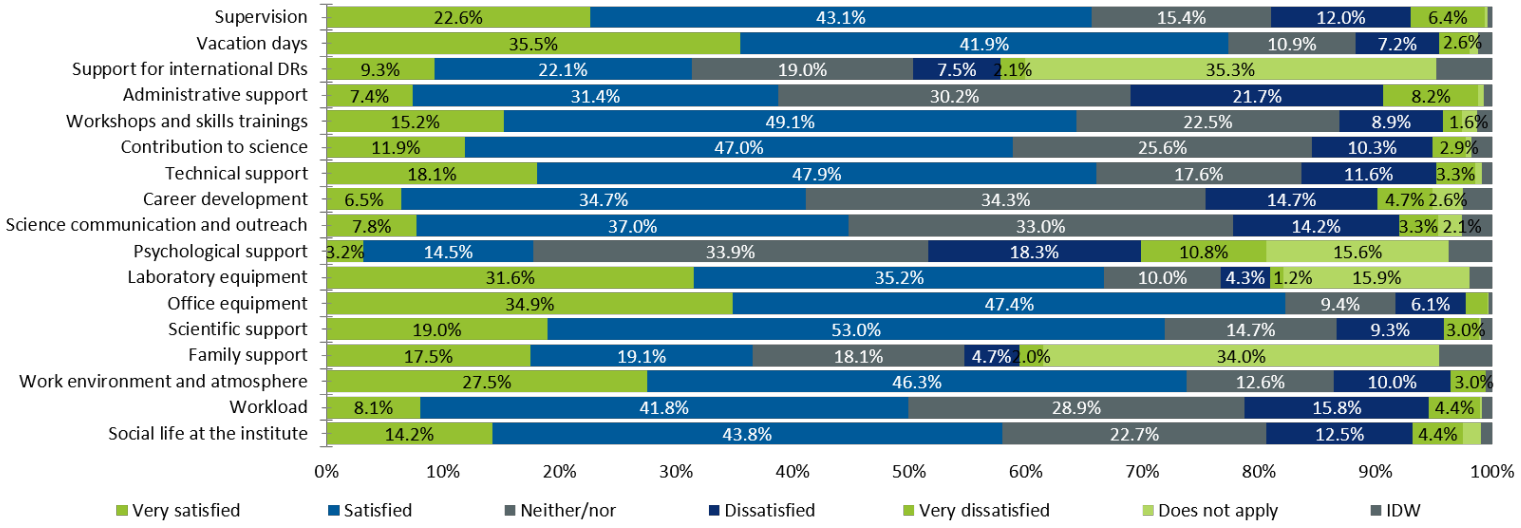


Figure A3: Participants were asked about their satisfaction with work related aspects "If you think about your own situation as a doctoral researcher, how satisfied are you with the following aspects?" - IDK = I don't know and IDW = I don't want to answer.

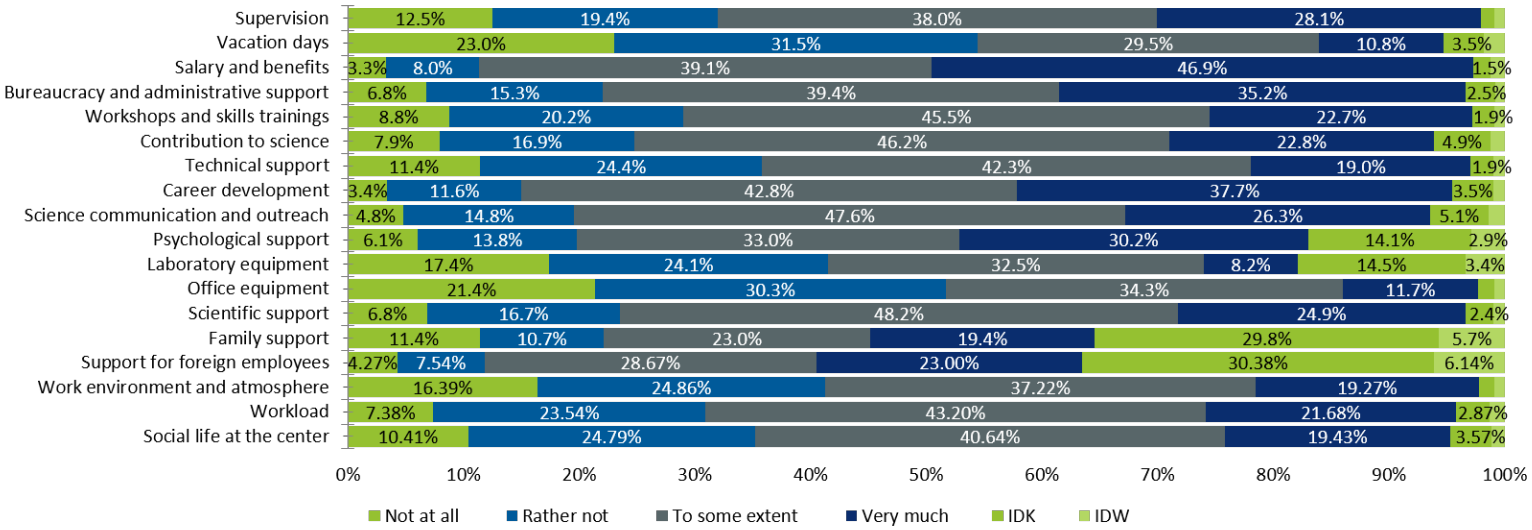


Figure A4: Participants were asked about their satisfaction with work related aspects "Which of the following aspects of your work as a doctoral researcher would you like to be improved?"- IDK = I don't know and IDW = I don't want to answer.

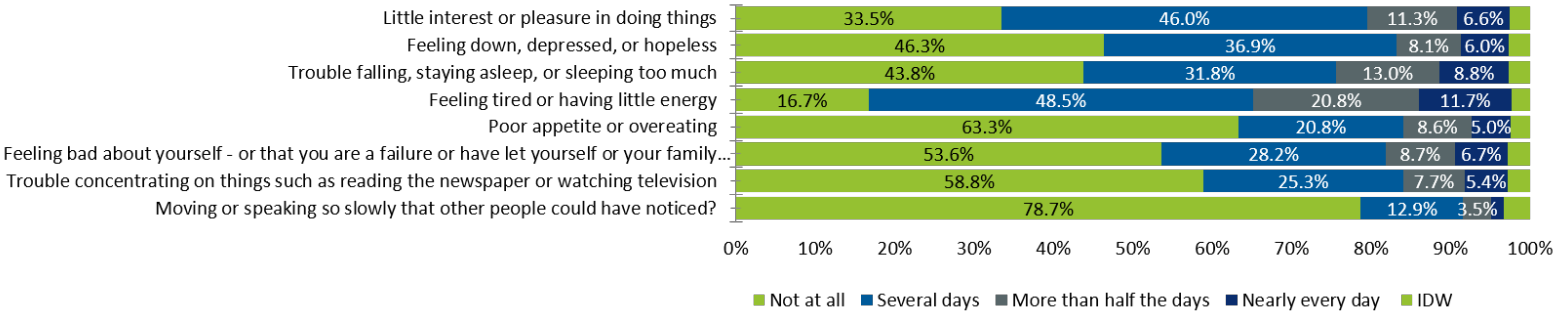


Figure A5: Rating of emotional statements is given "Please read each statement below and then indicate how you feel right now, at this moment." Relative answers are shown by group - IDW = I don't want to answer.

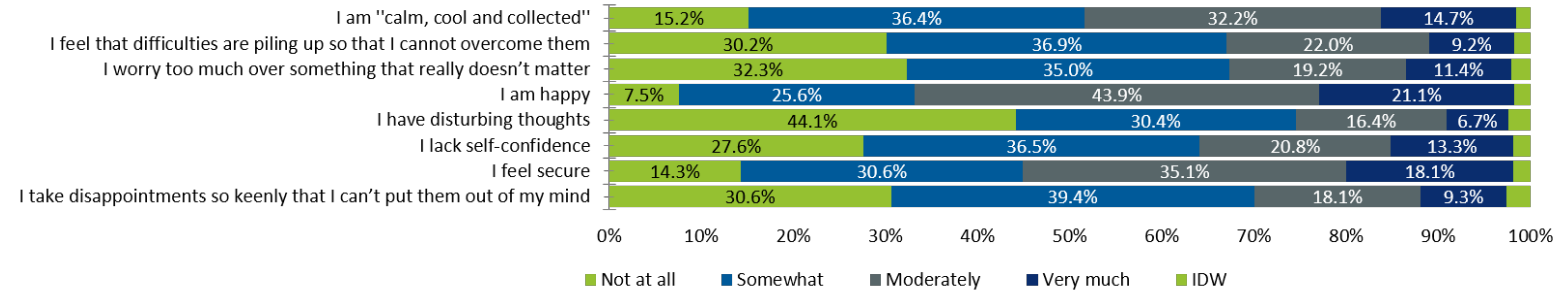


Figure A6: Participants were asked "Over the last two weeks, how often have you been bothered by any of the following problems?" Relative answers are shown by group - IDW = I don't want to answer.

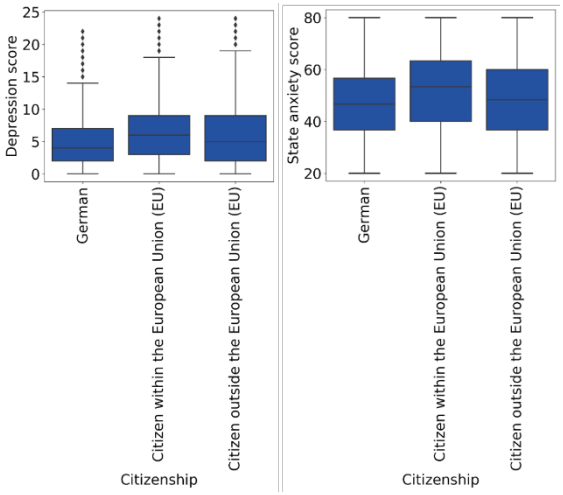


Figure A7: Correlation analysis of "Citizenship" with **(A)** the "Depression score" and **(B)** the "State anxiety score". The plot displays the variation of results without any assumptions of the underlying statistical distribution of the answers. The blue rectangles ("boxes") represent the first, second and third quartiles of the distribution. Lines extending from the rectangles ("whiskers") indicate minimum and maximum values of the distribution. The diamonds show the outliers.

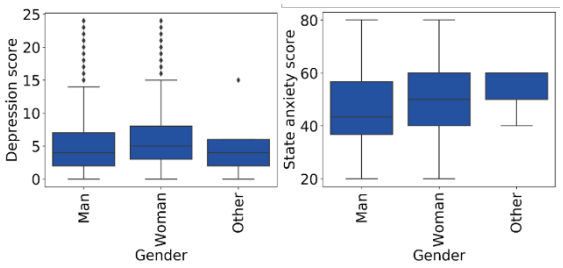


Figure A8: Correlation analysis of "Gender" with **(A)** the "Depression score" and **(B)** the "State anxiety score". The plot displays the variation of results without any assumptions of the underlying statistical distribution of the answers. The blue rectangles ("boxes") represent the first, second and third quartiles of the distribution. Lines extending from the rectangles ("whiskers") indicate minimum and maximum values of the distribution. The diamonds show the outliers.

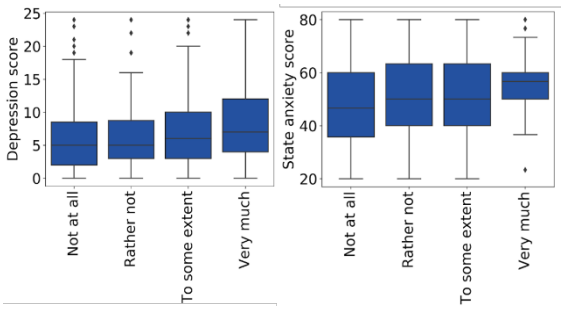


Figure A9: Correlation analysis of "Is language an obstacle for communication with people at your centre?" with **(A)** the "Depression score" and **(B)** the "State anxiety score". The plot displays the variation of results without any assumptions of the underlying statistical distribution of the answers. The blue rectangles ("boxes") represent the first, second and third quartiles of the distribution. Lines extending from the rectangles ("whiskers") indicate minimum and maximum values of the distribution. The diamonds show the outliers.

D. Tables free text answers

Free Text Answer Evaluation	
Question A7	
categories	No. of answers
total	95
no additional comments	6
thank you for survey	2
reasons why survey was not finished/unsure if data should be considered	3
criticism/suggestions for next survey	7
affiliation is not listed institute or more than 1 institute	4
PhD thesis submitted or defense date fix in 2019/at time of survey	8
limited contract	5
unknown date for finishing thesis (disregarding the contract date)	25
Reasons for extended PhD period	
supervision issues	8
university/institution switch (not necessarily topic switch) --> reason for extended PhD time	2
delay due to publication pressure	2
maternity leave included in contract time/thesis duration	13
extension granted	2
unclear financing situation(self-financing required, unemployment money, extra jobs)	4
others	7

Free Text Answer Evaluation	
Question B1	
categories	No. of answers
total	31
scholarship	18
Extra grant	2
third-party funded	1
unemployment money	2
university contract	2
no financing	2
Hiwi contract	1
others	3

Free Text Answer Evaluation	
Question B2	
categories	No. of answers
total	74
TVöD/TVL/related to 50% or less	12
TVöD/TVL/related to 55%	1
TVöD/TVL/related to 60%	7
TVöD/TVL/related to 65% (50% + 15%)	24
TVöD/TVL/related to 75%	15
TVöD/TVL/related to 100%	8
I don't know	2
unclear	5

Free Text Answer Evaluation	
Question B5	
categories	No. of answers
total	453
0	8
1	260
2	103
3	46
> 4	36

Free Text Answer Evaluation	
Question B9	
categories	No. of answers
total	46
personal/own (feeling of) pressure	18
dependency on experiments (ongoing, lab times, ...)	7
pressure (felt) by others (supervisor, colleagues, project,)	7
Other	14

Free Text Answer Evaluation	
Question B10	
categories	No. of answers
total	1039
< 21	303
21-25	126
26-30	266
31-35	10
36-40	324
41-45	1
46-50	6
51-55	1
56-60	1
61-65	1

Free Text Answer Evaluation	
Question B12	
categories	No. of answers
total	165
doctoral representation and other voluntary work	29
scientific communication and outreach	7
Administrative and Organisational things (Communication with Project partners, Ordering, Packing...)	25
Proposal, funding, job application	11
Additional job to finance PhD	5
Supervisors work, technicians work, lab maintenance, helping others, teaching, IT and technical support	34
Personal Development: Soft skills, Courses, Learning, Reading	5
procrastination, private and undefined activities	15
publications, scientific reports	4
Meetings	17
Conferences/Business trips	8
Project work (directly related to thesis or not further defined)	13
Additional projects not related to thesis	9
other	6

Free Text Answer Evaluation	
Question B13	
categories	No. of answers
total	135
comments on questionnaire improvement/changes	16
discrepancies between contract and reality	6
emphasising high workload	19
pressure from others (e.g. supervisor, institute, institute culture,)	11
workload changes/percentages change during doctoral research time	23
extensions	16
contract issues	35

administration time-consuming	6
positive comment	2
other	20

Free Text Answer Evaluation	
Question C5	
categories	No. of answers
total	129
poor supervision	20
Lack of teamwork/Issues with other team members	15
salary	8
discrimination	3
Mental health issues/work-life balance	21
Other personal issues	7
Time pressure/project duration	7
Lack of progress	6
Unclear research goal/topic	10
issues with academia in general	7

career options	7
topic	14
technical or administrative problems	3
other	5

Free Text Answer Evaluation	
Question C7	
categories	No. of answers
total	30
unemployment money	4
Wohngeld	6
Kindergeld	6
extra job	6
Stipend, grants	3
Savings	2
Friends and Family	1
no financial support	1
other	2

Free Text Answer Evaluation	
Question C9	
categories	No. of answers
total	158
1-99 Euro	81
100-199	29
200-299	16
>300	31

Free Text Answer Evaluation	
Question C13	
categories	No. of answers
total	144
Interesting topic/field	55
Nice group (colleagues, supervisor.)	22
location (city)	34
got an offer/successful application/chance	9
career options	13
flexibility	4
disappointing experiences	5
other	8

Free Text Answer Evaluation	
Question C16	
categories	No. of answers
total	103
Career development	6
Administrative difficulties	14
Salary, overtime and contracts	9
Comment on the survey	21
Discrimination, harassment, racism	5
Happy people :)	3
obstacles with soft skills/ courses	6
Work environment/location	7
Unsatisfaction with the supervisor	11
High workload	4
Other	26

Free Text Answer Evaluation	
Question E10	
categories	No. of answers
total	83
Not having enough contact with the supervisor	20
Poor management and leadership skills	19
Miscommunication	8
Unprofessional behaviour and conflicts	16
Lack of knowledge/technical support from supervisor	5
Lack of interest in project by supervisor	4
No problems	3
Needing more supervision from different people	7
Other	7

Free Text Answer Evaluation	
Question E11	
categories	No. of answers
total	99
Problems with TAC meetings or organization	9
Misconduct, harassment by supervisor	17
Lack of knowledge by the supervisor	7
No supervision	6
Comments about the survey	11
Not enough contact with the supervisor/ slow feedback	12
Unsatisfaction with daily supervisor	10
Communication problems by the DR	4
Leadership and organizational problems	4
Supervision improved or good	8
General dissatisfaction	7
Other	19

Free Text Answer Evaluation	
Question G5	
categories	No. of answers
total	72
Trainings, seminars, courses, workshops (soft skills)	33
Meetings and networking	7
Financial support	14
Career planning (courses)	5
Summer schools, retreats and conferences	7
Nothing/None	2
Unclear	7
Language and sport activities	3
Other	3

Free Text Answer Evaluation	
Question G6	
categories	No. of answers
total	65
Problems with the courses (quality and location)	19
Lack of Financial support (conferences...)	16
Comments on Survey	2
Comments on G2	1
Comments on G3	2
Comments for G5	3
Happy people	4
Lack of support for problems on supervision or internationals	2
more than one Grad School or not appropriate	7
Problems in grad school infrastructure (stuff, organization...)	5
Other	11

Free Text Answer Evaluation	
Question H1a	
categories	No. of answers
total	19
Child care	2
Comment about the survey	1
Travel forms	1
Accommodation	2
Stipend application	1
Staying abroad	1
Administration	5
No support	2
No support needed/requested	4

Free Text Answer Evaluation	
Question H1b	
categories	No. of answers
total	33
Internal Administration	3
Administration for internationals (visa, insurance...)	10
Travel	4
Insurance and administration	3
enrolment	3
Funding and scholarship	3
Thesis submission	1
Child care/parental leave	2
Language course	2
Other	3

Free Text Answer Evaluation	
Question H7	
categories	No. of answers
total	93
Activities are far away from me	5
Not enough high ranked scientists attending	1
Events are rare and/or unattractive	27
Comments about H6	11

People are not interested in attending social activities	5
This section does not apply to me	4
Comments about H1	4
No time to attend events	7
Comments about the survey	1
Administration doesn't speak English/ Emails only in German/ Information material on website is only in German	7
Language Barrier	11
Problem with German classes	7
Social events organization	9
Problems enrolling	2
Other	7

Free Text Answer Evaluation	
Question I2	
categories	No. of answers
total	30
conference contribution or other meeting of scientific community (Talk, poster, conference abstract)	12
Software, Tools, Model, Method	2
Review	2
Publication published or submitted	3
Co-authorship	4
publications unrelated to PhD topic	3
other	5
nothing	1

Free Text Answer Evaluation	
Question I5	
categories	No. of answers
total	21
medicine/pharma	7
industry	5
science communication/Graphic Design	3
federal/public institute/Landesamt	2

teacher	1
start-up	1
other	2

support	3
suggestions for courses/conditions	4
other	4

Free Text Answer Evaluation	
Question I10	
categories	No. of answers
total	75
critic/suggestions for next survey I8	9
critic/suggestions for next survey other questions	3
bad German courses	13
unclear regulations on number of publications required for PhD	8
clear regulations on number of publications	4
Lacking preparation for work outside of academia by institutes	15
Supervisors discouraging career/personal development	6
Bad working conditions in academia discourage to pursue this career	8

Free Text Answer Evaluation	
Question J4	
categories	No. of answers
total	11
yes, would use childcare	4
other support (financial, assistant, advice)	4
working conditions	2
other	1

Free Text Answer Evaluation	
Question J6	
categories	No. of answers
total	59
critic/suggestion for next survey/Section does not apply	7
No children because of the project	2
bad attitude towards children (by colleagues or supervisor)	10
limited information on family support	3
administrative difficulties	3
Day-care to short, not enough places, no financial child support, no childcare offered	13
limited contracts/unclear funding	8
Hope for better working conditions at later career stage	2
Cancelled child support	3
ideas for working conditions supporting families (home office, unlimited contract, flexible working hours)	4
positive experiences	3
other	3

Free Text Answer Evaluation	
Question F1	
categories	No. of answers
total	42
Graduate Schools, university	21
Unspecified, external mentor or PhD officer	10
group leader or colleagues members, working council	11
Psychological support	1

Free Text Answer Evaluation	
Question F3	
categories	No. of answers
total	20
Effect after report; Problem solved...	2
...solved alone	1
No effect of the report, because...	
...no specified reason	1
...Fear of dependency and failing	3
...helping institutions (ombuds person/Mediator/Works Council) are powerless	9
Witnessed, not self-experienced	1
Sexual harassment, racism	2

Free Text Answer Evaluation	
Question F8	
categories	No. of answers
total	63
witnessed, not self-experienced	4
offenders are....	
...supervisor or colleagues	15
...external offenders	3
...technician	2
...director	1
badly planned PhD	1
Quitting as consequence of Power Abuse	3
Racism, Discrimination (Asians, doctoral researchers, family...)	8
sexism, sexualized harassment...	8
...and discrimination against woman	7
...discrimination against men	1
critic against survey	1
Happy people	2

Free Text Answer Evaluation	
Question D6	
categories	No. of answers
total	92
Work or Project related problems	26
Supervisor related problems	5
Institute/centre related problems	1
diagnosed mental disorder	9
seeing a therapist	7
mental health situation improved after help	5
no issues or stress not related to work or defence...	9
...physical health	4
...children and family	7
...death	2
...racism	1
suggestions for next survey and critic	6
approval of survey	1
other	5

Free Text Answer Evaluation	
Question L1	
categories	No. of answers
total	180
positive comment about survey	72
critic/suggestions for next survey	53
other	57

E. Acknowledgments

The HeJu Survey and thus also the here presented report was made possible not only by the below mentioned members of the HeJu Survey Group 2019/20 but is a collaborative effort of many contributors, in particular:

All former HeJu Survey Group members, who laid the groundwork for this survey. The HeJu Communications Group for setting up the advertisement of the survey. All fellow HeJus, who organized and advertised the survey at their centres. Marlene Härtel and Maike Nagel as well as Kevin Becker for designing the layout of the survey. Our (former) spokespersons Stephany Taylor, Tim Lienig and Isabela Paredes Cisneros for supporting us in all stages of decision-making, setting up the survey and writing the report. All Helmholtz Centres who approved to have the survey carried out. Further, Helmholtz for financial support of the Helmholtz Juniors through the Helmholtz president Prof. Dr. Otmar Wiestler.

We are grateful to Max Planck PhDnet for sharing with us their programming routines and tools (developed by previous years and current Max Planck PhDnet team) for the survey analysis. And of course, we would like to thank both the Max Planck PhDnet and Leibniz PhD Network for the good and fruitful discussions.

Finally, we would like to thank all survey participants for taking the time to answer our questions.

Many thanks to all involved!

F. About the authors

Carsten Peukert
(HZI, HeJu Survey Group Speaker)

My name is Carsten Peukert and I am a biochemist by training, interested in any innovative way to afford new antibiotics or improve antibiotic delivery over the bacterial cell wall. My doctoral research project focuses on the design, synthesis and biological testing of novel so-called siderophore-conjugates to specifically transport dyes or antimicrobial effectors into bacterial cell in a Trojan Horse approach. What I particularly like about my project, is the interdisciplinary approach, that you have to take in order to successfully take the next step in antibiotic development. When not being in the lab, I love to hang out in the nature, travel a variety of places or calm my everyday life with sports outside. I look forward to the results this report has to offer and the chances it bears regarding the improvement of mental health or power abuse conditions in Helmholtz.

Lara Jacobi
(GEOMAR, HeJu Survey Group Vice-speaker)

My name is Lara and I am a doctoral researcher from GEOMAR - Helmholtz Centre for Ocean Research Kiel. Always

been interested in understanding how the earth works I studied (Marine) Geosciences at the University of Bremen. During this time, I went on my first international offshore expedition and since then I am thrilled to investigate the ocean and its role in climate change. Not surprisingly, I also spend most of my free time outdoors and close to the ocean, while having barbecues at the beach, going cycling, climbing, hiking or running yet I also enjoy more quiet moments playing the piano and the guitar. When becoming a representative at my centre and Helmholtz Junior survey group member I noticed that there is a lack of knowledge about the problems doctoral researchers are facing during their career. Therefore, I hope this report will rise awareness and thus initiate steps to improve our situation.

Jana Geuer
(AWI, HeJu Survey Group speaker 2018)

After studying forensic sciences and biotechnology I decided to pursue my interests in the ocean and chemistry in my doctoral research. Now, I am close to finishing my PhD in marine chemistry at Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research. The time as representative for doctoral researchers was very interesting. Working on the survey with the dedicated HeJus was a particularly exciting experience. I hope the results will help to understand the current situation of doctoral researchers and to further improve it in the future.

Isabela Paredes Cisneros
(DKFZ, Spokesperson 2020)

My name is Isabela and I am in the second year of my doctoral studies at the German Cancer Research Centre (DKFZ) in Heidelberg. I studied Physics in my home-country Colombia, in which I specialized later to conducting my master studies in Medical Physics in Chile. Since 2018 I develop my doctoral thesis in computer simulation of the radiation response of hypoxic tumours at the DKFZ, where I was elected as PhD representative in October 2019, and as one of the Helmholtz Juniors Spokespersons in January 2020. In my free time I enjoy dancing, singing, training Krav Maga, cooking and sunbathing.

Michaela Löffler
(UFZ, Spokesperson 2020)

My name is Michaela and I am currently working on my thesis at the Helmholtz Centre of Environmental Research – UFZ. There, I am investigating the potential effects of hydrogen storage in the subsurface. In my free time I like to paint, game and sew.

Tim Lienig
(FZJ, Spokesperson 2019)

Coming from the Technical University Darmstadt, where I studied Materials Science, I now work as a Doctoral Researcher at the Forschungszentrum Jülich. Work in the field of metal physics and investigate the plastic deformation behaviour of High-Entropy Alloys. After representing the Doctoral Researchers locally at the Forschungszentrum, I was elected Spokesperson of the Helmholtz Juniors in January 2019. In this position I was involved in the development and conduction of the 2019 N² harmonized survey. I am really happy with the turnout and results of the survey and looking forward to the future work of the Helmholtz Juniors which will be based on this data.

Stephanie Taylor
(DZNE, Spokesperson 2019)

Competing nationally in Canada in artistic gymnastics for all my childhood and springboard diving throughout my Bachelor's in Psychology, gave me the confidence, focus and drive to be able to juggle multiple commitments at once. I love being busy and for this reason when I started my PhD at the German Centre for Neurodegenerative Diseases in 2017 I became a member of the representative team. I was elected our centres' Helmholtz Juniors representative and joined the working conditions group shortly thereafter. Using the results of the 2017 Helmholtz Juniors survey we were successfully able to increase both the salaries and vacation days of Doctoral Researchers within Germany. In January 2019 I was then elected co-Spokesperson of the Helmholtz Juniors and was involved in the development and conduction of the 2019 N² harmonized survey. Having been through the process already I look forward to the progress and improvement of working conditions for Doctoral Researcher that the new group of Helmholtz Juniors will achieve based on this data.

Mirjana Gusic (HMGU)

My name is, Mirjana Gusic, and I am a Doctoral Researcher at the Institute of Human Genetics in Helmholtz-Zentrum München (HMGU) and Technical University of Munich, where my research is focused on genetics of mitochondrial disorders, a group of rare metabolic disorders. Currently I am finishing my thesis on the improvement of their genetics diagnosis. During 2017 and 2018 I was a Graduate Student Representative of her centre, as well as a member Helmholtz Juniors, where I was a part of the Survey working group. My origin is Serbia, where I acquired my B. Sc. and M. Sc. degrees in molecular biology. In my free time, she enjoys reading and traveling.

Nina Novakovic (HZB)

My name is Nina Novakovic and I am working as a Doctoral Researcher in Helmholtz-Zentrum Berlin (HZB) and am enrolled in Potsdam University. My field of study is spintronics, and it is focused on optical control of magnetic domains and textures in thin films and complex materials. Since 2018, I have been a doctoral representative at HZB and a member of Helmholtz Juniors survey group. Originally, I come from Novi Sad, Serbia, where I obtained my B. Sc. and M. Sc. in physics. Afterwards I worked for three years as a Teaching Assistant (and Associate) at Faculty of Technical Sciences, University of Novi Sad. In my free time, I like to paint, travel and spend time with her friends and family.

Theresa Kuhl (HMGU)

My name is Theresa Kuhl and I am a microbiologist by training and interested in any kind of microbe-host interaction. My research at the Helmholtz Centre Munich (HMGU) focuses on plant-growth promoting bacteria and their ability to support plant growth (bio fertilizer) and protect the plant against pathogens (biocontrol). I especially like the focus on the positive traits of bacteria in this research field. When not in the lab I love to hang out in nature and I am also a passionate traveller. As scientists we need numbers for everything to support our arguments and demands in a professional way. The survey group delivers these data for the purposes of the Helmholtz Doctoral Researchers. I am very proud to be part of the team and to support ideas of change with real numbers.

Elaheh Ordoni (KIT)

My Name is Elaheh and I am a Ph.D. candidate working at the Institute for Program Structures and Data Organization, at the Karlsruhe Institute of Technology. The main focus of my Ph.D. thesis is supporting data aspect in workflows to guarantee the correctness of business processes. Beside my academic work, I am part of Helmholtz Juniors (HeJu), working in the survey group.

Alexandra Runge (AWI)

I am Alexandra and I have a BSc in Geography from the University of Kiel and a MSc in Geo-Information Science and Earth Observation for Environmental Modelling and Management from the University of Twente and University of

Southampton. I love looking at Earth from space and I am fascinated by the vast range of dynamics and interactions that can be observed and assessed from satellite images. I am very lucky to be able to follow my two passions in my doctoral project. I work at AWI and assess permafrost landscape dynamics in Northeast Siberia during the last twenty years from satellite images. I like connecting to people and also believe that a community can help one another strongly. I therefore joined Helmholtz Juniors and engaged in the survey group helping to realise and assess the survey. In my free time I love being outside and in nature, going on bike rides, running, reading a book in a park or exploring the surrounding from the water on a stand-up paddle board or a kayak. Besides that, I love food and travelling, and especially eating new types of food while travelling.

Oleg Samoylov (IPP)

What do mythological heroes across thousands of years have in common? Call to Adventure. I had my first Call to Adventure when I was in school, where I discovered than one good idea and a couple good written formulas can change the World. That how I appeared in Physics. Short time passed, before I found out that not the author of such great formulas I was about to become. Later, it struck me that the World definitely needs a new source of energy. Nuclear Fusion energy. And here I was, flying to Germany to Max Planck Institute for Plasma Physics to answer this Call. There were already quite some people there. Standing in a line. Since 1960th. So, I took my ticket. This year, I got word that Japanese comrades are about to start a new nuclear fusion machine, but how would they do without me? So, these days, I am learning Japanese in parallel with writing my thesis in magneto hydrodynamics of hot plasmas. I believe that people, who study mythology, can fit a myth to any event happened. Thus, everyone has a chance to be hero of a myth, if one does not take into account many small details... Details that "fritters away our life", as classics say.

Khausik Narasimhan (HZG)

Marlene Härtel
(HZB, HeJu Communication Group Speaker)

My name is Marlene and I am the speaker of the Communication Group of the HeJus. Science communication and networking are very important to me, because I enjoy the exchange with others. I like the creative aspect of making science accessible and understandable to anyone. My research focuses on developing transparent contacts by plasma based physical vapor deposition for solar cells. At the Helmholtz-Zentrum Berlin I work in a very ambitious young investigators group, that breaks efficiency world records for Perovskite tandem solar cells. My contribution to this is to find out why the deposition process of the transparent contacts degenerates the opto-electrical properties of the Perovskite sub-cell and how this can be circumvented. Outside of the lab, I am dedicated to food and sports. I love to cook, try new things and experience the cultural aspect

of eating. The Korean, Thai, Chinese and Vietnamese cuisine are amongst my favorites. I can spend hours preparing food, it's like meditation after a stressful working day to me. To compensate for all of that, I do many sports as well, including Volleyball, Surfing and weight-lifting.

Anna-Lena Amend (HMGU)

I am Anna-Lena and a trained biologist, more precisely, a geneticist! I am happy that for my current research project at HMGU I am able to connect my general interest in metabolism with my training as a geneticist – I research genetic forms of diabetes! I believe that connecting with our surrounding community and having a strong network are essential for us as scientists. I always loved to connect with people, so joining the Helmholtz Juniors just seemed natural to me and I've enjoyed it ever since. Within the Communication Team, we try to communicate our work better to the outside. In my free time, I am an outdoor enthusiast. So, in winter, you can find me skiing, in summer hiking and biking. There's always something new to discover!

Maike Nagel (DZNE)

I am Maike and I studied Molecular Medicine and Cellular and Molecular Neuroscience. I was always fascinated by the human organism and the brain thrills me the most. During my PhD at the German Centre of Neurodegenerative Disorders (DZNE) in Tübingen, I am focusing on a rare neurodegenerative disorder called Hereditary Spastic Paraplegia. The possibility to find out what processes and mechanisms are involved in the disease and thereby maybe discovering a therapy for the patients drives me the most. What I love about my work is the variety between wet lab techniques and the development of new theories or approaches, as well as that I can pursue any of my ideas. My free time belongs almost completely to my family and friends. With them I like to go out for a drink or just enjoy the day by starting with a late breakfast. Whenever there is enough time, I love to go on a city trip or on bigger adventures. I am also a creative mind and spend some time painting, or working on a little interior design project. I joined the communications group to make use of my creativity and to help sharing the wonderful work of the Helmholtz Juniors.

Impressum

Demographics: Carsten Peukert
Working Conditions: Carsten Peukert
Satisfaction: Theresa Kuhl, Lara Jacobi
Supervision: Carsten Peukert
Graduate Schools: Khausik Narasimhan
Integration: Alexandra Runge
Career Development: Alexandra Runge
Family: Alexandra Runge
Power Abuse: Theresa Kuhl
Mental Health: Carsten Peukert
Correlation: Nina Novakovic
Comparison Nacaps: Carsten Peukert
Conclusion: Tim Lienig, Stephanie Taylor

Figures: Theresa Kuhl, Alexandra Runge

Cover Design: Marlene Härtel
Anna-Lena Amend
Maike Nagel

Infographics: Marlene Härtel
Anna-Lena Amend
Maike Nagel

H. The Survey

(A) *[core]* General 7 + 1 (last page)
(B) *[core]* Working conditions 12
(C) *[core]* Satisfaction 15
(E) *[core]* Supervision 10
(G) *[core]* Graduate schools 5
(H) *[core]* Integration 6
(I) *[core]* Career development 10
(J) *[core]* Family 5

n
(F) *[module]* Power Abuse 7
(D) *[module]* Mental health 4

[WELCOME TEXT FIRST PAGE]

First page, welcoming explanation, has to be entirely updated
Welcome to the N^2Survey 2019,

and thank you for participating! This is a voluntary survey for all doctoral researchers working within the Helmholtz Association, IPP Mainz, Leibniz Association and Max Planck Society combined in the platform of the 'Network of Networks' called N^2.

The aim of this survey is to provide a clear picture of the current payment and working conditions, the quality of the supervision and scientific practice, and the family plans of doctoral researchers of the main non-university related institutes in Germany.

Please take the time and carefully read the following terms and conditions:

The data you are providing is evaluated only in aggregated and anonymized form and complies with the General Data Protection Regulation (GDPR). It is not possible to identify you at any moment, as long as you refrain from providing personal data in the comment sections.

The data will be accessible to the members of the Survey Group only. Aggregated and anonymized data will be shared with the administrative bodies of the centres. Moreover, doctoral researcher representatives can request a detailed analysis for their centre / institute [adapt for every association] as long as your anonymity is guaranteed and data security laws are followed.

The survey is hosted on [association specific locations], employing the software solution LimeSurvey. The survey uses a unique token system tied to your E-mail. If you decide to stop your participation in the middle of the survey, collected data will be automatically deleted.

In order for the survey to be representative, it is vital that the majority of doctoral researchers participate. The questionnaire will take between 20 and 30 minutes to complete and contains questions about payment, working and living conditions, supervision, career, and family plans.

If you have questions, or wish to report technical issues, you can reach us at [association specific].

By clicking "Next", you accept the terms and conditions listed above, including the use of the provided data in case you complete the survey.

(A) General

[Explanatory text]
In this section, we ask general questions about yourself and your doctoral research project.

A.1) Which institute / section / centre are you associated with?
[DROP DOWN BASED ON ORGANIZATION]
- I don't want to answer this question

Comments: Institute specific data can be useful to facilitate change in single institutes but needs to be balanced with the need to reduce data collected and ensure anonymity. Will be discussed within Leibniz - not critical for designing the questionnaire. "Associated" chosen as word because it also includes PhDs who are not officially employed by the institutes but only working at the institutes

A.2) In which field do you conduct your doctoral research?
[Show this question only for people from Helmholtz because their centres are not field monocultures]
- I don't want to answer this question

A.3) What is your year of birth?
- [INTEGER]
- I don't want to answer this question

A.4) To which gender identity do you identify most?
- Woman
- Man
- Inter
- Other [FREE TEXT]
- I don't want to answer this question

A.5) What is your citizenship? Should you have multiple citizenships, please select the one you feel best represented by.
- German
- Citizen within the European Union
- Citizen outside of the European Union
- I don't know
- I don't want to answer this question

A.6) When did you start your PhD?
Explanation: The start of your doctoral research is either the start of your contract/stipend or your enrolment in a university as a doctoral researcher, whichever is earlier.
- [YEAR, MONTH] [RESTRICT NUMBER TO -6 YEARS FROM NOW]
- I don't want to answer this question

A.7) When do you expect to submit your PhD Thesis?
- [YEAR, MONTH][RESTRICT NUMBER TO +6 YEARS FROM NOW]
- I don't know
- I don't want to answer this question

(B) Working conditions

[Explanatory text]
In this section, we ask you about your salary or income, possible contract extensions, your working hours or the amount of holidays that are entitled to you.

B.1) How is your doctoral research currently financed (multiple answers possible)?
[expl. text]: *A contract is usually paid according to the TVöD system (e.g. 50% or 65%) and also includes the Fördervertrag. With a stipend you are not legally bound to your workplace, but do not pay into the social security system.*
- Contract
- Stipend
- Unpaid
- Other [FREE TEXT]
- I don't know
- I don't want to answer this question

Comments: define meta categories "contract", "stipend" and "unpaid". Have organization specific possibilities (like Fördervertrag or topped-up stipend) that belong to these meta-categories. Add in the questionnaire: *If you are financed by a scholarship and a top-up contract please select stipend and and contract.*

B.2a) What kind of contract do you have? If you have multiple contracts, please select "Other" and give details.
[FILTER BY "contract" in B.1]
Insert explanation on contracts ...
- TVöD / TvL

- Doktoranden Fördervertrag
- Guest contract
- Other [FREE TEXT]
- I don't want to answer this question

Comments: This is Helmholtz / Leibniz / IPP / Max-Planck dependent. Explanation crucial, because some people might not know what kind of contract they have.

B.2b) What kind of stipend do you have? If you have multiple stipends, please select "Other" and give details.
[explanatory text]: *An internal stipend is granted through your graduate school, institute/centre or the [association]. External stipends are granted through a third party e.g. DFG, DAAD, CSC, foreign associations etc.*

[FILTER BY "stipend" in B.1]
Insert explanation on stipends ...

- Internal stipend
- External stipend
- Other [FREE TEXT]
- I don't want to answer this question

Comments: This is Helmholtz /Leibniz/IPP/MPS dependent. Explanation crucial, because some people might not know what kind of stipend they have.

B.3) Right now, what is your monthly net income for your work at your research organization?
Explanation: Net income is the amount of money transferred to your bank account every month. Do not count any bonuses such as a Christmas bonus etc. Scholarship holders and freelancers: deduct tax and health insurance.

- < 501
- 501-700
- 701-900
- 901-1100
- 1101-1300
- 1301-1500
- 1501-1700
- 1701-1900
- 1901-2100
- 2101-2300
- 2301-2500
- > 2500
- I don't know
- I don't want to answer this question

B.4) How long was the original duration of your contract or stipend related to your PhD project? Please specify the amount of months in the field "Original duration".

- [DROPDOWN: <6months, 6-12 months, 12-24months, 24-36 months, 36-48 months, >48 months]
- I don't want to answer this question

B.5) Did you get an extension or an additional contract/stipend during your PhD? If yes, how many?

- [INTEGER]
- I did not get an extension so far.
- I don't want to answer this question

B.6) Would it be possible for you to extend your contract/stipend for the following reasons?
[ANSWER MATRIX: Yes, No, I don't know, I don't want to answer this question]

- More time needed to complete PhD project
- Parental leave
- Wrap-up phase after completion of the PhD project

B.7) How many holidays per year can you take according to your contract or stipend? Please specify the number of days in the comment field.

- [DROPDOWN <12, 12-17,18-21, 22-27, 28-32, > 32]
- My funding does not specify the number of holidays
- I don't know
- I don't want to answer this question

B.8a) How many days of your entitled holidays did you take in the past year? *[Filter by not "My funding does not specify the number of holidays"]*

- None
- Less than half
- Roughly half
- More than half
- Roughly all of them
- I don't want to answer this question

B.8b) How many days did you take off in the past year? Please specify the number of days in the comment field.
[Filter by not "My funding does not specify the number of holidays"]

- None
- Roughly one week
- Roughly two weeks
- Roughly three weeks
- Roughly four weeks
- More than four weeks
- I don't want to answer this question

B.9) Do you feel free to take days off*?*(multiple answers possible)
[Filter by yes "My funding does not specify the number of holidays"]
[MULTIPLE ANSWERS POSSIBLE]

- Yes
- No, because of pressure from my supervisor(s)
- No, because of high workload
- No, because I am saving up time for a longer period of vacation
- No, because of no special reason
- I don't want to answer this question
- No, because other reason [FREE TEXT]

B.10) On average, how many hours do you typically work per week in total? Please specify the number of hours in the comment field
[expl. text]: W*orking time - that is both for your dissertation and all other tasks you have to perform at your institute or university, for instance project work or meetings (in your office as well as at other places) and teaching*

- [DROPDOWN: <= 20, 20-25, 25-30... 75-80, >=80]
- I don't know
- I don't want to answer this question

B.11) How many hours per week are you expected to work according to your contract? Please specify the number of hours in the field "Hours per week".
[expl. text]: *A 50% contract according to TVöD demands you to work 20h or 19.5h depending on the state you work in (http://oeffentlicher-dienst.info/tvoed/vka-ost/arbeitszeit.html) and spend the remaining 20h on the completition of your thesis.*

- [INTEGER]
- I don't know
- I don't want to answer this question

B.12) What percentage of your working time do you currently spend on average on the following tasks?

- Scientific work directly related to the doctoral research [INTEGER]
- Scientific work not related to the doctoral research (helping other projects, maintenance, etc.) [INTEGER]
- Attending courses and seminars [INTEGER]
- Teaching/supervision [INTEGER]
- Administrative tasks [INTEGER]
- Other, please specify [FREE TEXT] [INTEGER]
- I don't know
- I don't want to answer this question

Comment: Technical implementation: Percentages should add up to 100%

(C)Satisfaction
[expl. text]: In this section, we ask

questions about how satisfied you are with different aspects of your work as a doctoral researcher, e.g. which of them could be improved, what you think about a career in academia, and if you have ever considered quitting your PhD.

C.1) How satisfied are you with the following aspects of your work as a doctoral researcher? [ANSWER POSSIBILITIES: "Very satisfied", "Satisfied", "Neither nor ", "Dissatisfied", "Very dissatisfied", "Does not apply", "I don't want to answer this question"] [RANDOMIZE ANSWER OPTION LISTING]

- Supervision
- Vacation days
- Salary and benefits
- Bureaucracy and administrative support
- Workshops and skills trainings
- Contribution to science
- Technical support
- Career development
- Science communication and outreach
- Psychological support
- Laboratory equipment
- Office equipment (e.g. computer, software, own desk etc.)
- Scientific support
- Family support
- Support for foreign employees
- Work environment and atmosphere
- Workload
- Social life at the institute

C.2) Do you identify with your research centre/institute?

- Yes, very much
- Yes, a bit
- Not quite
- Not at all
- I don't know
- I don't want to answer

C.3) Do you identify with your research organization, the [INSERT ORGANISATION HERE]?

[expl. text]:Your [institute/centre] belongs to the [INSERT ORGANIZATION HERE], a research organization comprised of a total of [INSERT NUMBER OF INSTITUTES/CENTRE HERE] institutes/centres which are located all over Germany [as well as abroad].

- Yes, very much
- Yes, a bit
- Not quite
- Not at all
- I don't know
- I don't want to answer

C.4) Have you ever considered quitting your PhD?

- Never
- Rarely
- Occasionally
- Often
- I don't know
- I don't want to answer this question

C.5) What was/were the reason(s) for considering to quit your PhD? (multiple answers possible)

[MULTIPLE ANSWERS POSSIBLE]
[FILTER BY ANSWER "rarely", "occasionally" OR "often" TO QUESTION C.5)]
[RANDOMIZE ANSWER OPTION LISTING]

- I do not like scientific work.
- I do not like my topic.
- I have problems getting by financially.
- I do not like my working conditions.
- I have work-related difficulties with my supervisor.
- I don't like the social environment at my workplace.
- I have personal difficulties with my supervisor.
- I find my career prospective unattractive.
- I have personal reasons.

– I do not feel qualified enough.
– I have no or poor academic results.
– I find other jobs more interesting.
– I can't cope with the high workload.
– My academic life is not compatible with my family responsibilities.
– My project is not funded anymore.
– I have administrative problems.
– I don't want to answer this question.
– I don't know.
– Other, please specify [FREE TEXT]

C.6) How much do you pay for your rent and associated living costs per month in euros (e.g., heating, gas, water, and electricity)? [expl. text]:Example: Your rent is 600€, you additionally pay 70€ for warm water and heating, 20€ for electricity, 20€ for internet and 10€ for garbage disposal plus elevator fees. This amounts to total costs of 720€.

– [INTEGER, DROPDOWN BOX WITH BINSIZE 100]
– I don't know
– I don't want to answer this question

C.7) Do you get external financial support to cover your living expenses? If yes, who is assisting you financially (multiple answers possible)?
[MULTIPLE ANSWERS POSSIBLE]

– I took up a loan for my time as a doctoral researcher
– Parents
– Other relatives
– Partner(s)
– Other job
– I do not get external financial support
– I don't want to answer this question
– Other, please specify [FREE TEXT]

C.8) How often have you worked during weekends or public holidays in the past year?

[expl. text]:This question asks for work related to your PhD. It is place-independent and includes all work done at your [institute/centre], your home or any other location. It does not include an additional part-time job or other work which is unrelated to your PhD.

– Never
– Less than once per month
– Once per month
– Twice per month
– Three times per month
– Every weekend
– I don't know
– I don't want to answer this question

C.9) Did you spend parts of your salary on items you exclusively used for work in the past year? If yes, how much money in Euros did you spend?

– Yes, I spent the following amount: [INTEGER, DROPDOWN BOX WITH BINSIZE 200]€
– Yes, but I do not know or do not want to disclose the amount
– No
– I don't want to answer this question

C.10) Do you know PhDnet / Leibniz PhD Network / Helmholtz juniors [filter by organization]?

– Yes
– No

C.11) Do you know N2?

– Yes
– No

Add a short paragraph explaining what the PhD-networks and N² are the end of the survey.

C.12) Do you know your current PhD representatives at your institution?

– Yes
– No

C.13) Why did you start your work on your doctoral thesis at your research

centre/institute (multiple answers possible)?
[MULTIPLE ANSWERS POSSIBLE] [RANDOMIZE ANSWER OPTION LISTING]

- Scientific excellence of the institute/centre or my specific group
- Interest in joining a structured PhD program/graduate school
- Interest in working with a specific scientist
- Continuing previous scientific project (internship, Master's thesis, etc.)
- Equipment and working facilities
- Attractiveness of pay and benefits
- Interest in the research being carried out at the institute
- Other, please specify [FREE TEXT]
- I don't know
- I don't want to answer this question

C.14) In general, how do you judge the following aspects of an academic research career?
[ANSWER POSSIBILITIES: "very attractive", "attractive", "neutral", "unattractive", "very unattractive", "I don't want to answer"]

- Salaries in academia
- Availability of permanent positions
- Teaching
- Applying for and obtaining funding
- Service to society
- Workload
- Mobility (i.e., work in different countries or cities)
- Compatibility of own career plans with career plans of partner
- Compatibility of own career plans with having children
- Interesting work
- Diverse topics

C.15) Which of the following aspects of your work as a doctoral researcher would you like to improve? (multiple answers possible)
[ANSWER POSSIBILITIES: "Very much", "To some extent", "Not at all", "I don't want to answer","I don't know"] [RANDOMIZE]

- Supervision
- Vacation days
- Salary and benefits
- Bureaucracy and administrative support
- Workshops and skills trainings
- Contribution to science
- Technical support
- Career development
- Science communication and outreach
- Psychological support
- Laboratory equipment
- Office equipment (e.g. computer, software, own desk etc.)
- Scientific support
- Family support
- Support for foreign employees
- Work environment and atmosphere
- Workload
- Social life at the institute
- I don't know
- I don't want to answer this question

(E) Supervision
[expl. text]: For the following questions, we would like to make the distinction between "formal/primary" and "direct/daily" supervisor clear: "Formal/primary" supervisor refers to the main advisor of your thesis; whereas "direct/daily" supervisor refers to the person you actually consult and discuss your project with on a more regular basis.
E.1) How satisfied are you with your PhD supervision in general?

- Very satisfied
- Satisfied
- Rather satisfied
- Rather dissatisfied
- Dissatisfied

- Very dissatisfied
- I don't know
- I don't want to answer this question

E.2) Do you have... (multiple answers possible)

[MULTIPLE ANSWERS POSSIBLE]

[expl. text shown at each answer possibility]: Explanation PhD supervision agreement: This is a written agreement between the formal/primary supervisor and the doctoral researcher outlining their responsibilities from the beginning of the PhD project until the completion of the doctoral thesis. Explanation project outline: This is a preliminary project plan defining the objectives of the PhD project as well as the methodology to achieve them within the given timeframe of a doctoral research project. Explanation training plan: This is a plan detailing the courses mandatory for the completion of your PhD. Explanation thesis advisory committee: A thesis advisory committee or "TAC" is a group of two or more independent researchers (including your formal/primary supervisor) who you meet on a regular basis, give you advice on how to progress and successfully complete your PhD project.

- a supervision agreement with your first/main supervisor?
- an organization-wide PhD guideline?
- a written project plan ?
- a written training plan?
- a thesis advisory committee (TAC)?
- I don't want to answer this question

E.3) Is your project progress according to your (reviewed) project plan?

[FILTER BY "yes" TO QUESTION E.1) "a written project plan"]

- Yes, I am even ahead
- Yes
- No, I am slightly behind my plan
- No, I am far behind my plan
- I don't know
- I don't want to answer

E.4) How often do you meet your thesis advisory committee?

[FILTER BY "yes" TO QUESTION E1.) "A thesis advisory committee (TAC)"]

- I meet my TAC once per semester or more frequently
- I meet my TAC once per year
- I meet my TAC once during my PhD
- There are no regulations to meet my TAC
- I don't know
- I don't want to answer this question

E.5) Is your formal/primary supervisor your direct/daily supervisor?

The "direct supervisor" refers to the person you consider to be your direct research supervisor or advisor. Please read the explanation at the top of the section for further information.

- Yes
- No
- I don't have a formal/primary supervisor yet
- I don't have a direct/daily supervisor yet
- I don't know
- I don't want to answer this question

E.6) How often do you communicate on average with your daily/direct supervisor about your PhD project?

- Almost daily
- Weekly
- Monthly
- Quarterly
- Six-monthly
- Yearly
- Less than once a year
- Never
- I don't know
- I don't want to answer this question

E.7) How often would you like to communicate with your daily/direct supervisor about your PhD project?

- Almost daily
- Weekly
- Monthly
- Quarterly
- Six-monthly
- Yearly
- Less than once a year
- Never
- I don't know
- I don't want to answer this question

E.8) How often do you communicate on average with your formal/primary supervisor about your PhD project?

- Almost daily or more frequently
- Weekly
- Monthly
- Quarterly
- Six-monthly
- Yearly
- Less than once a year
- Never
- I don't know
- I don't want to answer this question

E.9) Please rate the supervision provided by your first/main supervisor.

[ANSWER POSSIBILITIES: Fully agree; Partially agree; Neither agree nor disagree; Partially disagree; Fully disagree; I don't want to answer this question]

- My supervisor is well informed about my field of research.
- My supervisor is available when I need advice.
- My supervisor is open to and respects my research ideas.
- My supervisor gives constructive feedback.
- My supervisor supports my professional development (establishing contacts, recommending conferences...).
- My supervisor is well informed about my current state of PhD project.
- My supervisor encourages me to work independently.
- My supervisor treats me politely.
- My supervisor treats me professionally.
- My supervisor has strict requirements for my work.
- My supervisor has clear requirements for my work.
- I don't know
- I don't want to answer this question

E.10) Did you ever encounter problems regarding your supervision? (multiple answers possible)

[MULTIPLE ANSWERS POSSIBLE]

- Not enough meetings
- Too many meetings
- Not enough scientific discussion
- Meetings not regular enough
- Not enough experts in your group
- Supervisors not experienced enough in your field
- Not enough feedback
- Not enough encouragement
- Personality of my supervisor
- Disagreement between supervisors
- Other, please specify [FREE TEXT]
- I don't know
- I don't want to answer this question

(G) *Graduate schools*

[expl. text]:*Graduate schools are programs that coordinate and support doctoral researchers. Apart from offering specific lectures and seminars, they may provide interdisciplinary transferable skill courses and if necessary financial support for lab exchanges and international conferences*

G.1) Are you currently registered in a graduate school?

- Yes, at my institution

- Yes, somewhere else
- No
- I don't know
- I don't want to answer this question

G.2) Do you think you profit from being registered in your graduate school?
[FILTER BY "yes" TO G.1)]
- Yes
- No
- I don't know
- I don't want to answer this question

G.3) Why are you not registered?
[FILTER BY "no" TO G.1)]
- I don't want to
- My supervisor does not support it
- There is none available
- No time to enrol yet
- Other reasons
- I don't know
- I don't want to answer this question

G.4) Do you think you would profit from registration in a graduate school?
[FILTER BY "no" TO G.1)]
- Yes
- No
- I don't know
- I don't want to answer

G.5) Which of the listed items are offered to you either by your institute or graduate school? (multiple answers possible)
[MULTIPLE ANSWERS POSSIBLE]
- Financial support for conferences or travel
- Financial support for equipment
- Financial support for publications
- Financial support for PhD organized events
- Soft skill courses and workshops
- Methods courses
- Mobility period
- Career counseling
- German classes
- Other, please specify [FREE TEXT]
- I don't know
- I don't want to answer

(H) Integration
[expl. text]:*In this section, we ask you on how integrated you feel at your [centre/institute] in terms of language barriers and social integration and if you received support with administrative tasks.*

H.1) For which of the following aspects did you receive help from your institute (multiple answers possible)?
[MULTIPLE ANSWERS POSSIBLE]
[RANDOMIZE ANSWER OPTIONS]
[expl. text]:*Explanation 'support': You may have received support to fulfill different administrative tasks and to give you guidance in the process. This support may have been in the form of an information document, personal e-mail or oral correspondence and has been given to you directly or at least upon request. Examples of 'support' can be checklists for University enrolment, visa application, or local resident registration etc.*
- University enrolment
- Onboarding workshop
- Application to a graduate school
- Finding accommodation
- Registering at the local Resident Registration Office
- Visa for my residency
- Translation of working contract and relevant documents
- None of the above
- Other, please specify [FREE TEXT]
- I don't know
- I don't want to answer this question

H.2) Do you speak German?
[FILTER BY not "German" in A.5]
- None
- Beginner
- Intermediate
- Fluent
- Native
- I don't want to answer this question

H.3) Is language an obstacle for communication with people at your centre/institute?

- Yes, very much
- Rather yes, to some extent
- Rather no, generally not
- No, not at all
- I don't know
- I don't want to answer

H.4) Is all the important information (group internal, administrative, your contract/stipend) available in a language you understand?

- All of the information is available to me
- Some of the information is available to me
- No Information is available to me.
- I don't know
- I don't want to answer

H.5) Are you currently taking German language classes? (multiple answers possible)

[FILTER BY NOT "native" IN QUESTION H.2)]

- Yes, at my institution
- Yes, outside my institution
- No
- I don't want to answer this question

H.6) Are there regular social activities in your group or at your institution (e.g., sports events, going out for dinner/drinks, discussion forums, movie nights, etc.)?

- Yes, and I attend them always
- Yes, and I attend them often
- Yes, and I attend them sometimes
- Yes, but I rarely attend them
- Yes, but I do not attend them
- No, there are no social activities
- I don't know
- I don't want to answer

(I) Career development

[expl. text]:*In this section, we ask you about your career plans and how you evaluate the measures in place at your [institute/centre] to prepare you for your future career (publications, transferable skills, soft skills, etc.).*

I.1) Please specify the number and kind of publications (whether published, accepted for publication, or submitted) your university or graduate school requires you to obtain your PhD.

Explanation: If you can choose between multiple graduation options (e.g. monograph and cumulative dissertation), please choose the one you are most likely to do.

[0/1/2/3/4/≥5/I don't know/I don't want to answer this question]

- First author publications in peer reviewed journals
- Co-author publications in peer reviewed journals
- First author other publications
- Co-author other publications
- Presentations, talks, posters (e.g. at your institute, a conference, etc)
- Monograph
- I don't know
- I don't want to answer this question

I.2) Which of the following types of scientific output have you published so far during your doctoral research (multiple answers possible)?

[MULTIPLE ANSWERS POSSIBLE]

- Scientific talks at a conference
- Posters at a conference
- Articles in peer reviewed journals
- Book chapters
- Patent applications
- None of the above
- Other[FREE FIELD]
- I don't want to answer this question

I.3) Have you ever been on a research stay outside your host institute for longer than 2 weeks?
[expl. text]: *A research stay is a period of time ranging from a few weeks to several months, during which you can perform research at another institution.*

- Yes
- No, but my institute supports this
- No, and my institute does not support this
- No
- I don't want to answer this question

I.4) How much would you like to work in the following fields after completing your PhD?
[ANSWER POSSIBILITIES: "Not at all" = 0, "Rather not" = 1, "Indifferent" = 2, "Rather yes" = 3, "Very much" = 4 , "I don't know", "I don't want to answer this question"]
- Academia
- Non-academic scientific research
- Public science-related job (e.g., public relationships or science management)
- Private science-related job (e.g., public relationships or science management)
- Non-scientific job
- Take an extended break
- Start my own business
- Further education (e.g. another PhD, MBA)
- Other, please specify [FREE TEXT]

I.5) Which field do you think you will work in after your PhD (multiple answers possible)?
[MULTIPLE ANSWERS POSSIBLE]
- Academia
- Non-academic scientific research
- Public science-related job (e.g., public relationships or science management)
- Private science-related job (e.g., public relationships or science management)
- Non-scientific job
- Take an extended break
- Start my own business
- Further education (e.g. another PhD, MBA)
- Other, please specify [FREE TEXT]
- I don't know yet
- I don't want to answer this question

I.6) Where would you like to work after you complete your doctoral degree (multiple answers possible)?
- Germany
- Europe, but not Germany
- Outside of Europe
- I don't know
- I don't want to answer this question

I.7) Which of the following measures for your career development are supported by your institute/centre?
[ANSWER POSSIBILITIES: "Yes, to a great extent", "Yes, to a some extent", "No", "I don't know", "I don't want to answer"]
- Mobility period (e.g. internships, research stays,...)
- Language classes
- Mentoring
- Soft skill courses
- Practical courses (e.g. method-oriented courses, ...)
- Transition to a non-academic career (e.g. career fairs, career talks, networking possibilities,...)
- Career development office
- Other[FREE FIELD]

I.8) How does your institute support you in learning German (multiple answers possible)?
[FILTER BY NOT "native " to H.2)]
- My institution offers German courses
- My institution offers monetary support for external courses

- My institution permits attendance of courses during working hours
- My institution does not offer any support
- I don't know
- I don't want to answer this question

I.9) Do you think that you are well trained for a job outside science?
[expl. text]:*A job outside academia can be in industry or public service not related to publicly funded research institutions.*

- Very well trained
- Well trained
- Untrained
- Very untrained
- I don't know
- I don't want to answer this question

(J) Family
[expl. text]: In this section, we ask questions related to family life while conducting your doctoral research project. We are interested in whether you have children and how families are supported by your institute in terms of childcare, organizational and financial aspects.

J.1) Do you have or are you currently expecting children?

- Yes
- No
- I don't know
- I don't want to answer

J.2) Would you consider having (more) children during your doctoral research project? (multiple answers possible)
[MULTIPLE ANSWERS POSSIBLE]

- Yes
- No, because of personal reasons
- No, because I don't have the money to support children
- No, because my working conditions are not family-friendly
- No, because I fear jeopardizing my career
- No, because of other reasons
- I don't know
- I don't want to answer this question

J.3) Does your institute offer support in childcare services? (multiple answers possible)
[MULTIPLE ANSWERS POSSIBLE]

- Access to day-care
- Financial support for day-care
- Child-friendly work environment
- Parent-friendly work environment
- Reimbursements for day-care during business travel
- Home office / mobile work
- I don't know
- I don't want to answer this question

J.4) If your centre offers childcare support do/would you use it?(multiple answers possible)
[MULTIPLE ANSWERS POSSIBLE]

- Yes, access to day-care
- Yes, financial support for daycares
- Yes, possibility to bring my child to work
- Yes, reimbursements for daycares during business travel
- Yes, home office / mobile work
- No
- Other family support, please specify [FREE TEXT]
- I don't know
- I don't want to answer this question

J.5) Do you feel that there is sufficient support (financial and organizational) from your institute for raising a child?

- Yes
- No
- I don't know
- I don't want to answer this question

===== new page to separate from family section =====

A.8) One last question: Would you recommend doing a doctoral research project at your centre/institute to a friend?

- Yes
- No
- I don't know
- I don't want to answer this question

(F) Power abuse [additional module] * shifted to the end compared to previous versions to reduce bias to other sections

[expl. text]: In this section, we ask you about mechanisms for conflict resolution in place at your [institute/centre], conflicts you are experiencing during your PhD, for instance with a superior and your satisfaction with the resolution of these conflicts. A superior in your working context is a person in a position of power over you, for example by having influence on the success of your academic career or the prolongation of your working contract. **Abuse** of **power** describes the behaviour of a superior using their **power**for personal gain and/or to your disadvantage and can take many forms.

F.1) Which of the following mechanisms that can help you in case of a conflict with a superior are you aware of?(multiple answers possible)

[MULTIPLE ANSWERS POSSIBLE]

- Institute Ombudsperson
- Section Ombudsperson
- Institute Works Council
- General Works Council
- Institute Equal Opportunity officer
- Central Equal Opportunity officer
- External law firm
- PhD representatives
- Compliance officer of the Max Planck Society
- Medical services and counseling
- Security service
- Other, please indicate [FREE TEXT]
- I don't want to answer this question

Comment: check above selection for the other organizations. The above selection is for Max Planck. Must be organization specific.

F.2) Did you ever report a conflict with a superior to one of the institutions above?

- Yes
- No
- I don't know
- I don't want to answer this question

F.3) Please indicate the level of satisfaction with the consequences of your report

[FILTER BY "yes" TO QUESTION F.2)]

- Very dissatisfied
- Dissatisfied
- Neither satisfied nor dissatisfied
- Satisfied
- Very satisfied
- Still ongoing
- I don't know
- I don't want to answer this question

F.4) While working at your institute/centre, have you at any point <u>experienced</u> unwanted behaviour that you would call "sexualized harassment"from a superior?

Explanation: such behaviour includes for example: Sexist remarks, different treatment because of your gender, sexist remarks, unwanted attempts to establish a romantic/sexual relationship, unwanted touching, bad/different treatment for refusing to engage in a romantic/sexual relationship, implication that you would advance faster if you agreed to a romantic/sexual relationship.

- Never
- Occasionally
- Monthly
- Weekly

- Daily
- I don't know
- I don't want to answer this question

F.5) While working at your institute/centre, have you at any point witnessedany unwanted behaviour towards a colleague that you would call "sexualized harassment"from a superior?
Explanation: such behaviour includes for example: Sexist remarks, different treatment because of gender, unwanted attempts to establish a romantic/sexual relationship, unwanted touching, bad/different treatment for refusing to engage in a romantic/sexual relationship, implication that they would advance faster if they agreed to a romantic/sexual relationship.

- Never
- Occasionally
- Monthly
- Weekly
- Daily
- I don't know
- I don't want to answer this question

F.6) While working at your institute/centre, have you at any point been subjected tobullying bya superior?
Explanation: "Bullying" here denotes repeated and persistent negative behaviour directed towards one or several individuals, which creates a hostile work environment, including discrimination based on gender, sexual orientation, age, health, culture, ethnicity or religion.

- Never
- Occasionally
- Monthly
- Weekly
- Daily
- I don't know
- I don't want to answer this question

Comments: Explanation will be more detailed.

F.7) While working at your institute/centre, have you at any point witnessed bullying by a superior?
Explanation: "Bullying" here denotes repeated and persistent negative behaviour directed towards one or several individuals, which creates a hostile work environment.

- Never
- Occasionally
- Monthly
- Weekly
- Daily
- I don't know

I don't want to answer this question

(D) Mental health [additional module] * shifted to the end compared to previous versions to reduce bias to other sections
[Expl. text]: In this section, we ask you about your personal, psychological well-being in the context of your doctoral research project. With this section we acknowledge the obstacles, pressure to perform, as well as the impact the latter can have on your mental health.
The term "mental health" has been explained by various scholars, but can be summarized, according to the WHO, as the "subjective well-being, perceived self-efficacy, [...] and self-actualization of one's intellectual and emotional potential, among others."
The questions in this section were adapted from the "State-Trait Anxiety Inventory (STAI) and "Beck's Depression Scale" and enable probing for the frequency of different states of mind. The occurrence of the latter is converted into a score, revealing whether or not different degrees of depression could be present.
We want to, again, stress the importance of confidentiality and anonymity of the answers submitted during your participation of this survey. If you feel

uncomfortable with the questions in this section, please consider replying "I don't want to answer this question" to the questions of this section.

***D.1)Please read each statement below and then indicate how you feel* right now, at this moment.**
[ONLY ONE OF THE OPTIONS BELOW]

- I feel calm
- I feel tense
- I feel upset
- I feel relaxed
- I feel content
- I feel worried
- I don't know
- I don't want to answer this question

D.2) Please read each statement below and then indicate how you* generally *feel.
[ONLY ONE OF THE OPTIONS BELOW]

- I am "calm, cool and collected"
- I feel that difficulties are piling up so that I cannot overcome them
- I worry too much over something that really doesn't matter
- I am happy
- I have disturbing thoughts
- I lack self-confidence
- I feel secure
- I take disappointments so keenly that I can't put them out of my mind
- I feel that difficulties are piling up so that I cannot overcome them
- I don't know
- I don't want to answer this question

D.3) Over the last two weeks, how often have you been bothered by any of the following problems?
[ANSWER POSSIBILITIES: "Not at all" = 0, "Several days" = 1, "More than half the days" = 2, "Nearly every day" = 3]

- Little interest or pleasure in doing things
- Feeling down, depressed or hopeless
- Trouble falling or staying asleep, or sleeping too much
- Feeling tired or having little energy
- Poor appetite or overeating
- Feeling bad about yourself - or that you are a failure or have let yourself or your family down
- Trouble concentrating on things, such as reading the newspaper or watching television
- 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

D.4) If you have been bothered by any problems, how difficult have these problems made it for you to do your work?

- Not difficult at all
- Somewhat difficult
- Very difficult
- Extremely difficult
- I have not been bothered by any problems
- I don't know
- I don't want to answer this question

D5)You answered "I don't want to answer this question" for all questions in block D. We would be interested in your reasons for not answering.
[FILTER: "I don't want to answer this question" FOR D1, D2, D3 AND D4]

- *I feel uncomfortable answering such questions*
- *I can't relate to this type of questions*
- *Other, please specify [FREE TEXT]*
- *I don't want to answer this questions*

[expl. text after section]:
Your mental health is utmost important for the success of your doctoral research project, but also for a happy and fulfilled

private life. This survey aims to raise awareness amongst you, your colleagues and the scientific community, as we all have our moments.
Please do not hesitate to turn to (telephone number, english speaking, web address, PhDnets contact details) one of the included help lines, friends or your doctoral representatives, if especially emotionally touched by these questions.

(Logos) Thank you note:

Thank you very much for your participation in the 2019 survey! The data of the survey is invaluable for the realistic assessment of the situation of doctoral researchers in [association] and the basis for future improvement for their situation. We will carefully analyse the results after the survey closes and will publish the aggregated survey results in the form of a public report as soon as they are available.

This questionnaire has been developed in the framework of N² the "Network of Networks". It represents more than 18.000 doctoral researchers of the Helmholtz Association, the IPP Mainz, the Leibniz Association, and the Max Planck Society. It aims to promote doctoral researchers, focusing on working conditions, career development, supervision, and equal opportunities.

For any questions, comments and concerns, you are welcome to contact us via email, as well as our social network platforms (Twitter, Facebook, Instagram, LinkedIn). You can also find us on the [association] homepage or by getting in touch with the PhD representatives at your centre.

Additional comment box at the very end: "Do you have any feedback regarding the survey you would like to tell us?

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