

Doctoral Researchers in the Leibniz Association: Final Report of the 2017 Leibniz PhD Survey

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Doctoral Researchers in the Leibniz Association: Final Report of the 2017 Leibniz PhD Survey

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1 Preamble

The Leibniz PhD Network was founded in 2016 by a group of doctoral researchers as an initiative for building a platform for cross-disciplinary exchange among all doctoral researchers in the Leibniz Association and to give them a voice. The network is organized in a Steering Group and working groups, which tackle various topics that concern doctoral researchers in the Leibniz Association. The Steering Group is elected on an annual basis by elected representatives of the doctoral researchers within the Leibniz Institutes and Research Museums. One of the aims of the Leibniz PhD Network is to work towards common standards of working conditions for doctoral researchers within the Leibniz Association and help create greater transparency regarding careers within and outside of academia.¹

This report provides for the first time a detailed quantitative description based on survey data of those doctoral researchers who work and perform their research at one of the 91 Leibniz Institutes and Research Museums.² In November 2017, the Leibniz PhD Network sent out invitations via PhD representatives and works councils to the doctoral researchers within the Leibniz Institutes and Leibniz Research Museums to participate in the survey's online questionnaire. More than 1,000 doctoral researchers answered the online survey by early February 2018, resulting in a response rate of 40.5%.³

The chapters of the report follow the structure of the questionnaire, displayed in section 13.4. The report starts with a presentation of demographic information on the doctoral researchers in Chapter 4. In Chapter 5, we present our findings with respect to the types of contracts and stipends issued in the Leibniz Association, as well as the level of payment and the duration of contracts and stipends (among other things). Chapter 6 then deals with the highly important topic of PhD supervision and describes how PhD supervisors might be able to increase the level of satisfaction of their doctoral researchers. Chapters 7 and 8 present tools that Leibniz Institutes use to support the career development of their employees. Moreover, we elaborate on the career aspirations of doctoral researchers within and beyond academia. Chapter 9 focuses on the large group of interna-

¹See <https://leibniz-phd.net> for further information about the Leibniz PhD Network.

²In the meantime, three further non-university research institutes have joined the Leibniz Association. Those institutes were not yet part of the target population when the survey data were collected.

³Section 13.2 provides a comprehensive summary of the methods used in collecting and weighting the data.

tional doctoral researchers and their demand for support in daily life and at their institutes. As the last major chapter, Chapter 10 deals with perceptions of the compatibility of a career in academia with a private life. A special focus will be on those respondents who have to meet parental responsibilities while pursuing their PhD. Last but not least, we briefly touch upon the structures of doctoral representation in the Leibniz Association in Chapter 11.

The present report and the underlying survey are the products of a collaborative process within the Survey Working Group of the Leibniz PhD Network. The survey was developed, conducted, and analyzed by doctoral researchers in various Leibniz Institutes in close collaboration with the Leibniz Head Office, the representation of the works councils, and individual Leibniz Institutes.

The authors of this report would like to thank their colleagues Friedrich Anders, Yannic Brasse, Jennifer Deventer, Susann Grill, Richard Höchenberger, Lisa Hoffmann, Martin Wengenmayr, Yusuf Karatay, Tom Konzack, Martin Schmidt, Stefan Sorge, and Nicky Zunker for all their work during the development and analysis of the Leibniz PhD Survey. We also would like to thank Katharina Willenbücher and Jonathan Stefanowski for their support as Spokespersons of the Leibniz PhD Network, and Leibniz President Matthias Kleiner, Secretary General Bettina Böhm, Vice president Katrin Böhning-Gaese, Johanna Dämmrich, and Sabine Müller for their support and valuable input on behalf of the Leibniz Association and the Leibniz Head Office. Last but not least, we want to thank all the committed and interested PhD representatives who worked with us on the topics addressed in this report during the various General Assemblies of the Leibniz PhD Network.

2 Executive Summary

In general, the survey data illustrate a high level of **overall satisfaction** of respondents with their situation as doctoral researchers at Leibniz Institutes and Research Museums. A little over 65% of our respondents are satisfied or very satisfied with their general situation in their Leibniz Institute. Similarly positive is that these perceptions appear consistent across various groups: Women and men, international and German respondents, doctoral researchers in any of the five Leibniz sections, and stipend holders all express a certain degree of satisfaction with their situation. However, it is striking that doctoral researchers in the early phase of their doctorate are much more satisfied

than those at a later stage. Some dissatisfaction surfaces when it comes to the duration of the doctorate.

A central aspect of satisfaction is how frequently doctoral researchers have considered abandoning their PhD. About 43% of the doctoral researchers indicate that they have thought about **not continuing their doctorate**. This number is larger for German than international respondents (36% vs. 47%); larger for parents (55%) than for non-parents (42%); and larger for those who are mainly funded through working contracts (45%) rather than stipends (35%). The three most important reasons for thinking about not continuing a doctorate are as follows: 66% of the doctoral researchers did so because of an unclear career path or career opportunities; 31% thought they have no or only poor academic results; and 29% did so because of financial insecurities.

According to the survey data, 79% of all doctoral researchers have a working **contract** with their institute. Another 18% of respondents hold a **scholarship or stipend** from an external funding body or their own institute (5%). A small group of stipend holders has an additional working contract (4% of all respondents). Considerable differences with respect to the contracts of doctoral researchers across sections can be observed. The upper limit is set by Section A, in which more than 94% of all respondents have a working contract without an additional stipend, whereas this is the case for only 73% of the respondents working in Section B. We also observe remarkable differences with respect to the citizenship status of our respondents. Only 62% of our international respondents have a working contract and no stipend, which is 27 percentage points fewer than German doctoral researchers (89%).

Among those respondents with a working contract, every third respondent receives a **payment** of 50% TVöD⁴; another 36% are paid between 50 to 65% TVöD; and only 10% of all doctoral researchers in the Leibniz Association hold a working contract with 76% or an even higher fraction of paid working time. Strong differences in the level of payment appear across sections, as Chapter 5.2 shows.

3% of all respondents have an income of less than 950 euros net per month, which defines “relative poverty” in our report.⁵ Remarkable differences become apparent when comparing different groups. Some groups are more affected by the peril of relative poverty. Among the 121 parents,

⁴Tarifvertrag für den Öffentlichen Dienst (TVöD), collective agreement determining the salaries in the public sector

⁵In Germany, individuals earning less than 999 euros net per month are at risk of being relatively poor. For further information, please refer to <http://www.amtliche-sozialberichterstattung.de/A2armutsgefaehrdungsschwellen.html>.

9% are relatively poor⁶, compared to 3% of respondents without children.

The level of **satisfaction with supervision** is relatively high. A majority of the doctoral researchers is satisfied (40%) or even very satisfied (23%) with their PhD supervision. At the same time, as with overall satisfaction, the level of satisfaction with supervision clearly declines over the time of a doctorate. We identified three factors that contribute to a positive perception of the supervision received. Firstly, the supervisors' engagement in the doctoral research, their accessibility, and their awareness of the current state of the research seem to be essential. Secondly, the degree of independence, trust, and friendly interaction are important factors for the level of satisfaction with the supervision. Thirdly, the frequency of communication regarding the research project affects the level of satisfaction with PhD supervision. Doctoral researchers are significantly more satisfied when their supervisor communicates with them at least on a monthly basis. On average, doctoral researchers are granted sufficient time during their working hours to pursue their PhD project. They spend 50% of their working hours on their PhD. 17% of their working hours is dedicated to research not related to their own PhD⁷.

Career development constitutes a crucial aspect of the doctorate. Leibniz Institutes can support doctoral researchers in their career development beyond the provision of good research facilities. We find that for 71% of the doctoral researchers, the costs for conferences involving active participation are fully covered by the respondents' institutes. More than half of the doctoral researchers receive full financial support for specific training. The majority of doctoral researchers have access to training in scientific writing and scientific methods, and can attend graduate schools. Yet there are considerable differences depending on the contractual situation. Doctoral researchers who have a working contract receive almost twice as much support for conferences compared to doctoral researchers with a stipend.

Regarding future development and **career aspirations and perspectives**, about two thirds of the doctoral researchers want to pursue an academic career. Fewer women than men want to stay in

⁶Assuming they are single households.

⁷We summarized the remaining categories in "other activities", since each category taken for itself is rather negligible. Doctoral researchers spend 33% of their time occupied with other activities.

academia. Further, when doctoral researchers decide against pursuing a career in academia, they rarely indicate lacking qualifications or interest as reasons. Rather, the reasons given are frequently precarious employment conditions in academia, which are characterized by limited working contracts, the necessity to be mobile, and low income. Besides pursuing a career in academia, 57% of the doctoral researchers could imagine doing research in various industries; 46% would consider research in the public sector; 36% can imagine pursuing a career in private, non-academic jobs; and 35% want to embark on a career in publicly funded, non-academic jobs.

International doctoral researchers make up one third of doctoral researchers in Leibniz Institutes and Research Museums. We closely examined this group, since international collaborations are important for most Leibniz Institutes and international doctoral researchers need additional support structures. Indeed, half of all international respondents wish to have more support from their institutes (49%). Only four out of ten international respondents state they have a contact person for international researchers at their institute. 40% of international respondents face language barriers at work. An equal proportion of international doctoral researchers do not receive all relevant information in a language they understand.

The **compatibility of life domains** is an important component for doctoral researchers as well. Only 8% of the doctoral researchers declare that being in a partnership and working in academia are not compatible. 35% (strongly) disagree that working in academia is compatible with childcare responsibilities. Differences across the Leibniz sections are present in this perception. An active social life and hobbies are considered incompatible with working in academia for 36% and 26% of the respondents respectively. In addition, 76% of the doctoral researchers think that working in academia creates too much financial insecurity; 55% think it requires them to move too often; and 35% indicate that working in academia is incompatible with making private-life plans. The latter numbers are higher for parents.

3 Fields of Action

High levels of satisfaction among doctoral researchers create a solid basis when tackling areas of improvement and naming possible fields of action. Overall, three out of five doctoral researchers are satisfied or very satisfied with the situation at their Leibniz Institute or Research Museum. Further, about six out of ten doctoral researchers are satisfied or very satisfied with their PhD supervision. Nevertheless, some scope for improvement exists.

First of all, our data show that stipends as an option for funding create income inequality within the Leibniz Association. Additional inequality also exists among those doctoral researchers holding a working contract. There is still a large majority of doctoral researchers employed on contracts below 65% TVöD. In fact, part-time contracts are *not* associated with a lower average working time, as our data shows. Doctoral researchers in the Leibniz Association work on average between 39 to 44 hours per week, no matter how much of this working time is actually paid. Part-time contracts therefore lead to a larger number of unpaid extra hours and to a significantly lower level of hourly recompense for most respondents.

Apart from better payment and improvements to the contractual situations, as well as more research associate positions, institutes could also use more flexible financing tools to improve the situation of doctoral researchers. For example, many respondents wish to have completion grants (27% of all respondents) to finish their PhD without worrying about financial uncertainty. According to the estimations of our respondents, a PhD takes 3.8 years on average to complete, with some differences between sections (see Chapter 4), whereas many positions are limited to three years.

Regarding career development, almost half of the doctoral researchers indicate the need for support and training with respect to grant applications. The survey also inquires whether doctoral researchers benefit by a mentoring program, as mentors can play a crucial role in the career of researchers. The data shows that only one in eight doctoral researchers has access to such a mentor. Completion grants, support for grant applications, and mentoring could provide the means to reverse declining satisfaction rates over the course of a doctorate, in terms of the general situation as well as with regard to supervision. Institutes might further think about more targeted ways

to address the specific needs of doctoral researchers in the later stages of their doctorate, for instance by increasing transparency in terms of their career opportunities within as well as outside of academia. The number of doctoral researchers considering a career outside of academia after their dissertation shows that it is of major importance that Leibniz Institutes and Research Museums consider further measures to prepare their doctoral researchers for alternative career paths.

Scope for improvement exists regarding the integration of international researchers and the balance between working life and private life, especially for doctoral researchers with childcare responsibilities. Chapter 9 reveals potential areas for a transfer of knowledge across Leibniz sections, as present differences in the available support options provide a basis for an exchange of best practices with respect to supporting structures for international researchers. The necessity to empower parents, and especially mothers, to feel prepared for pursuing their PhD and to take up job opportunities in academia is a relevant field of action revealed in Chapter 10.

4 Demographic Description

Main findings from the following chapter:

- The first Leibniz PhD Survey achieved a good response rate: 40.5% of all doctoral researchers employed at Leibniz Institutes participated in the survey. The gender distribution across sections does not differ much from official numbers in the 2017 Leibniz data retrieval.
- 29.2% of all doctoral researchers do not have German citizenship. They come from other EU countries (10.4% of all respondents) or from non-EU countries (18.4% of all respondents).
- Almost 12% of the doctoral researchers are parents of mostly very young children. Only 6% of all parents are single parents raising their child(ren) without a partner.
- A PhD in the Leibniz Association takes 3.8 years (45.2 months) on average to complete. A majority of all respondents (60%) estimate a duration between 3 to 5 years. The duration does not differ significantly across most sections, with only doctoral researchers in Section B estimating a longer duration (4.2 years).
- Living with a child increases the duration of the PhD by half a year on average (when controlling for other variables).

The very first Leibniz PhD Survey provides a unique and detailed description of the doctoral researchers working and researching at Leibniz Institutes and Leibniz Research Museums across Germany. The first questions of the survey asked which of the five different sections of the Leibniz Association the respondents are affiliated with; their citizenship status, gender, and age; how long they have already pursued their PhD for; and how long they think it will approximately take them to finish their PhD (estimated duration).

In total, 1,026 respondents participated in the Leibniz PhD Survey. If we take the data obtained

in the 2017 Leibniz data retrieval⁸ as the most reliable source of information on the number of doctoral researchers in the Leibniz Association, our survey achieved a response rate of 41% of all eligible doctoral researchers at Leibniz Institutes and Leibniz Research Museums (see Figure 1).

4.1 Affiliation with Leibniz Sections

The number of respondents within specific sections mainly follows the aggregate data reported in the Leibniz data retrieval in 2017 (see Table 11 in the Appendix). As Figure 2 shows, sections C and D are the largest sections in our sample, followed by Section B with approximately 20%, and sections A and E around 12%.⁹

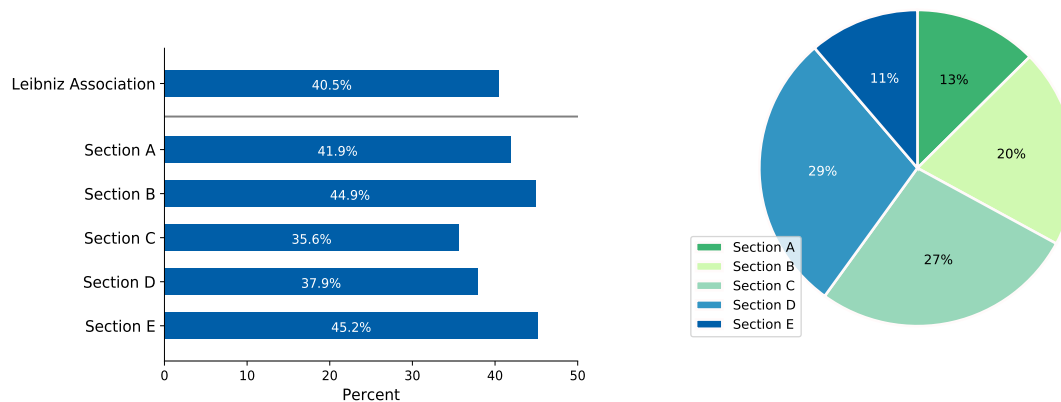


Figure 1: Response rates across sections

Figure 2: Affiliation of respondents with Leibniz sections (unweighted results)

The response rates differ to a certain extent between the sections (see Figure 1). Sections B and E show the highest response rates, with around 45% of all doctoral researchers in these sections. In Section A, 42% of all doctoral researchers participated in the survey. In the two largest Leibniz sections, Section D (38%) and Section C (36%), the survey yielded lower response rates. However, participation in the survey is more or less evenly distributed across sections and the available data allow us to draw some statistical conclusions at the section level.

⁸As of 31st of December 2017

⁹22 respondents preferred not to answer this question and will be excluded in the following analyses whenever weights are applied.

To preserve anonymity, the survey did not focus on the situation of doctoral researchers in individual Leibniz Institutes or Research Museums, but instead on the overall situation of Leibniz researchers and whether this situation differs among the different sections.

4.2 Demographics

Gender

The gender distribution in the sample of respondents is nearly balanced. 54% of all respondents identified as female, compared to 46% of male respondents.¹⁰ Each of the Leibniz sections covers a different scientific discipline or a number of related disciplines (see Table 10 in the Appendix). As a consequence of the varying disciplines, the gender distribution differs across the various Leibniz sections (see Figure 81). This can be observed in the Leibniz data retrieval, as well as in the Leibniz PhD Survey. In our data, approximately 56 to 57% of all respondents in the three sections B, C, and E identified as female. Sections A and D are less gender-balanced. In Section A, nearly 70% of all respondents were female, whereas in Section D only 40% of all respondents were female.

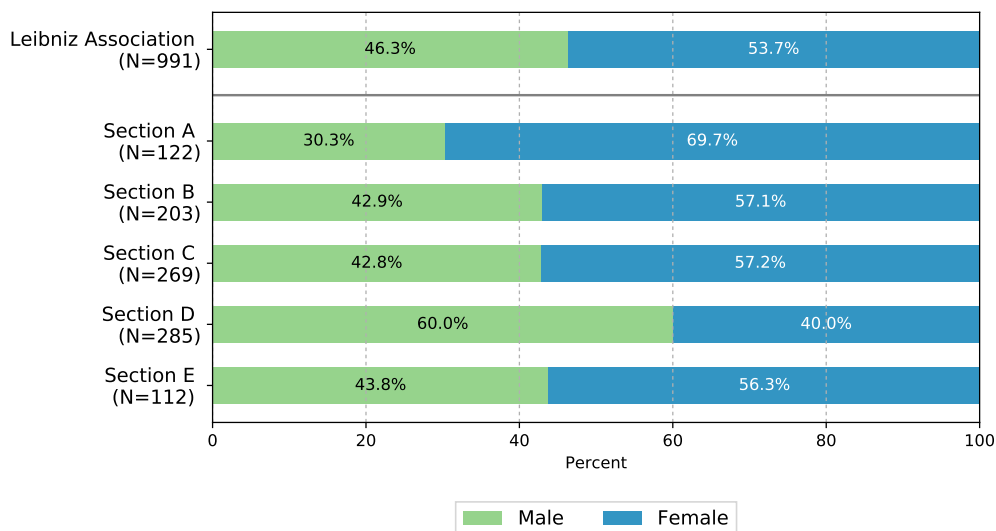


Figure 3: Gender distribution within Leibniz sections (unweighted results)

¹⁰14 respondents did not answer this question and another respondent stated "neither/nor". Due to the very low number of cases in our sample those respondents are not included in the following gender-related analyses.

Comparing the unweighted numbers in the Leibniz PhD Survey to the 2017 Leibniz data retrieval, it seems to be the case that the survey overestimates the number of female doctoral researchers, except in Section C, where the number of women is underestimated by 2 percentage points. In the sections B (8 percentage points), D (8 percentage points), and E (10 percentage points) the number of women is clearly overestimated, whereas the share of women in Section A is very similar in the two data sources (2 percentage points of overestimation in the survey). In the aggregate, the Leibniz PhD Survey overestimates the share of female researchers by about 5.3 percentage points. This gender distortion, as well as the affiliation of respondents reported in Section 4.1, have been corrected by using weights to make the survey estimates meet the aggregate data in the Leibniz data retrieval. Thus, we display only weighted results¹¹.

Age

On average, the respondents are 29.0 years old. Less than 10% of all respondents are younger than 25 years old. A large majority of doctoral researchers are aged between 26 and 30 years (66%), and every fifth doctoral researcher is aged between 30 to 35 years. Only 4% of all respondents are older than 35 years. The average age differs slightly across the various sections. A significant statistical difference can be observed in sections C (28.7 years) and D (28.4 years), where doctoral researchers are younger than in other sections. By contrast, the average age of respondents in Section E is above the overall average age (30.4 years).

Citizenship Status

Nearly every third respondent does not have German citizenship. 10% of the respondents hold citizenship of another EU country. 19% of all respondents are citizens of a non-EU country. 67% of all respondents hold German citizenship, and only 39 respondents report a second citizenship in addition to their German citizenship (4%).¹² The overwhelming majority of international respondents in our survey did not grow up in Germany (98% of the international respondents) and can be classified as first-generation migrants.

¹¹For technical details of the weighting scheme used, see Section 13.2 in the Appendix.

¹²For all subsequent analyses, we added those 39 respondents to the group of respondents with German citizenship.

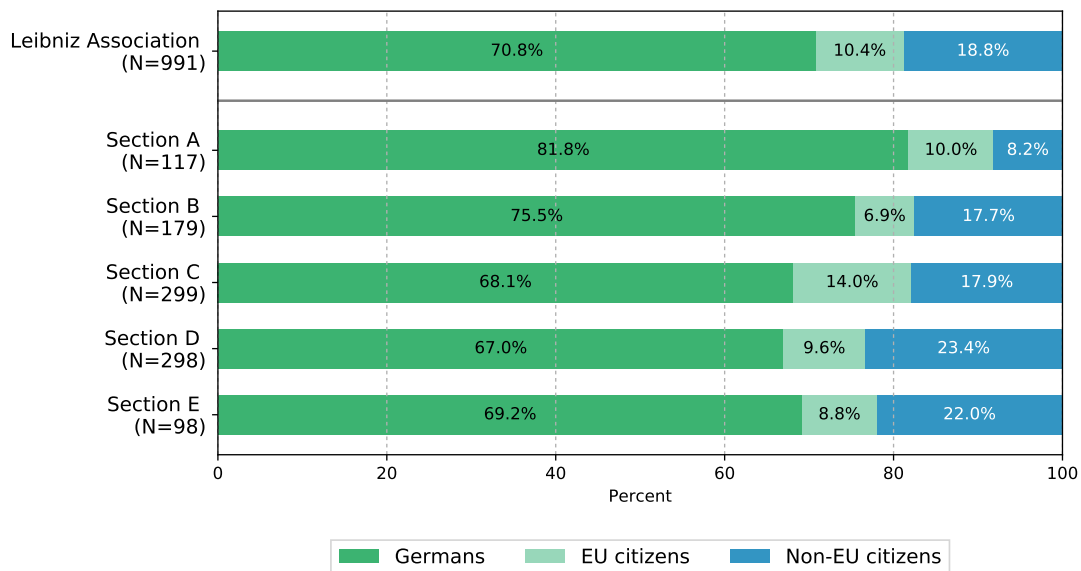


Figure 4: Distribution of citizenship status within Leibniz sections and the Leibniz Association

Regarding the reported citizenship status of our respondents, a comparison with the 2017 Leibniz data retrieval shows a slight overestimation of international doctoral researchers (29% in the survey compared to 27% in the data retrieval). The numbers of international doctoral researchers (with non-German citizenship) in the respective sections mainly follow the results of the Leibniz data retrieval. As with gender distribution, differences occur between the sections with respect to citizenship status (see Figure 4). According to the survey results, 18% of all doctoral researchers in Section A do not hold German citizenship (compared to 13% in the Leibniz data retrieval). By contrast, every third doctoral researcher working for an institute in the sections C to E does hold citizenship of another EU country or another non-EU country (31% in Section E, 32% in Section C, and 33% in Section D). These numbers are very close to the proportions of international doctoral researchers reported in the Leibniz data retrieval (deviations smaller than 3 percentage points). In between, 25% of all doctoral researchers in Section B do not hold German citizenship, according to our survey. Again, the estimated share of foreigners is lower in the Leibniz data retrieval for this section (21%).

Citizenship status and further demographic variables, such as age or gender, are statistically uncorrelated. Thus, the three groups of doctoral researchers with different citizenship statuses in the Leibniz Association do not differ with respect to age and gender.

Parenthood and Relationship Status

Nearly 12% of the Leibniz doctoral researchers indicated in the survey that they or their partner have at least one child who mainly lives in their household. Approximately two out of three parents have one child; 26% have two children; and 9% of the parents have three children living with them in their household.¹³ Many doctoral researchers have very young children. For 94% of all parents, the youngest child is younger than 6. Two thirds of all parents have a child younger than 2 years of age.

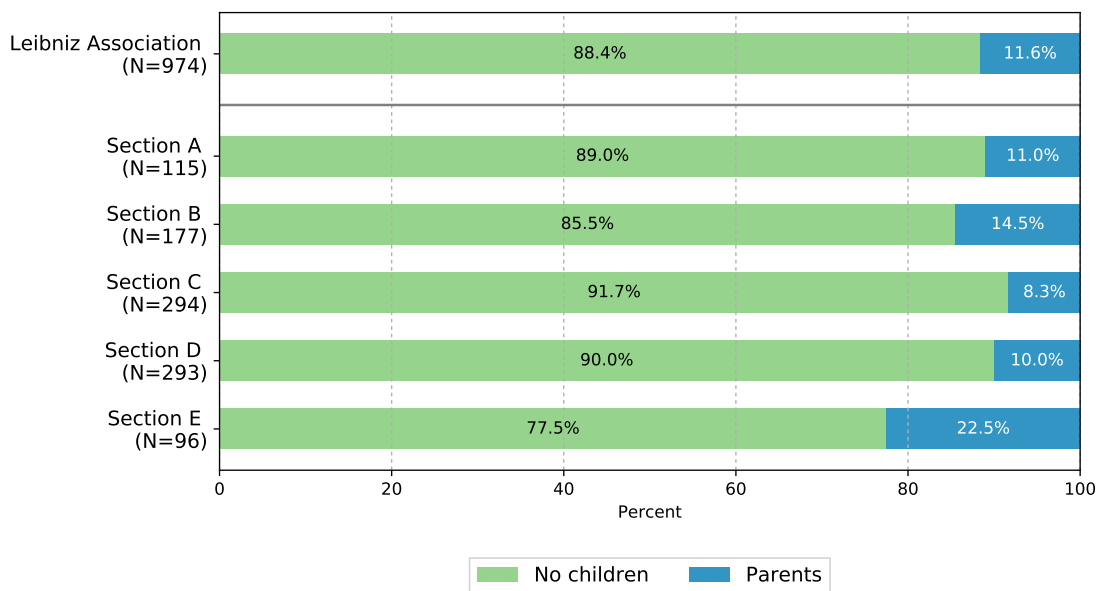


Figure 5: Distribution of parents within Leibniz sections and the Leibniz Association

When examining the number of parents within the Leibniz sections, some differences can be observed (see Figure 5). More than every fifth doctoral researcher in Section E lives with a child, whereas only 10% or an even smaller proportion of doctoral researchers in sections A, C, and D are parents. A multivariate logistic regression shows that parenthood in the Leibniz Association is mainly driven by age (see Table 19 in the Appendix). As Figure 7 shows, the proportion of parents obviously increases with age. The higher mean age in Section E also partly explains the higher

¹³Please note, this definition does *not* cover children living in another place. This might be especially relevant for international doctoral researchers, who might have to leave their children behind in some cases.

share of parents in this section. The likelihood of having children while working as a doctoral researcher in the Leibniz Association is *not* statistically influenced by either the gender (see Figure 6 below and Table 19 in the Appendix) or citizenship status of doctoral researchers.

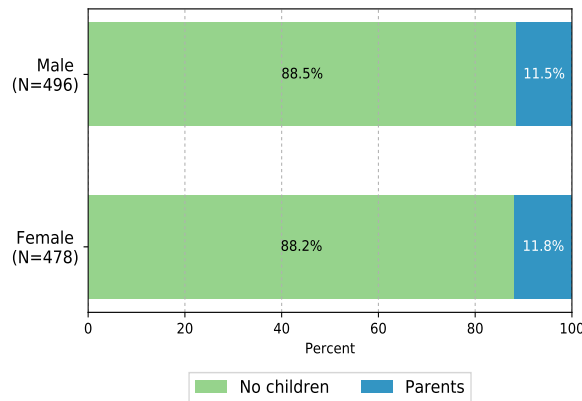


Figure 6: Parenthood across genders

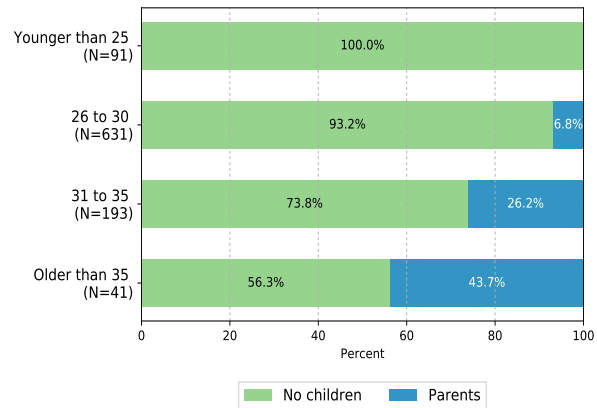


Figure 7: Parents in various age cohorts

The survey asked all respondents about their current family status. Respondents could indicate whether they were single or had a partner (married or unmarried) at the time of the survey. A little less than 36% of the doctoral researchers said they were single; the remaining 64% lived in a partnership. The given answers differ significantly between people with different kinds of passports. Among the doctoral researchers with German citizenship, 70.9% have a partner or are married. Around 57% of the non-German EU citizens and only 44% of those with non-EU citizenship have a partner.¹⁴ The likelihood of living in a relationship increases with age and does not differ between the genders.

Very few parents within the group of respondents seem to raise their child or children without a partner. Only 6% (N = 8) of the doctoral researchers who have children in their household answered that they were single. Owing to the low number of singles with children, we will not use this variable for further analyses.

¹⁴Please note that these differences could be partially explained by different understandings of partnership and social desirability relating to this intimate topic. Some respondents who are in a romantic partnership without being married might consider themselves as single.

4.3 Duration of PhD and Estimated Duration

At the time when the survey interview took place, slightly more than 76% of all respondents were in the first (30%), second (25%), or third (22%) year of their PhD (see Figure 8). Another 14% of the respondents were in their fourth year, and a little more than 10% of all respondents were in their fifth year.

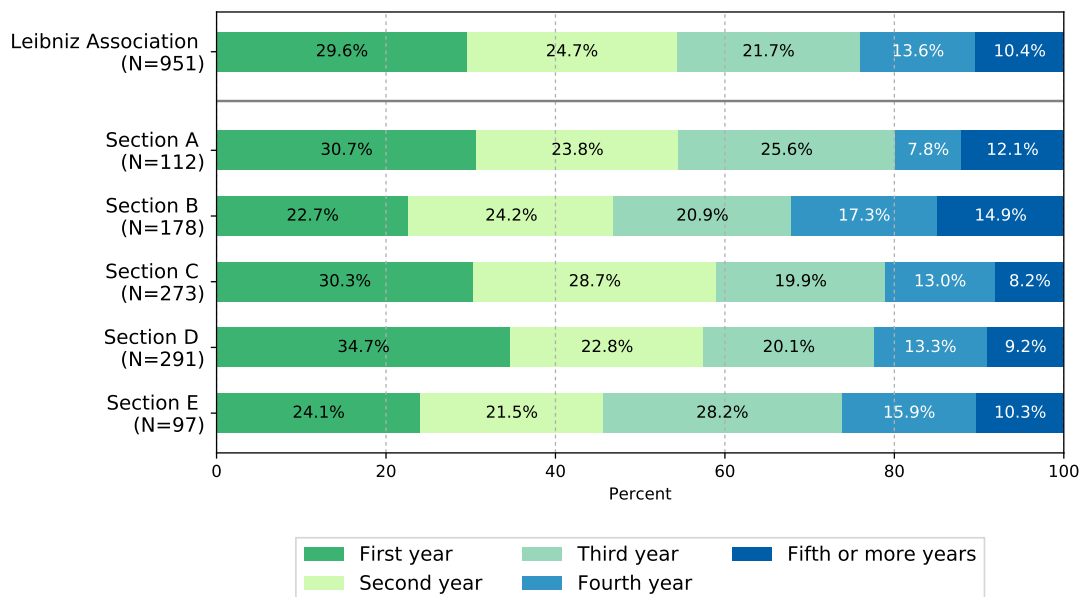


Figure 8: Year of PhD in the Leibniz sections

The survey also asked all respondents in which year and month they expect to submit their PhD thesis. By subtracting the starting point of the PhD from the estimated end date, we were able to calculate the overall (estimated) duration of the PhD for each respondent. On average, doctoral researchers in the Leibniz Association estimate that their PhD will take 3.8 years (45.2 months) to complete. Every third respondent in the Leibniz PhD Survey estimates that the PhD will take less than 3 years (see Figure 9) to complete. However, a majority of all respondents (59%) expects a duration of between 3 and 5 years. Less than 10% of all respondents expect that their PhD will last longer than 5 years. A significant fraction of respondents could not provide us with the end date of their PhD (N = 192).¹⁵

¹⁵A logistic regression of the respondents that did not provide a valid answer to the question of the end date of their

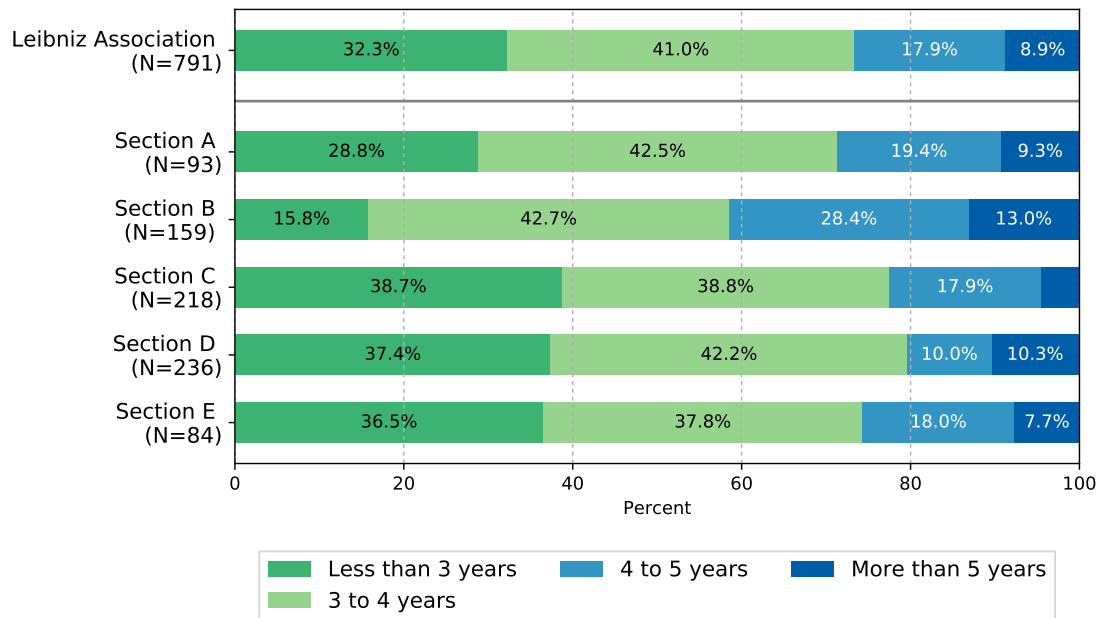


Figure 9: Estimated total duration of PhD

Respondents in Section B estimate the longest duration compared to all other sections (4.2 years), whereas the doctoral researchers working in Section C estimated a duration of 3.6 years. In a multivariate regression on the total estimated duration of the PhD, only the expectations in Section B differed to a significant extent from the reference category (in Section A). Respondents with non-German citizenship, notably non-EU citizens, expect a shorter duration of their PhDs, as do younger respondents. The latter might simply reflect a more optimistic attitude and greater confidence among younger doctoral researchers in finishing their PhD on time, whereas the respondents who already needed more time to work on their doctoral thesis naturally indicated a longer duration (selection effect). With respect to the gender of respondents, no significant differences can be observed. Being a parent significantly extends the estimated duration of the PhD, even when controlling for age. Living with at least one child in the household increases the estimated duration of the PhD by only half a year on average. Further analyses of the compatibility of children and a career in academia are presented in Chapter 10.

PhD only shows a systematic item non-response for the duration of the PhD and for citizenship status. Respondents in the early phase of their PhD could not provide the end date more often. Respondents with German citizenship answered this question less often than respondents from other EU-member countries. With respect to affiliation with Leibniz sections, gender, or age, no systematic item non-response was found.

5 Contracts and Working Conditions

This section focuses on the contractual and working situations of doctoral researchers at the Leibniz Institutes. The survey covers pecuniary aspects such as contractual situation, net income, as well as the duration of the current contract. Moreover, it also addresses a wide range of non-pecuniary aspects, such as satisfaction levels regarding the respondents' situation at the respective Leibniz Institute.

- 65% of the doctoral researchers are either satisfied or very satisfied with the situation at their Leibniz Institute or Research Museum.
- Among those doctoral researchers who have funding, 19% hold a stipend. Among these, 8% have a monthly net income of 951 euros or less.
- On average, the doctoral researchers devote about 50% of their time to their PhD thesis. They spend 17% of their time with other research projects and 32% of their time with other tasks.
- The doctoral researchers could choose among different hypothetical options to improve their financial situation. The three most preferred options were: higher payment (55%), more positions as contracted research assistants (39%), and higher availability of completion grants (27%).

5.1 Satisfaction with the Situation at the Leibniz Institute or Leibniz Research Museum

Satisfaction with the situation at the Leibniz Institute has been inferred from a single-item question. Answers were given on a 6-point Likert scale, with answers ranging from 1 “Very dissatisfied” to 6 “Very satisfied.” Overall, 991 respondents provided valid answers. 65% of the doctoral researchers are either satisfied or very satisfied with the situation at their Leibniz Institute or Research Museum.

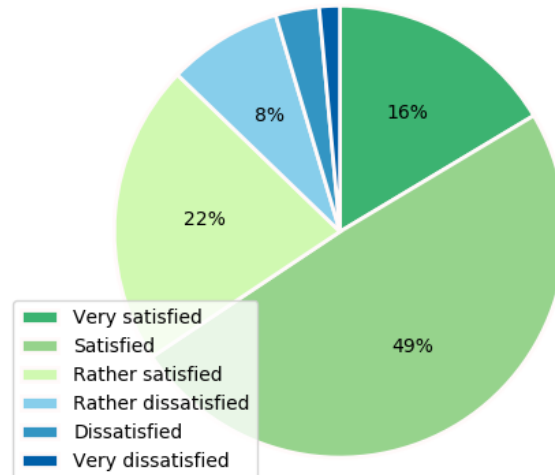


Figure 10: Satisfaction with situation in general at the Leibniz Institute

Year of PhD

If we consider overall satisfaction with respect to the actual year of the doctoral phase, we observe a steady decline in average overall satisfaction. While doctoral researchers in the first year of their PhD phase report an average level of satisfaction with the situation in general of about 4.9, the average declines to 4.3 for those doctoral researchers in the fifth or more year, as depicted in Figure 11. We do not find any substantial differences with respect to gender, section of the Leibniz Association, nationality, or whether the doctoral researchers hold a stipend or a working contract. In order to account for potential collinearities between characteristics of doctoral researchers, we present below the results of a multivariate regression of general level of satisfaction on several characteristics of the doctoral researchers. The results are depicted in Table 12 in the Appendix. The following becomes apparent: Satisfaction with the situation in general is significantly lower in sections C and E, where Section A is the reference category. Moreover, the satisfaction with the situation decreases considerably over the duration of the doctorate.

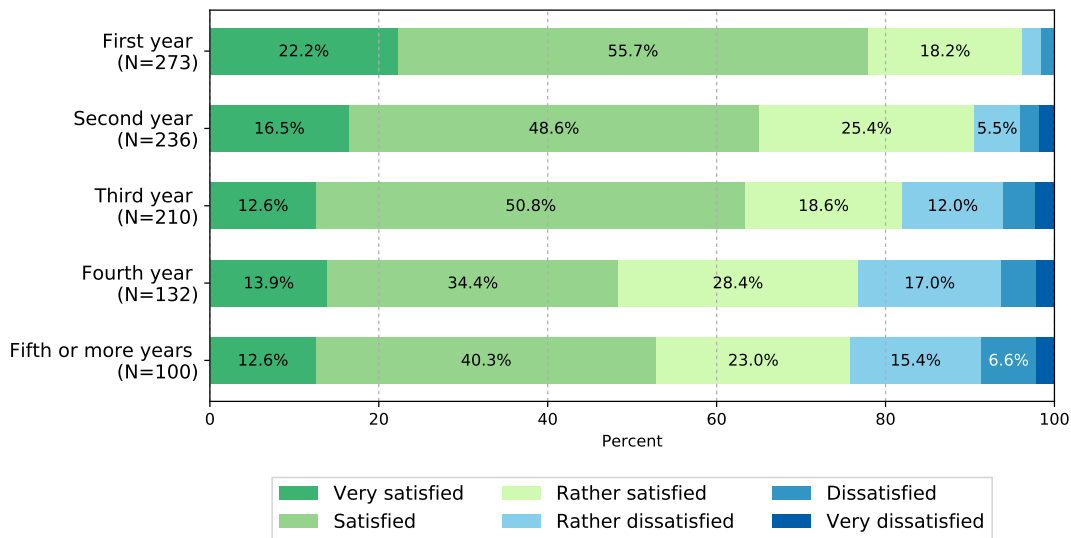


Figure 11: Satisfaction with situation in general at the Leibniz Institute, conditional on the year of the PhD

5.2 Contract Situation

The survey asked how respondents finance their PhD research. Overall, 991 respondents provided valid answers to this question. The distribution is displayed in Figure 12.

In order to facilitate the further analysis, we constructed an indicator which is equal to one if respondents have only a working contract and zero if respondents hold a stipend. Stipend holders with an additional working contract were assigned to the stipend holder group. This necessarily led to the exclusion of respondents who do not receive any funding, any other funding, or who do not know how they are funded. Thus, we used information on 956 respondents who hold either stipends or working contracts or both. Overall, 79% of the 956 respondents have a working contract.

Sections

If we direct our attention towards section differences, we notice that Section A has the highest share of respondents holding only working contracts, with 94%. This is followed by 82% and 81% in sections C and D respectively. In Section E, 81% of the respondents report they hold only working contracts. Lastly, 73% of the respondents in Section B report that they hold only a working contract. Notice that the difference between Section A and Section B in the share of

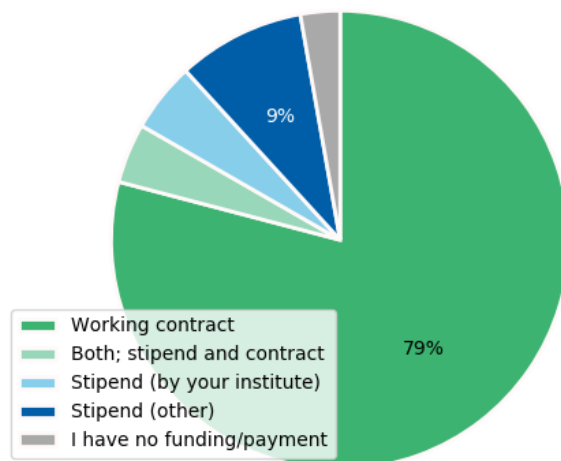


Figure 12: Distribution of funding options in the Leibniz Association

individuals who hold a working contract is about 20 percentage points.

International Doctoral Researchers

When considering differences between international and German doctoral researchers, we infer that 62% of the international researchers hold only a contract, whereas 89% of the German doctoral researchers hold a working contract. This is a difference of about 27 percentage points, which translates into 32% of the baseline mean of 81%.

Year of PhD

As we can infer, there exists a non-linear relation between the share of doctoral researchers holding only a contract and the year of the doctorate of the doctoral researchers. In the first year, 81% hold a working contract. In the second year, about 77% hold a working contract. This number then rises to 88% in the fifth year.

We do not find any gender differences or differences between parents and doctoral researchers who are not considered parents with respect to holding only a working contract as opposed to holding a stipend.

5.3 Level of Payment

We infer the level of pay according to the applicable tariff of the public employers in %.¹⁶ Figure 13 shows the distribution of the level of pay as a percentage of a full-time contract within the Leibniz Association. The categories in the legend refer to the percentage of a 100% working contract. 824 respondents provided valid answers. 3% indicated that they do not know their level of pay or prefer not to answer. 1% of the doctoral researchers in the Leibniz Association have a level of pay of less than 25% of a full-time contract. 1% indicate that they have a contract with 25-49%; 32% have a 50% contract; 37% have a contract of about 51-65%; 18% have a contract of about 66-75% of a full-time contract; 2% have a contract of about 76-99%; and 9% have a contract of 100% of a full-time working contract.

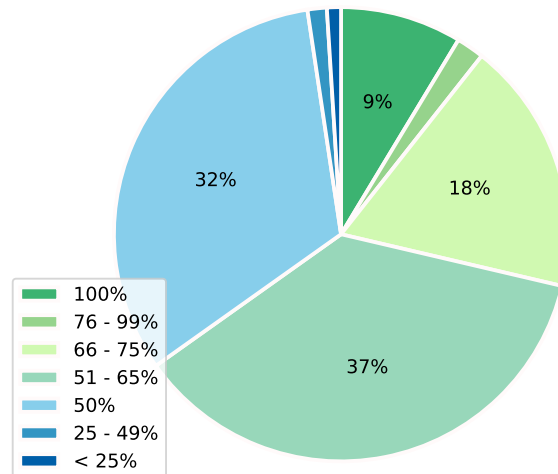


Figure 13: Distribution of the level of payment as a percentage of a full-time working contract. The categories in the legend refer to percentages of a full-time contract

In the following, we construct an indicator which is equal to one if the doctoral researchers have a level of pay of more than 50% of a full-time working contract, conditional on not receiving a

¹⁶On average, the pay of doctoral researchers in Germany is determined in accordance with the applicable scheme of the civil service (TV-L E13). Moreover, doctoral researchers are either employed full-time or part-time. If doctoral researchers work part-time, their employment typically varies between 50% and 100% of a full-time contract. In the following, we refer to the level of payment as a percentage of a full-time contract.

stipend and holding a working contract. This leaves us with 747 respondents, of which 67% have a tariff of more than 50% of a full-time position. We use this indicator in the following analysis of demographic differences.

Sections

Figure 14 displays the share of doctoral researchers holding a contract of more than 50% of a full-time contract. As we can see, considerable variation exists across the sections. For instance, while 89% of Section A hold a working contract with more than 50% of a full-time working contract, only 54% of Section D hold such a working contract.

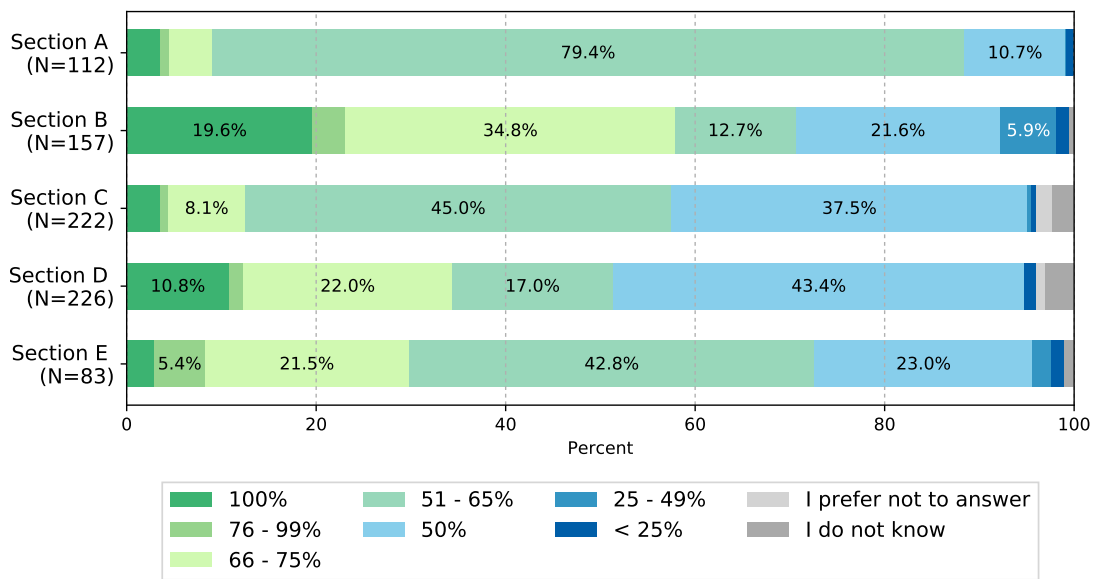


Figure 14: Distribution of the level of payment, conditional on the section

Year of PhD

Over time, the share of doctoral researchers holding a contract with more than 50% tends to increase. In the first year, the share corresponds to 64%; and in the fifth or more year, the share corresponds to 72%.

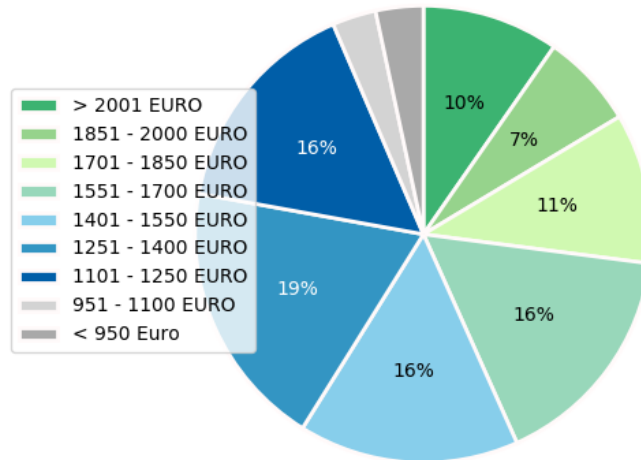


Figure 15: Average monthly net income

International Doctoral Researchers

We see considerable differences between international and German doctoral researchers. 69% of the German doctoral researchers hold a contract which corresponds to more than 50% of a full-time contract. By contrast, 57% of the international researchers hold a contract with more than 50% of a full-time contract. We do not observe any gender differences or any differences across parents and non-parents.

5.4 Average Monthly Net Income

Respondents were asked to indicate their average monthly net income in predefined ranges. Overall, 991 individuals enter the analysis. The first bracket is “below or equal to 500 euros.” Thereafter, the brackets consist of intervals of 150 euros. The last bracket is “More than or equal to 2001 euros.” About 3% of the doctoral researchers preferred not to answer. The mode of the distribution of answers among those who provided valid answers is “1251-1400 euros,” with 19%. The median of the distribution is “1401-1550 euros.” For a better visualization of the answers, we decided to collapse certain income brackets. The distribution is displayed in Figure 15.

We have constructed an indicator which is equal to one if individuals earn below 950 euros. We

chose 950 as a threshold because 999 euros is the threshold value for the definition of relative poverty in Germany¹⁷. Owing to our questionnaire design, we had to choose 950 euros because it is closer to 999 euros than the lower boundary of the next income bracket of 1100 euros. Please keep in mind that this led to underestimates. According to that indicator, 3% earn at most 950 euros net per month. In the following, this indicator will be used.

Sections

We observe some variation in the share of respondents earning at most 950 euros net per month. The smallest share is in Section B with 2%, whereas the highest share, of 6%, is in Section E. This is a difference of four percentage points.

Gender

Focusing on the share of respondents earning below 951 euros across genders, we find that 3% of males are considered relatively poor. By contrast, 4% of the female doctoral researchers are considered relatively poor.

Year of PhD

If we analyze the share of doctoral researchers earning below 951 euros net per month, conditional on the current year of the PhD, we observe that the relation is nonlinear, with a minimum of about 1% in the third year and a maximum of 8% in the fifth or more year.

International Doctoral Researchers

According to our indicator, 7% of the international doctoral researchers have a net income of at most 950 euros net per month. By contrast, 2% of the German doctoral researchers have a net income of at most 950 euros per month.

¹⁷For further information, please see <http://www.amtliche-sozialberichterstattung.de/A2armutsgefaehrungsschwellen.html>.

Parents

9% of the doctoral researchers who are parents have a monthly income of at most 950 euros. By contrast, only 3% of the doctoral researchers who are not parents earn at most 950 euros per month¹⁸.

Contract Situation

8% of all doctoral researchers who hold a stipend earn at most 950 euros per month. By contrast, only 1% of the doctoral researchers who only hold a working contract earn at most 950 euros per month net.

5.5 Average Working Hours

Overall, 917 respondents provided valid information on average hours typically worked per week. The mean number of average hours worked is 42.

Sections

Some variation in hours worked exists across sections of the Leibniz Association. For instance, doctoral researchers in Section A state they work on average 39 hours per week. By contrast, doctoral researchers in Section C indicate they work on average 44 hours per week. Moreover, doctoral researchers in Section B state they work 43 hours per week; doctoral researchers in Section D state they work on average 41 hours per week; and doctoral researchers in Section E state they work on average 40 hours per week.

Gender

Distinguishing between female and male respondents, we conclude that female respondents work on average 41 hours per week. Male respondents report that they work on average 43 hours per week.

¹⁸The definition of relative poverty refers to single households. Unfortunately, we do not have the partner's monthly net income to make a more in-depth comparison

Year of PhD

We clearly see that the average of hours worked increases with the current year of the doctoral phase. While doctoral researchers in the first year work on average 40 hours per week, the number peaks in the fourth year, in which doctoral researchers work on average 44 hours per week.

International Doctoral Researchers

International doctoral researchers indicate they work on average 41 hours per week, whereas German respondents state that they work on average 42 hours per week.

Parents

Those respondents who indicate they have children in the respective household have average weekly working hours of 40 hours. By contrast, respondents who state that they have no children in their household report average weekly working hours of about 42 hours.

Contract Situation

We do not observe meaningful differences between those respondents who get funded solely through working contracts and those who have a stipend. In the following, we focus on the respondents who have a working contract and compare the average number of weekly working hours with the level of payment, measured in percent of a full time position. As Table 1 shows, we do *not* find any statistical correlation between the average working hours and the contractual level of payment. Given that 39 working hours per week correspond to a full time position¹⁹, we can conclude that most respondents work full time or even more, despite the fact that only 9% of the respondents are also paid full time (see section 5.3). Clearly, this points towards a non-trivial share of unpaid working time. For instance, every third doctoral researchers in the Leibniz Association has a 50% position and works on average 22.4 hours per week without being paid. Among those respondents with a full-time position, the number of extra hours amounts to 5.14.

¹⁹See paragraph 6 of the collective agreement for the public service (TVöD).

Table 1: Average weekly working hours conditional on level of payment

Level of payment	Average weekly working hours
less than 25%	37.2
25 to 49%	45.8
50%	41.9
51 to 65%	42.0
66 to 75%	41.3
76 to 99%	39.5
100%	44.1

5.6 Distribution of Working Time

We inferred the distribution of working time in % by means of 15 items, as depicted in the questionnaire in the Appendix. Here, we focus on the two most important categories, “PhD thesis” and “Research projects (not your PhD project).” All other activities are summarized in “Other activities.” In the latter category, we summarize the remainder items

On average, doctoral researchers in the Leibniz Association devote 50% of their working time to their PhD thesis, 17% to research projects unrelated to their PhD project, and 32% to other activities.

Sections

Looking at section differences, we observe that doctoral researchers in sections A and B spend less time on their PhD thesis compared to those in the remaining sections. Doctoral researchers in sections A and B spend on average 46% and 44% respectively on their PhD project, whereas the remaining sections spend on average about 51% of their time on their PhD projects.

Contract Situation

Clearly, those who hold no stipend but a working contract spend less time on their PhD thesis and more time on other research projects than those who hold a stipend. Those who hold a working contract spend 49% of their working hours on their PhD thesis and 18% on other research projects.

By contrast, those with stipends spend on average 54% of their working time on their PhD thesis and 11% on other research projects excluding their PhD thesis.

We do not find any differences with respect to the year of the PhD, gender or nationality.

5.7 Duration of the Current Contract

Figure 16 depicts the distribution of the duration of the current contract, including stipends.

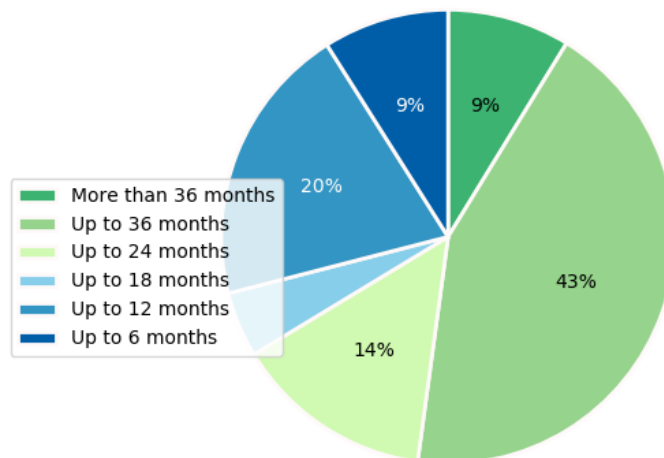


Figure 16: Distribution of contract duration

Sections

Comparing distributions of contract duration across sections of the Leibniz Association, as depicted in Figure 17, we see considerable variation. While all distributions share the same mode of “Up to 36 months,” they do not share the same median. Sections A, B, and E have a median of “Up to 36 months;” sections C and D have a median of “Up to 24 months.”

Parents

Figure 18 shows that parents are more likely than non-parents to have contracts with a duration of more than 36 months, but also contracts of up to 12 months.

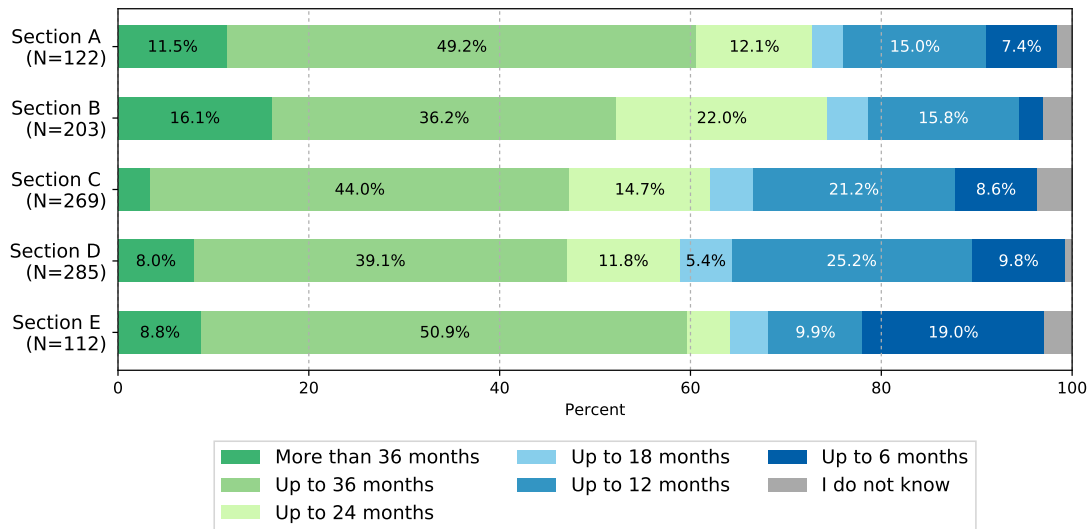


Figure 17: Distribution of contract duration across sections of the Leibniz Association

Contract Situation

Figure 19 displays the distribution of contract duration, conditional on the contractual situation. Stipend holders have on average more contracts running for longer than 36 months, as well as more contracts running up to six or twelve months.

We observe no differences with respect to the gender and nationality of the doctoral researchers, nor to the duration of their doctorate.

5.8 Number of Prior Contracts

The distribution of contracts, including stipends and working contracts, ranges from zero to one hundred. Thereby, 96% of respondents state that they have at most nine prior contracts or stipends. To avoid distortion of the following analysis, we only considered values below ten. After this restriction, the average number of prior contracts is 1.1.

Sections

Doctoral researchers of the Leibniz Association had on average 0.8 prior working contracts in Section A, 1.0 prior working contracts in Section B; 1.2 prior working contracts in Section C; 1.2 in Section D; and 1.1 in Section E.

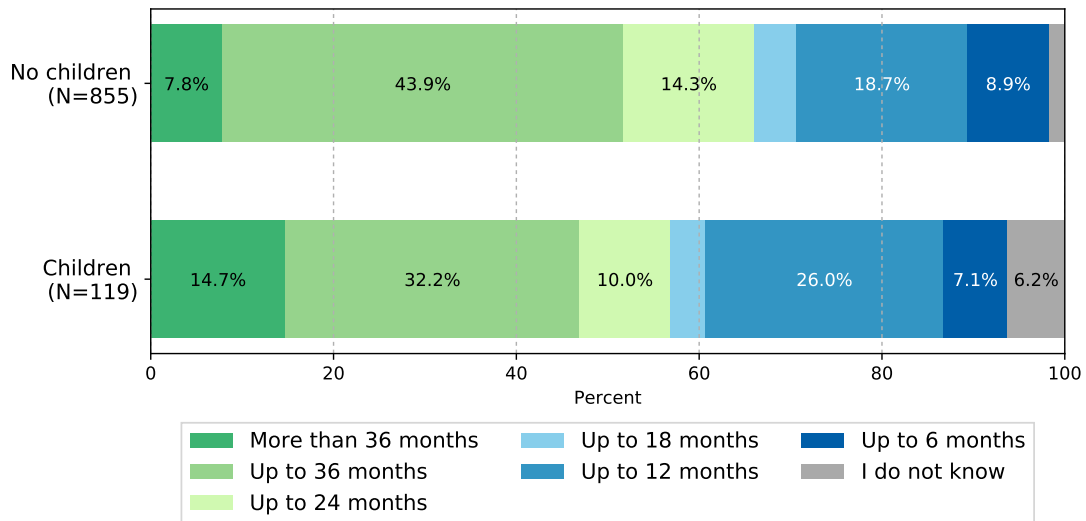


Figure 18: Distribution of contract duration, conditional on parental status

Year of PhD

If we condition on the actual duration of the doctoral phase, we observe that doctoral researchers in the first year have had on average 0.4 prior contracts; those in the second year have had 0.6; doctoral researchers in the third year have had on average 1.2 prior contracts; those in the fourth year, 1.9; and those in the fifth year have had on average 2.9 prior contracts.

International Doctoral Researchers

International doctoral researchers have had on average 0.7 prior working contracts, whereas the German doctoral researchers have had on average 1.2 prior contracts.

Parents

Doctoral researchers with children in their household report that they have had on average 2.0 prior working contracts. By contrast, those who do not have children in their household report on average 1.0 prior working contracts.

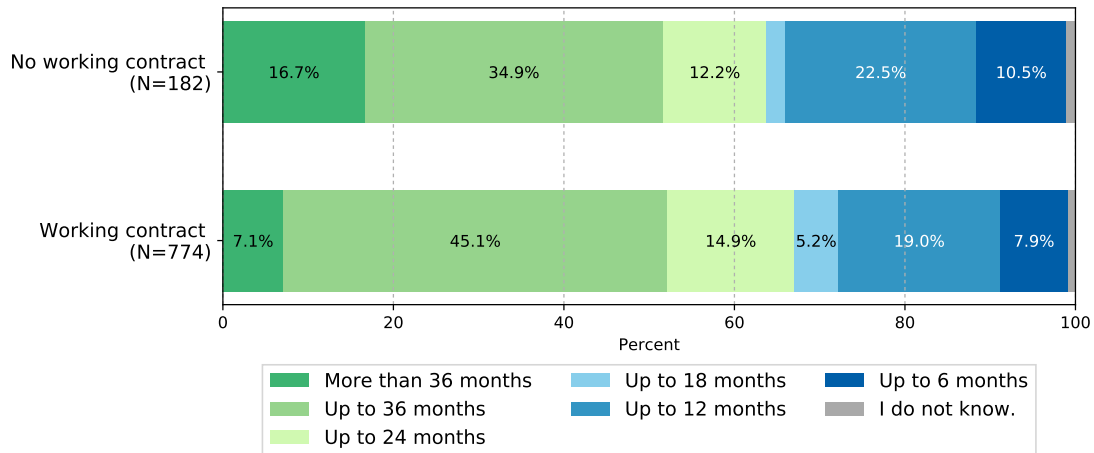


Figure 19: Distribution of contract duration, conditional on contractual situation

Contract Situation

Those doctoral researchers who hold a stipend have had on average 0.8 prior contracts, whereas those with a working contract and no stipend have had on average 1.1 prior contracts.

We found no differences with respect to the gender of the doctoral researchers.

5.9 Potential Improvements to Financial Situation

Among the 991 respondents, 55% state that their financial situation could be improved by a higher payment; 39% indicate their financial situation could be improved with more positions as research associates with contracts; 19% state their financial situation could be improved by greater transparency in funding options; 27% indicate their financial situation could be improved through wider availability of completion grants; 25% indicate that their financial situation could be improved by more follow-up grants; 14% indicate that their financial situation could be improved through wider availability of hardship grants; and 11% do not see any need to improve their financial situation.

Sections

Comparing the need for financial improvements along the different measures, the following becomes apparent: While the need for higher payments ranges from approximately 43% in Section B and 44% in Section E to 50% in Section A, sections D and C are outliers with 64% and 60%

respectively.

While the need for more positions as research associates with working contracts ranges from 35% in Section B, via 36% in Section D to 38% in Section A, the need is a little higher in sections C and E, with 43% and 48% respectively.

The need for transparency in funding opportunities ranges from 15% in Section E, 18% in sections A and B, and 19% in Section C to 21% in Section D.

The indication for a need of completion grants is quite evenly distributed. The share of doctoral researchers demanding completion grants is about 23% to 29% in all sections, except Section E with 36%.

If we focus on the need for follow-up grants, we can see that the need is highest among doctoral researchers in Section E, with 40%. In the other sections, this share ranges from 20% to 28%.

Investigating the need for hardship grants, we observe that the distribution is quite uniform. It ranges from 8% to 13%. The need is somewhat higher in Section C, with 19%.

The last question infers whether doctoral researchers of the Leibniz Association do not need any financial improvements. The share ranges from 6% to 13%. Here, Section B has a somewhat higher share of 18%.

Gender

Considerable differences between males and females can be observed with respect to the need for more positions (36% vs. 42%) and better hardship grants. Moreover, male doctoral researchers indicate more often that they have a need for more hardship grants (9% vs. 19%). Lastly, 9% of the females indicate no need for improvement of their financial situation, compared to 13% of the males.

Year of PhD

Fewer doctoral researchers suggest higher payments as a measure for the improvement of their financial situation as the duration of the doctorate increases. But as the actual duration of the doctoral phase increases, the demand for more positions increases. Moreover, the need for transparency in funding opportunities does not vary with the duration of the doctoral phase.

In addition, while the need for completion grants does not vary with the duration of the doctoral phase, the demand for follow-up grants increases with the duration of the doctoral phase. The demand for hardship grants tends to be unrelated to the duration of the doctoral phase, whereas the demand for any financial improvement decreases with the duration of the doctoral phase and increases if the respondents are in the fifth year or higher.

International Doctoral Researchers

58% of the international respondents would prefer higher payments to improve their financial situation, compared to 54% of the German respondents. Moreover, 43% of all international respondents would prefer more positions, compared to only 38% of German respondents. 24% of international doctoral researchers would see more transparency in funding opportunities as a potential solution to improving their financial situation, whereas 17% of German doctoral researchers see transparency in funding opportunities as a measure to improve their financial situation.

Among international doctoral researchers, 30% consider completion grants an appropriate measure to improve their financial situation. By contrast, 26% of German doctoral researchers regard this as an appropriate measure to improve their financial situation. 24% of the international doctoral researchers would suggest follow-up grants as a way to improve their financial situation, compared to 25% of German doctoral researchers. There exists no difference between international and German doctoral researchers in the need for hardship grants to improve the financial situation of doctoral researchers. Lastly, 7% of the international doctoral researchers see no need to improve their financial situation, whereas 13% of the German doctoral researchers have no need to improve their financial situation.

Parents

In the following, we analyze the distribution of suggestions for financial improvements among those doctoral researchers stating that they have children in their respective household (N=121). While 45% of all doctoral researchers who indicate that they have children in their household state they would favor higher payments, 57% of those doctoral researchers who have no children in their household indicate that they would prefer higher payments. The tendency reverses if we look at the respective difference in preferences regarding more positions. 45% of those who have children

in their household state a need for more positions, whereas only 39% of those with no children indicate a need for more positions. 20% of respondents with children in the household indicate a need for more transparency regarding funding, compared to 19% of those without children in their household. With respect to completion grants, 24% of doctoral researchers who have children in their household state that they see a need for more completion grants, compared to 27% of those who do not have children in their household. 37% of those individuals who have children in their household see a need for follow-up grants, in contrast to 24% of those who do not have children in their household. Moreover, 29% of doctoral researchers who have children in their household have a need for hardship grants, compared to 11% among those who do not have children in their respective household.

Lastly, 10% of doctoral researchers with children in their household see no need for improvements in their financial situation, whereas 11% of doctoral researchers without children in their household hold this opinion.

Contract Situation

We do not see any differences with respect to the demand for higher payments between stipend holders and those with only contracts. But 46% of the stipend holders wish for more positions as research associates, compared to 37% in the other group. There exists no considerable difference with respect to the need for transparency in funding options. 25% of the contract holders wish for more completion grants, whereas 32% of the stipend holders demand more completion grants. 32% of the stipend holders wish for more follow-up grants for preparing proposals, compared to 23% among the contract holders. There exists no differences with respect to the need for hardship grants and for improvement of the financial situation.

6 PhD Supervision

- 63% of the doctoral researchers are satisfied or very satisfied with their PhD supervision. 43% of the doctoral researchers interact at least weekly with their supervisor and 65% of the doctoral researchers have a PhD agreement with their supervisor.
- 43% of the doctoral researchers in the Leibniz Association have thought about not continuing their doctorate. The three most important reasons for this are an unclear career path (66.0%), no or only poor academic results (31.2%), and financial insecurities (29.4%).
- The frequency with the PhD supervisor is the strongest predictor of the satisfaction with PhD supervision. If the supervisor interacts at least monthly with his or her supervisee, compared to never, the satisfaction with the PhD supervision increases by almost one point²⁰. On the other end, if the supervisor interacts almost daily with the supervisee, this increase is about 1.74. This holds even after controlling for a rich set of background characteristics.

6.1 Satisfaction with PhD Supervision

Overall, 63% of the doctoral researchers state they are satisfied or very satisfied with their PhD supervision. About 43% of the doctoral researchers interact at least weekly with their supervisor. Moreover, 65% have a PhD agreement. About 43% of the doctoral researchers have ever thought about not continuing their doctorate. This number increases with the duration of the doctorate and is larger among German respondents as well as among parents and those having a contract and no stipend.

Satisfaction with PhD supervision in general is inferred from answers to the question “How satisfied are you with your PhD supervision in general?” Answers ranged from 1 “Very dissatisfied” to 6 “Very satisfied.” 991 respondents provided valid answers to this question. The distribution of the respondents is depicted in Figure 20.

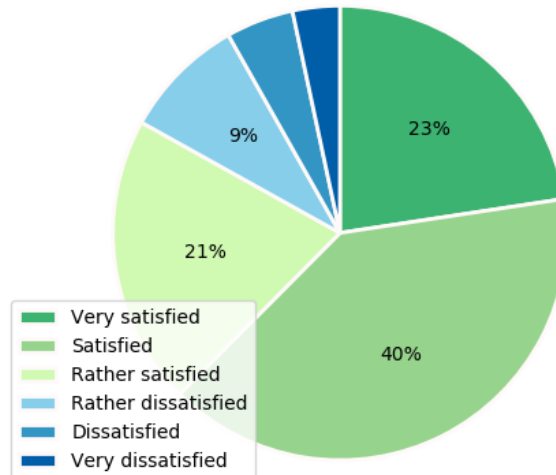


Figure 20: Satisfaction with PhD supervision

Year of PhD

Looking at the development of respondents' level of satisfaction with their PhD supervision over the duration of the doctoral phase, depicted in Figure 21, we see a decline in the mean from 5.0 in the first year to 4.1 for those doctoral researchers who are in their fifth year or higher.

International Doctoral Researchers

If we distinguish between international and German doctoral researchers, we observe that international doctoral researchers have a mean level of satisfaction with their supervision of about 4.7 and the German doctoral researchers have a mean level of satisfaction of about 4.5.

Parents

Differences also emerge when we focus on whether respondents indicate they have children in their household. While those respondents with children in their household have an average level of satisfaction with their supervisor of about 4.2, it is 4.6 for those doctoral researchers who do not have children in their household. Clearly, parenthood is associated with age as well as the current year of the PhD. Therefore, if we account for that, as it can be seen in Table 13, the significance

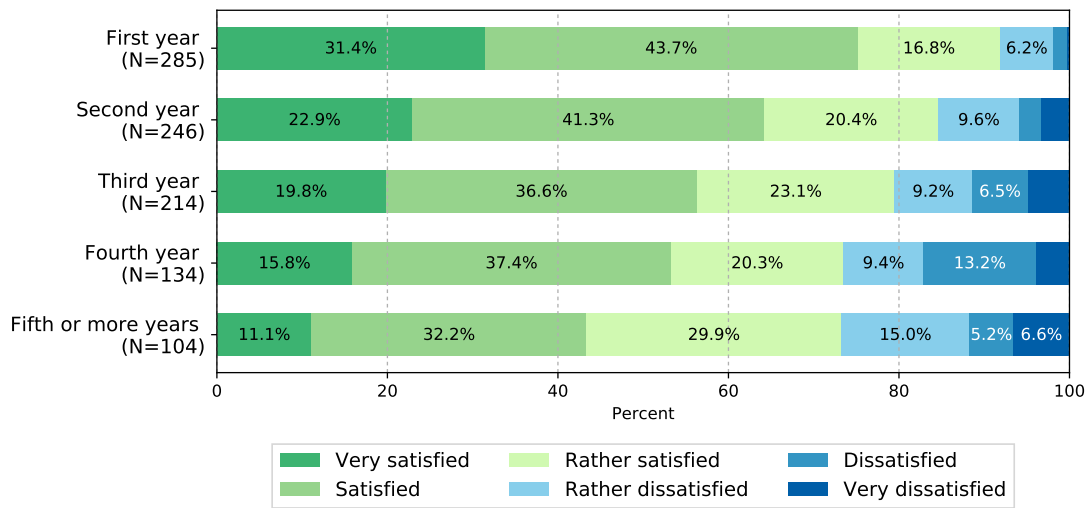


Figure 21: Satisfaction with PhD supervision, conditional on the actual year of the PhD

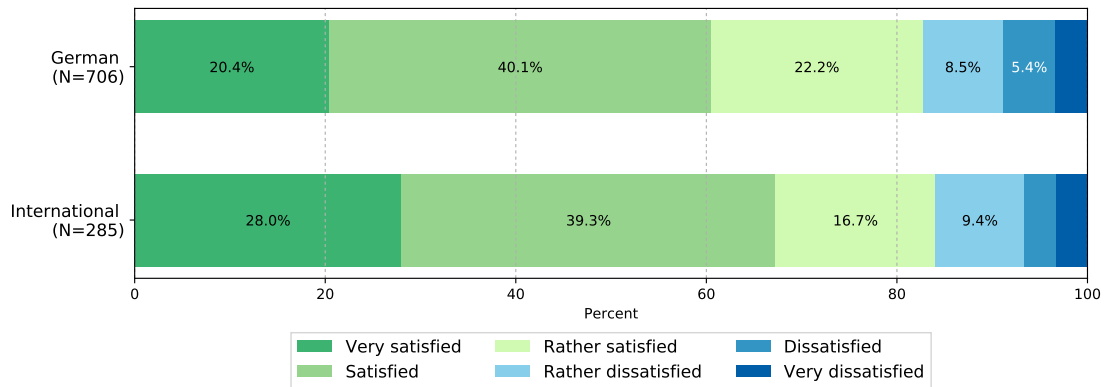


Figure 22: Satisfaction with PhD supervision, conditional on nationality

between parenthood and satisfaction with PhD supervision vanishes.

Contract Situation

Those doctoral researchers with a stipend report an average level of satisfaction with their supervision of about 4.8, whereas those with a working contract but no stipend report an average of about 4.5.

We observe little variation with respect to sections and gender.

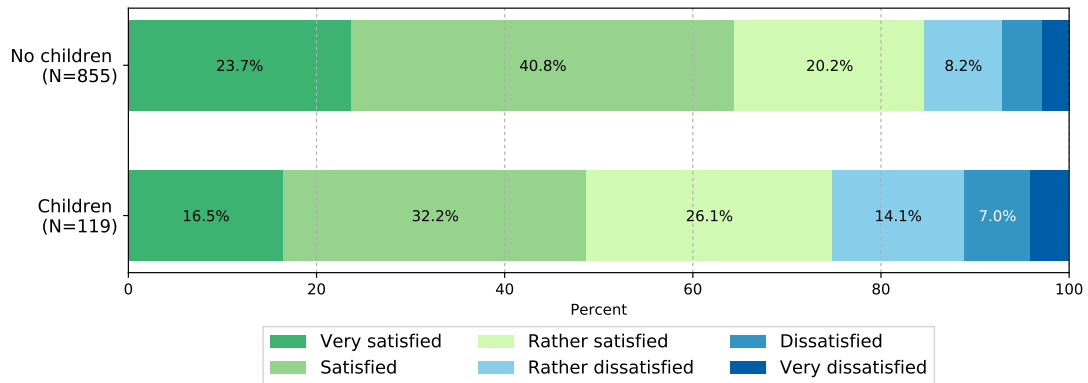


Figure 23: Satisfaction with PhD supervision, conditional on parental status

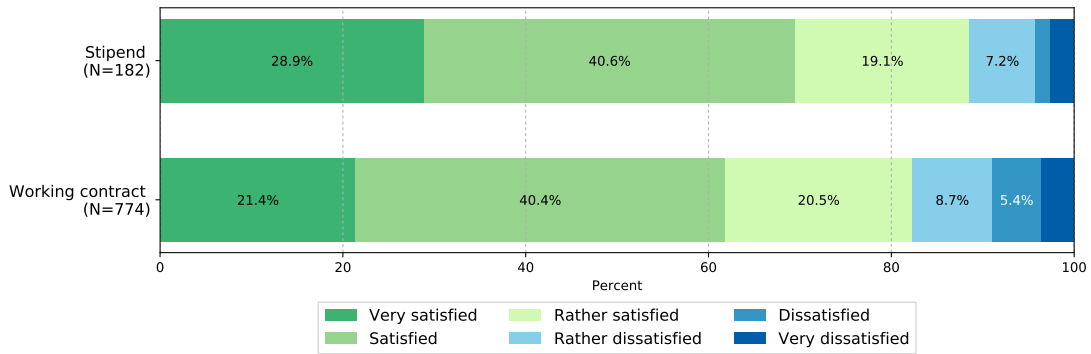


Figure 24: Satisfaction with PhD supervision, conditional on contractual situation

Multivariate Regression

Table 13 displays the results of an OLS regression of satisfaction with PhD supervision based on the characteristics of the doctoral researchers. As we can see, a PhD agreement is positively associated with the level of satisfaction with PhD supervision. Moreover, we also observe that satisfaction with the PhD supervision is negatively associated with the length of the doctorate.

6.2 Employment of First or Main Supervisor

The employment of the first or main supervisor is inferred from the question “Where is your first/main supervisor employed?”²¹ Respondents could give multiple answers, which is why the

²¹Please note that the categories are not mutually exclusive. For instance, a supervisor can be employed at the university or Leibniz Institute, or both. The situation of "both" is the default if a supervisor is the department head, as

percentages do not add up to 100%. The number of valid answers ranged from 975 to 984. The vast majority of doctoral researchers, 84%, have their first or main supervisor at their Leibniz Institute. 29% have their first or main supervisor at a university. More than 15% of all respondents chose both options, implying that these supervisors work for the respective Leibniz Institute and the university. Only 3% of all respondents have a supervisor who does not work for their own Leibniz Institute or for a university.²² Since the majority of doctoral researchers indicated that their first or main supervisor is either employed at their Leibniz Institute or at a university, we focus on these answers in the following analysis.²³

Sections

We observe that the employment status of the first supervisor varies considerably with the sections. In sections A and B, 71% and 72% of supervisors respectively are employed at the Leibniz Institute of the respective respondent. Further, we notice that 85% of supervisors in Section E and 88% of supervisors in Section D are employed at the respective Leibniz Institute. Lastly, 92% of supervisors in Section C are employed at the respective Leibniz Institute.

If we investigate the share of supervisors that are employed at a university, conditional on the section of the respondents, we observe that the share of supervisors employed by universities is 32% in Section A, 43% in Section B, 22% in Section C, 28% in Section D, and 21% in Section E.

Year of PhD

While we do not observe a systematic variation of the share of supervisors employed at the respective Leibniz Institute with respect to the duration of the doctoral phase, we can observe that the share of supervisors employed at a university increases from 24% in the first year of the doctoral phase to 34% in the fifth or more year.

these commonly also hold a professorship.

²²1% of all doctoral researchers have their supervisor at another Leibniz Institute; 1% of the supervisors are retired (Emeritus); 1% do not have a supervisor (yet); and 1% do not know where their supervisor is employed or prefer not to answer.

²³Please note that respondents gave multiple answers. Thus, categories are not mutually exclusive.

International Doctoral Researchers

88% of the supervisors of the international researchers are employed at the respondent's respective Leibniz Institute, compared to 83% of the German doctoral researchers. 26% of the international researchers have a supervisor employed at a university, compared to 30% of the German doctoral researchers.

Contract Situation

86% of the supervisors of doctoral researchers who hold a contract are employed at the respective Leibniz Institute, whereas 80% of the supervisors of those who hold a stipend are employed at the respective Leibniz Institute. Moreover, 33% of the supervisors of those researchers who hold a contract and no stipend are employed at a university, whereas the share is 27% for those researchers who hold a stipend.

We do not observe any differences with respect to gender.

6.3 Frequency of Interaction with PhD Supervisor

The frequency of the interaction is inferred from the question “How often do you communicate on average with your first/main supervisor about your PhD project?” 991 respondents provided valid answers. The distribution is displayed in Figure 25. In Table 13, we can observe that there exists a strong association between the frequency of the interaction with the supervisor and satisfaction with supervision. However, this relation becomes significant if the supervisor meets at least monthly with the supervisor compared to never. Moreover, the effect increases by 50% if the interaction is weekly and almost doubles if the interaction is daily.

Sections

When comparing the distribution of answers across sections, we notice the following: The mode as well as median of the distribution of answers for sections A and B respectively are “Monthly.” By contrast, the mode and median of the distributions in sections C, D, and E are “Weekly.” Thus, doctoral researchers in sections C, D, and E talk more frequently to their supervisor than doctoral researchers in sections A and B.

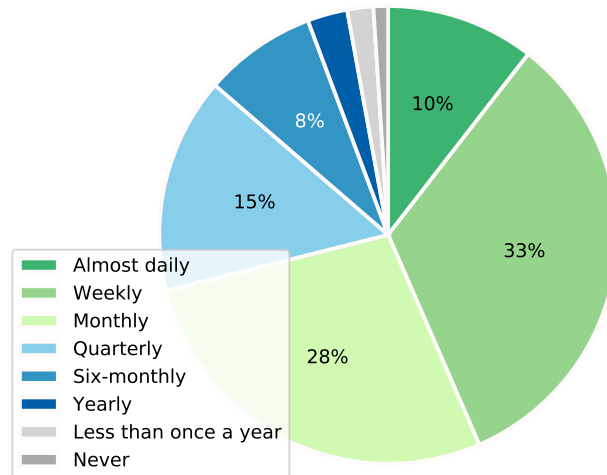


Figure 25: Frequency of interaction with PhD supervisor

Gender

As Figure 27 shows, the distribution of the answers from male and female doctoral researchers shares the same median and mode. Nevertheless, the distribution of male doctoral researchers is more left-skewed. That is, female doctoral researchers talk to their main supervisor less often.

Year of PhD

If we compare the distributions conditional on the duration of the doctoral phase, we observe that individuals tend to communicate less often with their supervisor the longer the doctoral phase lasts.

International Doctoral Researchers

Comparing the distribution of international researchers and German doctoral researchers, we observe that the distribution of international and German doctoral researchers shares the same mode “Weekly,” with 39% and 30% respectively. However, the median for international doctoral researchers is “Weekly,” whereas the median for German doctoral researchers is “Monthly.”

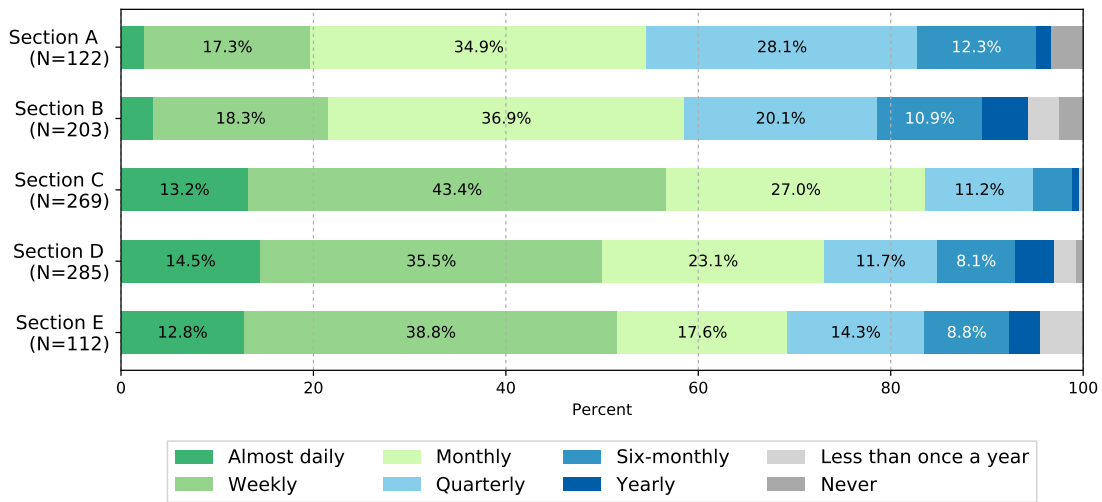


Figure 26: Frequency of interaction with PhD supervisor, conditional on section

Parents

Comparing the distribution of answers between doctoral researchers who state they have children in their household and those who have no children in their household, we notice the following: While both distributions share the same median, which is “Monthly,” they each have a different mode. While the most frequent answer among those doctoral researchers who have children in their household is “Monthly,” the most frequent answer for those with no children in their household is “Weekly.” Thus, doctoral researchers with no children communicate more frequently with their supervisor. We do not observe any differences with respect to the contractual situation.

6.4 PhD Supervision Agreement

As has been shown in Table 13, having a PhD agreement increases the level of satisfaction with PhD supervision. In the survey, we asked whether doctoral researchers of the Leibniz Association have a PhD supervision agreement with their first or main supervisor. Overall, 991 respondents enter the analysis. 65% indicate they have such an agreement with their supervisor. 25% answer that they do not have such a supervision agreement. Lastly, 10% answer that they do not know. The latter group does not further enter the analysis.

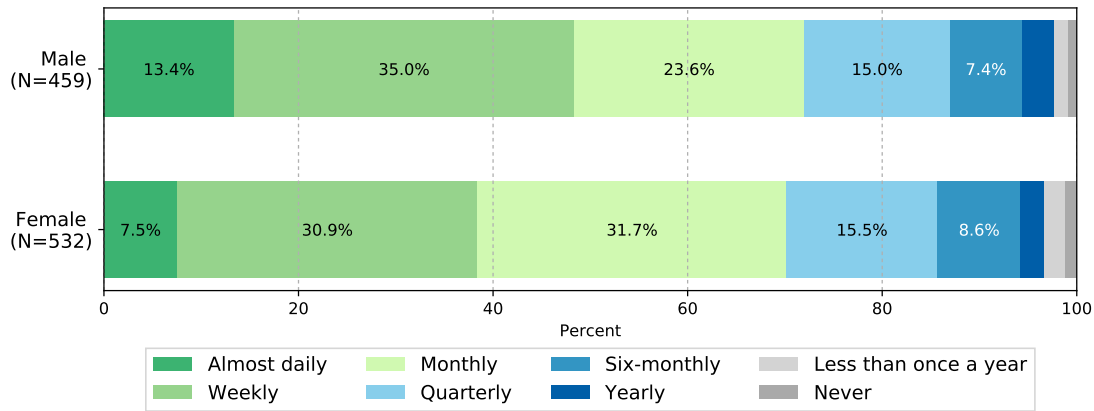


Figure 27: Frequency of interaction, conditional on gender

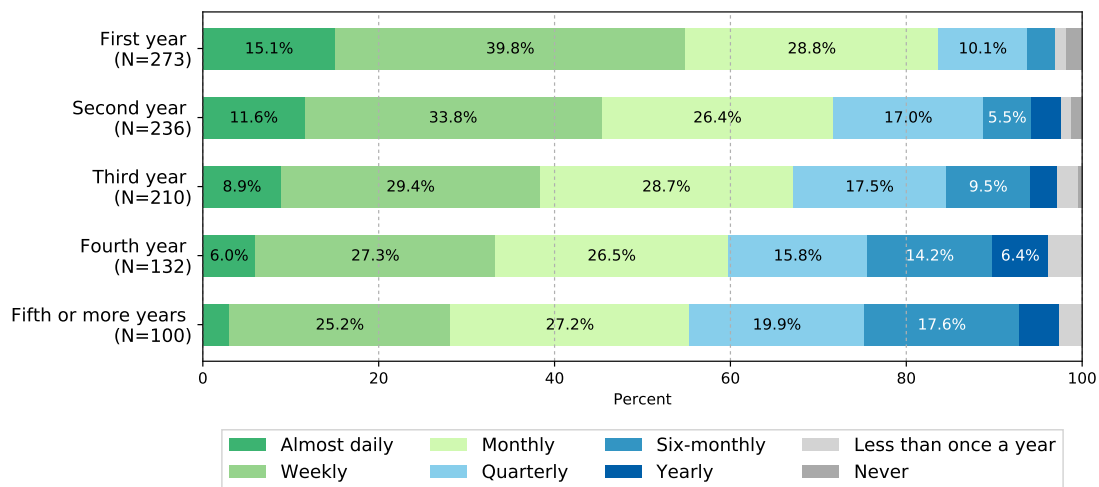


Figure 28: Frequency of interaction with PhD supervisor, conditional on year of the PhD

Sections

Section A hosts the lowest share of doctoral researchers with a supervision agreement. This is followed by sections B to D, with shares ranging from 71% to 74%. The highest share of doctoral researchers with a supervision agreement is in Section E. There, 86% of doctoral researchers have a supervision agreement. The differences between the sections are also statistically significant in a multivariate logistic regression when controlling for various other potential explanatory variables, such as year of PhD, gender, or citizenship status. In fact, the affiliation with a certain section is the most important predictor of having a PhD agreement with the supervisor, leaving potential for

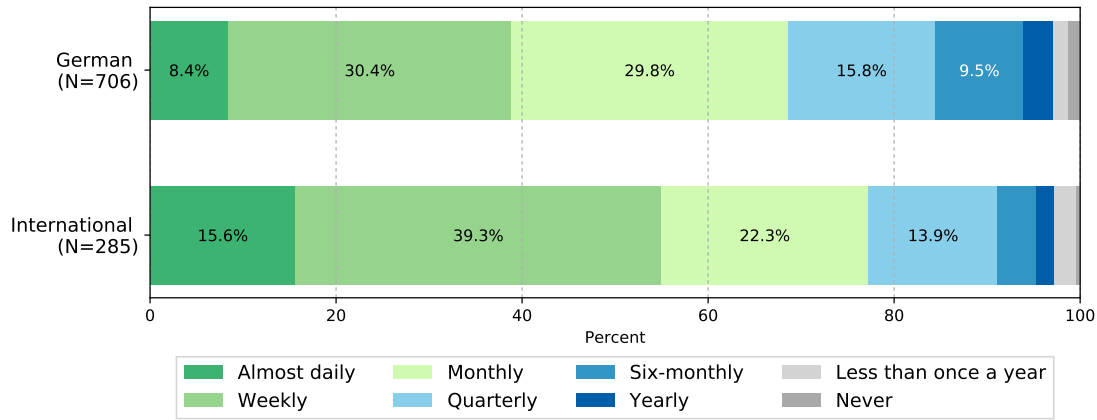


Figure 29: Frequency of interaction with PhD supervisor, conditional on nationality status

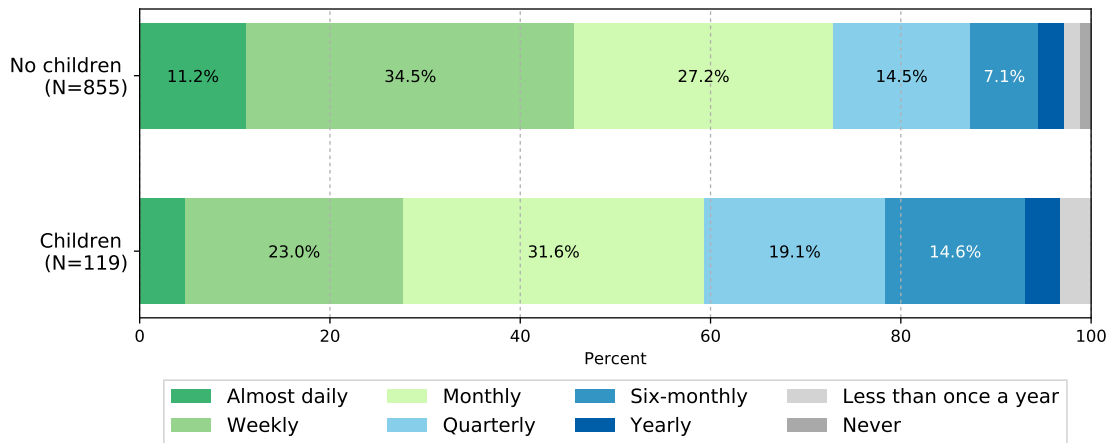


Figure 30: Frequency of interaction with PhD supervisor, conditional on parental status

learning and improvements across disciplines and sections.

Year of PhD

In fact, the trend seems to be positive, since doctoral researchers in an earlier stage of their PhD signed a PhD agreement more often than longstanding doctoral researchers. We observe that the share of doctoral researchers with a supervision agreement increases over time from 72% in the first year up to 78% in the fourth year. But in the fifth or higher year, the share of doctoral researchers with a PhD agreement decreases to 53%.

Moreover, we observe no differences with respect to gender or nationality, with respect to whether doctoral researchers are parents or not, or with respect to the contractual situation.

6.5 Rating of Supervision from First Supervisor

We infer the rating of the supervision from nine items. Answers are given on a five-point Likert scale ranging from 1 “Fully disagree” to 5 “Fully agree.” The questions are displayed under B.12 in the questionnaire in the Appendix. We performed a factor analysis and applied a promax rotation. We decided to rely on two factors which explain a considerable share of the variation across items and can be interpreted in a sensible manner. The resulting factor loadings are displayed in Table 14.

The first factor is positively associated with high ratings on “My supervisor gives constructive feedback,” “My supervisor is available when I need advice,” “My supervisor advises me in terms of career development,” “My supervisor is well informed about my current state of work,” “My supervisor gives me reliable and consistent advice,” and “My supervisor is well informed about my field of research.” Thus, we characterize this factor as reflecting the involvement of the supervisor and call this factor “Involvement.”

The second factor scores highly on the items “My supervisor respects my ideas with regard to my thesis,” “My supervisor encourages me to work independently,” and “My supervisor treats me politely.” The second factor characterizes a supervisor who encourages a great degree of independence. In consequence, we refer to this factor as “Independence.”

We transform both scores so that they have a mean of 50 and a standard deviation of 10.

Sections

We see differences in the involvement of supervisors across sections. In Section D, this score is 51 on average. By contrast, this score is 49 on average in Section C. We see no differences in the encouragement of independence from the supervisors.

Year of PhD

We clearly observe a steady decline of the involvement of the supervisor from 54 in the first year to 46 in the fifth or more year. The encouragement to work independently also decreases over time during the doctorate, from 54 in the first year to 48 in the fifth or more year.

International Doctoral Researchers

We observe differences in the involvement of the supervisors between international and German doctoral researchers. The score is 52 for international researchers, whereas it is 49 for German doctoral researchers. The two groups also differ in the degree to which the respective supervisors encourage independence. The independence score is 51 for international researchers and 50 for German doctoral researchers.

Parents

Doctoral researchers who are parents score 48 on the involvement scale, whereas those doctoral researchers who do not have children score 50 on the involvement scale. Parents are less likely to state that they are encouraged to work independently. They score 48 on this scale, whereas non-parents score 50.

Contract Situation

Doctoral researchers who have a stipend score 52 on the involvement scale, whereas those with a contract but no stipend score 50. Doctoral researchers with a stipend are encouraged more to work independently. Those doctoral researchers score 52 on this scale, whereas those with only a working contract score 50.

We observe no differences with respect to sections or gender.

6.6 Thoughts about Not Continuing Doctorate

We asked respondents “Have you ever thought of not continuing your doctorate?” 987 answers enter the analysis. 43% indicate that they have ever thought about not continuing their doctorate.

Sections

Overall, there is little variation across sections. The share of doctoral researchers who ever thought about quitting their doctorate ranges from 40% in Section D to 44% in Section A. The only exception is Section B, with a share of 48% having ever thought about not continuing their doctorate.

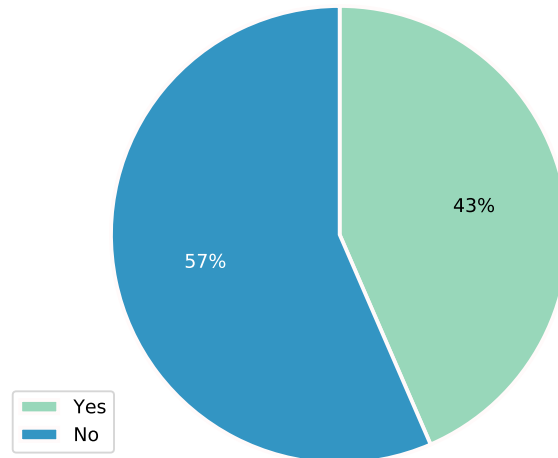


Figure 31: Share of doctoral researchers who ever had thoughts about not continuing their doctorate

Year of PhD

We see that the share of doctoral researchers who have ever thought about not continuing their PhD increases with the year of their doctorate. While the share is about 29% in the first year, it increases to 59% in the fifth or more year.

International Doctoral Researchers

We observe that 36% of the international researchers have thought about not continuing their doctorate, compared to 47% of German doctoral researchers.

Parents

We observe that 55% of the parents have ever thought about not continuing their doctorate. Especially mothers are affected by doubts with regard to the continuation of their PhD. Among them, around 64% have ever thought about not continuing their doctorate. In contrast to parents, 42% of the doctoral researchers without children have ever thought about not continuing their doctorate. There is no difference between men and women without children.

Contract Situation

We see that 45% of the doctoral researchers who hold a working contract and no stipend have ever thought about not continuing their doctorate. Furthermore, 35% of the doctoral researchers with a stipend have ever thought about not continuing their doctorate.

We observe no differences with respect to the gender of the doctoral researchers.

6.7 Reasons for Thoughts about Not Continuing Doctorate

If respondents indicated that they have ever thought about not continuing their doctorate, they were prompted to indicate their reasons for doing so. Respondents could indicate multiple answers among eleven items, where one is “I prefer not to answer.” 426 respondents enter the analysis.

The three most important reasons are an unclear career path or unclear career opportunities, with 66%. 31% have no or only poor academic results. The third reason is financial insecurities, with 29%.

Sections

The most important reason across all sections for doctoral researchers thinking about not continuing their doctorate is an unclear career path. Aside from this, there is huge variation across sections in the reasons for thinking about not continuing the doctorate.

Gender

We observe considerable differences across genders. Females are less likely than males to state that they do not like scientific work anymore (20% vs. 24%); that they do not like their topic anymore (18% vs. 24%); that they have financial insecurities (26% vs. 33%); or that they have an unclear career path (63% vs. 70%).

Moreover, females are more likely than males to state that they have work-related difficulties with their supervisor (31% vs. 27%); that they have personal difficulties with their supervisor (17% vs. 13%); and that they do not feel qualified enough to continue (33% vs. 25%).

It is noteworthy that we see no gender differences in the likelihood of doctoral researchers stating that they thought about quitting their doctorate because of poor academic results; because other

jobs are more interesting; and because academic life is not compatible with their family responsibilities.

Year of PhD

The largest increase in reasons to think about not continuing the doctorate is an unclear career path. In the first year, 58% report they have thought about not continuing their doctorate because of an unclear career path. In the fifth or more year, 75% say they have thought about not continuing their doctorate because of an unclear career path.

International Doctoral Researchers

International researchers are more likely than German doctoral researchers to state that they have thought about not continuing their doctorate because of financial insecurities (36% vs. 27%); because of an unclear career path (69% vs. 65%); and because of work-related difficulties with their supervisor (31% vs. 28%).

International researchers are less likely than German doctoral researchers to state that they have thought about not continuing their doctorate because they do not like scientific work anymore (16% vs. 24%); because they do not like their topic anymore (19% vs. 22%); because of no or only poor academic results (27% vs. 33%); because their academic life is not compatible with their family responsibilities (12% vs. 20%); and because they do not feel qualified enough (27% vs. 30%).

Both groups are equally likely to state that they have thought about not continuing their doctorate because of personal difficulties with their supervisor or because other jobs are more interesting.

Parents

Parents are more likely than non-parents to state that they have thought about not continuing their doctorate because of an unclear career path (75% vs. 65%) and because they think academic life is not compatible with their family life (52% vs. 12%).

By contrast, parents are less likely than non-parents to state that they have thought about not continuing their doctorate because they do not like scientific work anymore (18% vs. 23%); because they do not like their topic anymore (16% vs. 22%); because of financial difficulties (28% vs. 29%); because of work-related difficulties with their supervisor (25% vs. 30%); because of no or

only poor academic results (27% vs. 33%); because of other jobs being more interesting (14% vs. 18%); and because they do not feel qualified enough (19% vs. 31%).

We observe no difference between parents and non-parents with respect to whether they state that they have thought about not continuing their doctorate because of personal difficulties with their supervisor.

Contract Situation

The doctoral researchers that hold a working contract and no stipend, as opposed to those who hold a stipend, are more likely to state that they have thought about not continuing their doctorate because they do not like scientific work anymore (24% vs. 19%); because they do not like their topic anymore (22% vs. 15%); because of an unclear career path (67% vs. 56%); because of work-related difficulties with their supervisor (30% vs. 17%); and because they do not feel qualified enough (30% vs. 26%).

Moreover, they are less likely to state that they have thought about not continuing their doctorate because of financial insecurities (27% vs. 34%) or because other jobs are more interesting.

We find no differences between the two groups with respect to personal difficulties with their supervisor, no or only poor academic results, or incompatibility with family life as a potential reason not to continue their doctorate.

7 Support for Career Development

Main findings from the following chapter:

- For 71% of the doctoral researchers, the costs of participation in conferences with active participation will be fully covered by the institute; and more than half of the doctoral researchers receive full financial support for specific training courses.
- While there are moderate differences across sections, the contract situation of the doctoral researchers plays an important role in financial support. With respect to conferences, there is almost twice as much support for doctoral researchers with a contract as for those with scholarships.
- Only one out of eight doctoral researchers has a personal mentor for career development.
- The majority of doctoral researchers have access to training courses on scientific writing and scientific methods, and can attend graduate schools, whereas only one quarter can take part in training courses on grant applications.
- At the same time, almost half of the doctoral researchers feel they need support with respect to grant applications (especially in sections C and E).

In this section, we look at the support for career development offered at Leibniz Institutes. We first consider whether doctoral researchers receive support with the following measures: Attending conferences with active participation, attending conferences without active participation, attending specific training courses, and attending job fairs. Respondents could indicate whether they have the possibility to attend these types of events with the expenses being 1) fully covered, 2) partly covered, 3) not covered, or 4) do not have the possibility to attend. We also examine whether doctoral researchers have access to a personal mentor for career development. Finally, we look at what types of professional training courses are offered and required in the institutes.

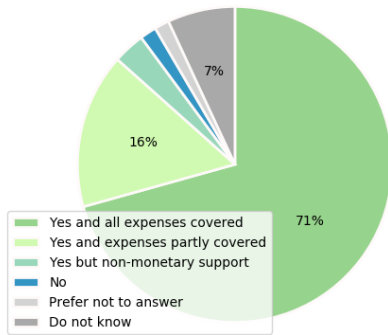


Figure 32: Support for conferences with active participation

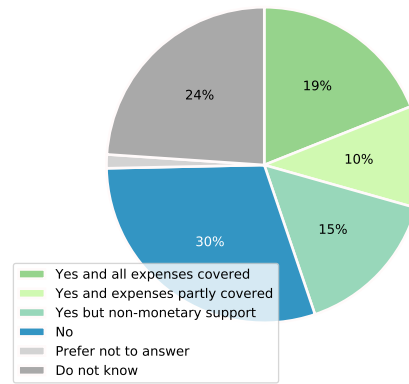


Figure 33: Support for conferences without active participation

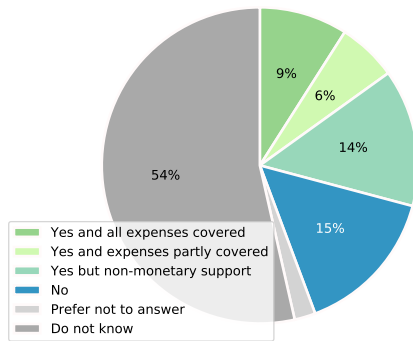


Figure 34: Support for job fairs

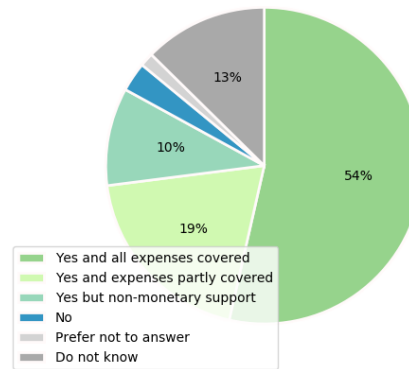


Figure 35: Support for specific training courses

7.1 Support for Conferences with Active Participation

On average, seven out of ten doctoral researchers have the possibility to attend (international) conferences with active participation. Another 16% of the doctoral researchers state that the expenses are partly covered. Yet 7% do not know whether their institute covers the costs for active participation in conferences.

Sections

The difference between sections is relatively small. Only in Section E does the proportion of doctoral researchers whose expenses for conferences are covered by their institute appear lower than for doctoral researchers in other sections.

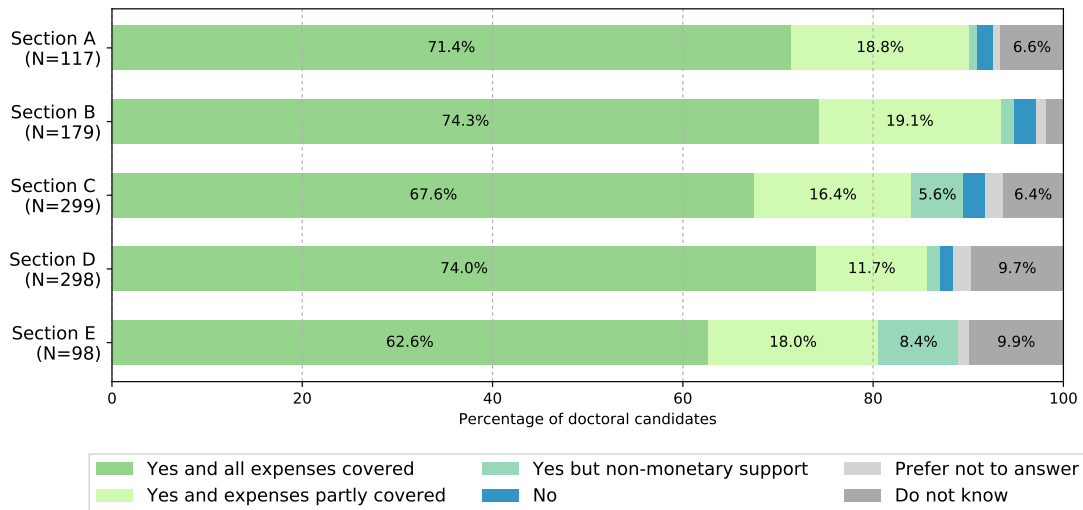


Figure 36: Support for conferences with active participation by section

Year of PhD

At first glance, the support offered to actively take part in conferences seems to increase with the project duration. Yet this relation might be driven by the fact that new doctoral researchers often do not know whether their institute can support them. 15% of first-year doctoral researchers responded that they “don’t know” whether their institute can fund their participation.

International Doctoral Researchers

We further find that international doctoral researchers are less likely to be supported financially than the other doctoral researchers (61% instead of 74%). A possible explanation for this is that international doctoral researchers are more often funded through scholarships than Germans.

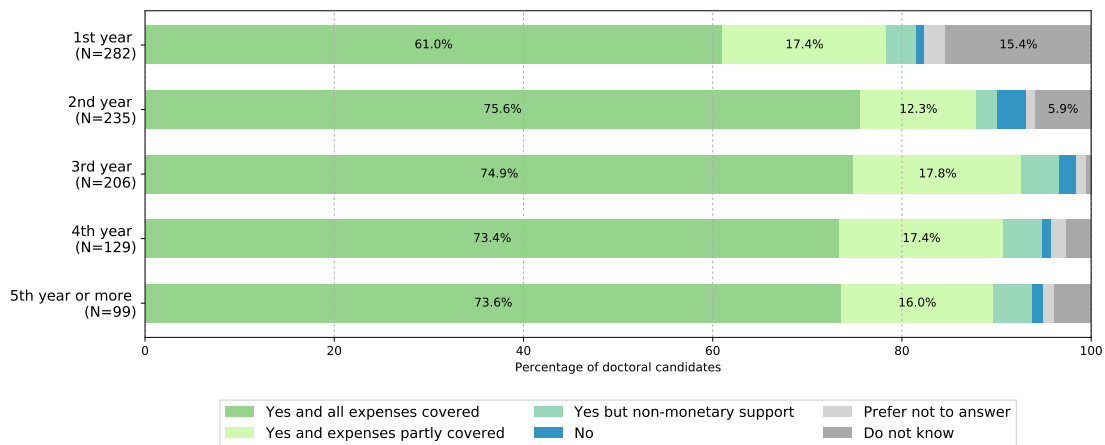


Figure 37: Support for conferences with active participation by year of PhD

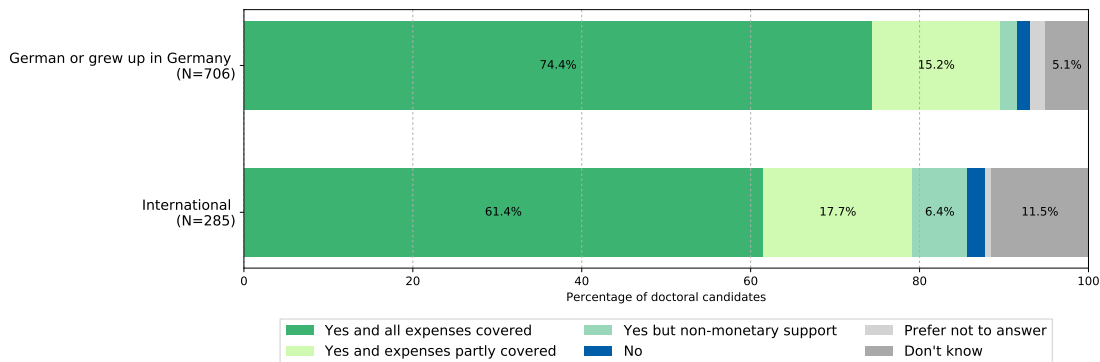


Figure 38: Support for conferences with active participation for German and international doctoral researchers

Contract Situation

Indeed, we see clear differences with respect to the contract situation. The costs for conferences with active participation are more frequently covered among doctoral researchers with a working contract (78%) compared to all other types of contract situations (44%).

7.2 Support for Conferences without Active Participation

Overall, Leibniz doctoral researchers receive significantly less support for conferences without active participation. About 19% state that the costs for conferences without active participation are fully reimbursed. The high proportion of doctoral researchers who do not know whether they can

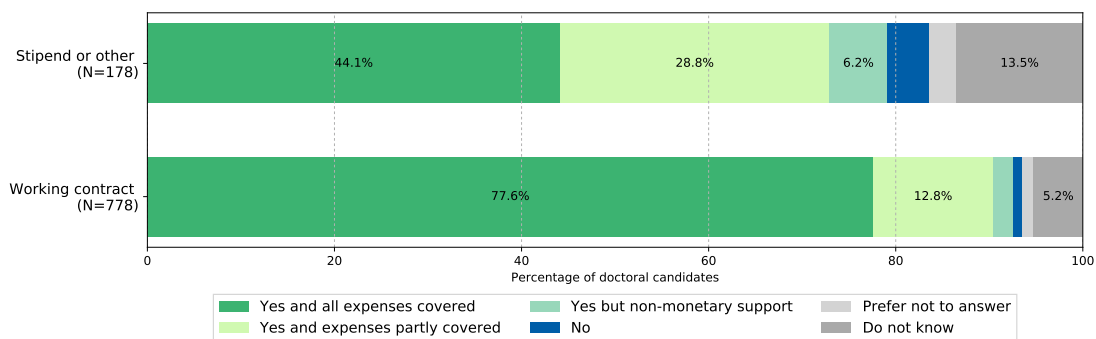


Figure 39: Support for conferences with active participation by contract situation

be supported for this type of activity (24%) makes it difficult to further interpret the results.

7.3 Support for Specific Training Courses

Through specific training courses, doctoral researchers can learn new scientific methods, develop soft skills, or get to know a special software. More than half of the doctoral researchers (54%) receive full financial support from their institutes for these activities. For 19% of the respondents, the costs for specific training courses are partly covered. 3% are not supported at all.

Sections

In Section D, only 41% of the respondents state that they are supported and fully reimbursed for the costs of participating in specific training courses, whereas in Section B 66% are supported.

Contract Situation

Again, we see differences in support levels with respect to the contract situation of the doctoral researchers. While the costs of participation in specific training courses are covered by the institute for 57% of the doctoral researchers with a working contract, they are only fully covered for 41% of the doctoral researchers with other types of funding (usually scholarships).

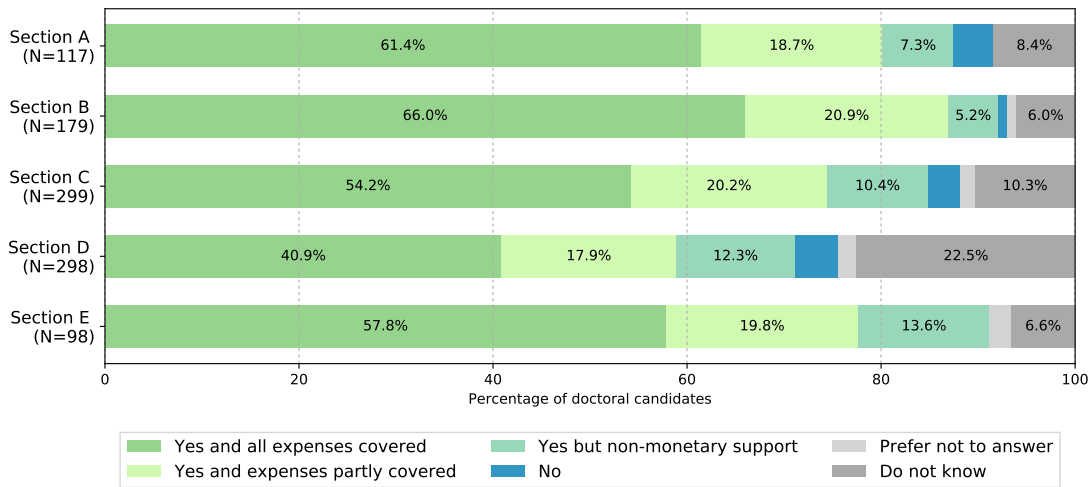


Figure 40: Support for specific training courses by section

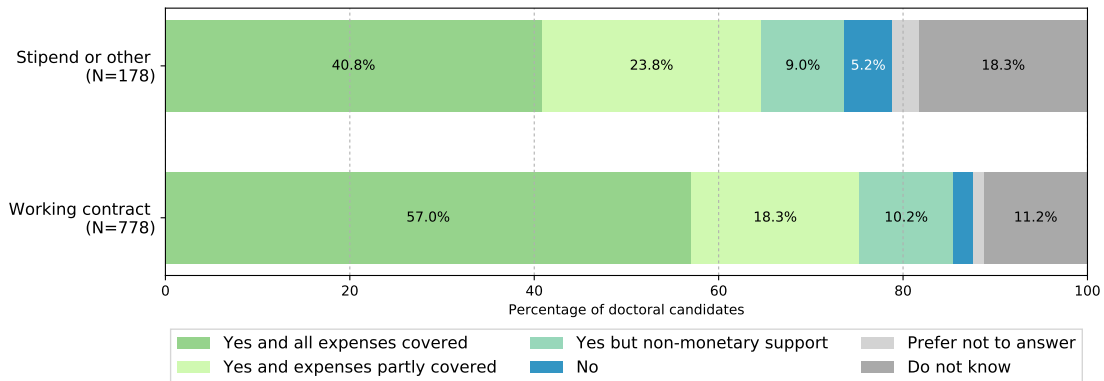


Figure 41: Support for specific training courses by contract situation

7.4 Support for Job Fairs

Similar to the level of participation in conferences without active contribution, doctoral researchers receive a much lower level of support for job fairs compared to conferences with active participation (see Figure 34). Only 9% of the respondents state that they are supported by their institute and that all expenses are covered. By contrast, 15% say that they are not supported at all. At this point, however, it should be noted that more than half of the doctoral researchers do not know whether job fairs are supported financially at their institute. The high proportion of “don’t know” answers makes the disaggregation of results by groups problematic.

7.5 Support for Other Activities

Other types of support for career development were reported by doctoral researchers in the open question. These are research visits, research collaborations, retreats, and workshops on soft skills such as scientific writing and presentations. These activities focus on improving skills needed on the academic job market and are less relevant for a career in the private or public sectors.

7.6 Access to a Personal Mentor for Career Development

Only 13% of all doctoral researchers state that they have a personal mentor for career development. A large proportion (29%) do not know whether or not they have access to such a service.

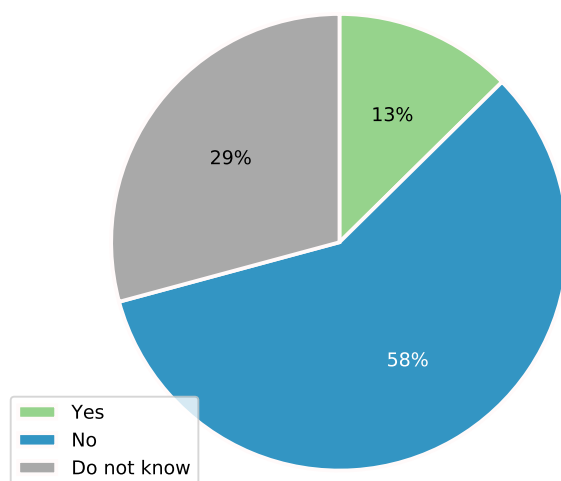


Figure 42: Access to a personal mentor for career development

Year of PhD

Of the six main explanatory variables of this report (section, gender, year of PhD, international doctoral researchers, parents, contract situation), only the year of PhD is significantly related to access to a mentor for career development. First-year doctoral researchers have a slightly higher chance of having access to a mentor. Yet at the same time, a large share of doctoral researchers from this cohort (39%) do not know whether or not they can use this service.

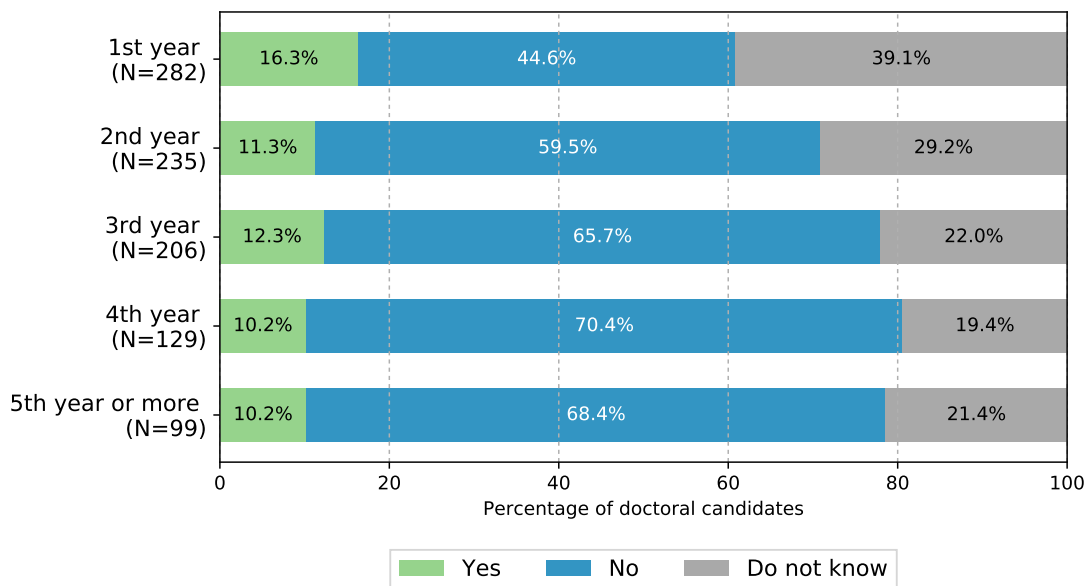


Figure 43: Access to a mentor by year of PhD

7.7 Professional Training Offered at the Institutes

The majority of respondents have access to training in scientific writing (60%) and scientific methods (59%), and can attend graduate schools (55%). Other soft skills (46%) include, for example, writing and presentation workshops, communication, media and interview training, software and statistics programs training, but also project and time management courses. Fewer doctoral researchers could take part in training courses on career development (34%) and grant applications (27%). Furthermore, doctoral researchers' answers to the open question show that Leibniz institutes provide training in computer and programming skills, job interviews, doctoral colloquiums, and workshops for female researchers.

7.8 Professional Training Needed at the Institutes

Most doctoral researchers see a need for more support with respect to scientific methods (47%), grant applications (47%), and scientific writing (46%). 26% of the doctoral researchers need more support with other soft skills training, such as career development (jobs outside of academia and interview training), time management and self-management, coaching and project management, but also statistics, programming and software training, teaching, and presentation training. It is

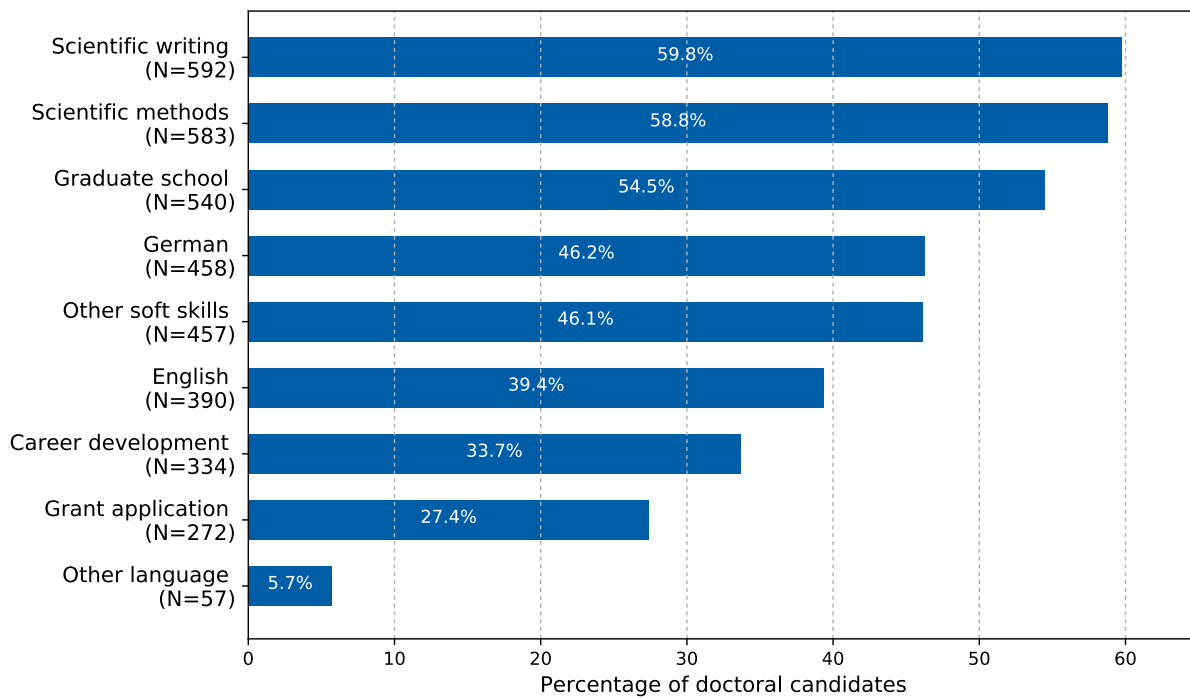


Figure 44: Training offered at the institutes

worth noting that although scientific writing and scientific methods are the most provided training types, doctoral researchers still seem to be looking for more support for these types of activity. Two important factors related to the demand for professional training are sections and year of PhD.

Sections

We find that a majority of doctoral researchers in sections D (mathematics) and E (natural sciences, engineering, and environmental sciences) would like to develop their scientific methods. Learning how to prepare a grant application is important for more than half of the respondents in sections C and E. A majority of doctoral researchers in sections C and D would like to improve their scientific writing.

Year of PhD

Our results show that the priorities of doctoral researchers with regard to professional training change over the course of their doctorate. New doctoral researchers are particularly interested in learning about scientific methods and writing. As they progress with their dissertation, develop-

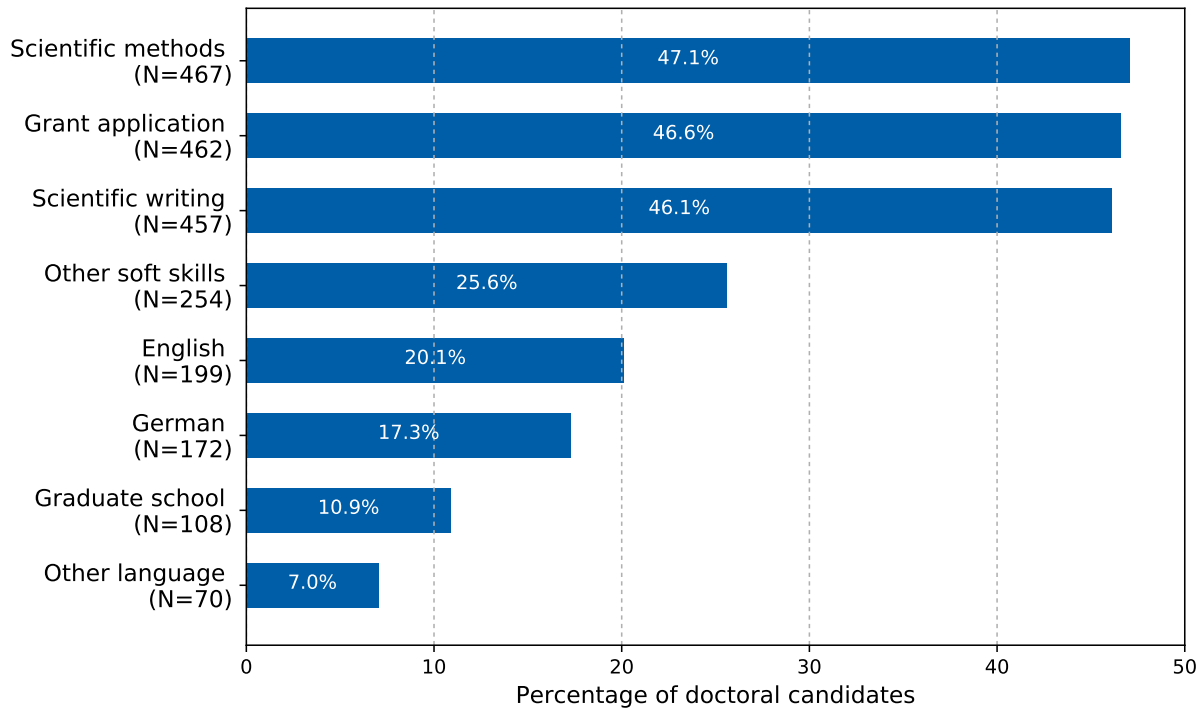


Figure 45: Training needed at the institutes

ing the skills to write a grant applications becomes increasingly important. We observe a large difference between the supply and demand for grant application training.

Table 2: Professional training needed by section (in percentages)

	A	B	C	D	E
Scientific methods	40	38	49	51	54
Grant application	35	39	57	43	50
Scientific writing	43	33	51	52	40
Other soft skills	25	19	31	25	26
English	34	9	18	23	25
German	5	11	21	22	21
Graduate school	7	6	13	11	16
Other language	7	6	7	7	8

Table 3: Professional training needed by year of PhD (in percentages)

	1st year	2nd year	3rd year	4th year	5th year or more
Scientific methods	56	45	44	43	43
Grant application	45	42	45	50	57
Scientific writing	55	51	43	34	35
Other soft skills	27	32	22	18	20
English	26	18	20	18	15
German	21	19	16	11	12
Graduate school	15	11	8	8	8
Other language	10	7	7	4	1

8 After the Doctorate: Aspirations and Perspectives

Main findings from the following chapter:

- Two thirds of the doctoral researchers would like to pursue an academic career.
- Proportionally fewer women than men want to stay in academia.
- When doctoral researchers decide against pursuing a career in academia, they rarely do so because of a lack of qualifications or interest. Rather, this decision is often justified on the basis of precarious employment conditions in academia, characterized by limited working contracts, changes of residence, and a relatively low income.
- Half of the doctoral researchers do not feel sufficiently informed about their career options.

We are also interested in the respondents' preferred area after the doctorate, the reasons for not wanting to pursue a career in academia, the information offered to doctoral researchers about career options, and the steps taken by respondents to transition into a new career.

8.1 Preferred Area after the Doctorate

Respondents could indicate whether they would be interested in 1) an academic job, 2) a scientific job in the private sector, 3) a scientific job in the public sector, 4) a non-scientific job in the private sector, or 5) a non-scientific job in the public sector. In total, two thirds of all Leibniz doctoral researchers hope to find a job in academia. A majority of doctoral researchers are also interested in a scientific career in the private sector. Yet important differences across sections and gender must be highlighted.

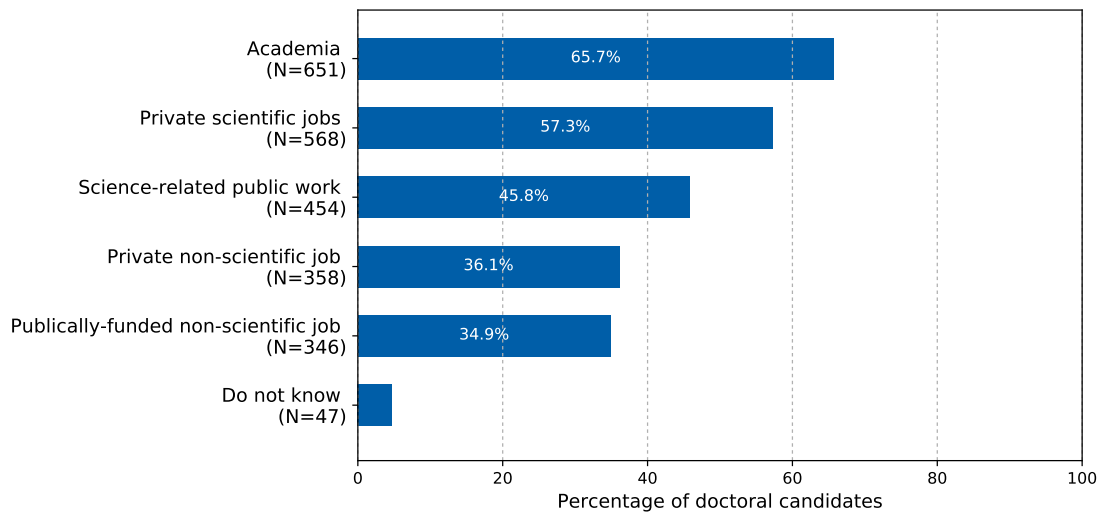


Figure 46: Preferred areas after the doctorate

Sections

In sections A and E, three out of four doctoral researchers are interested in an academic job. The share of doctoral researchers interested in an academic career is smallest in Section D, with 60%. For jobs outside academia, we find remarkable differences between the sections: While 72% of the doctoral researchers in Section B are interested in science-related public positions, only 30% do so in Section D. Interest in scientific jobs in the private sector also differs across sections: In Section D, almost 80% are interested in this kind of job, in comparison with only 32% in Section A. The least preferred areas are publicly funded non-scientific (e.g. at ministries) and private non-scientific jobs. In general, a clear majority of doctoral researchers would like to apply their scientific skills either in academia or in the public or private sectors. Nonetheless, publicly-funded non-scientific jobs remain attractive for doctoral researchers in sections A, B, and E.

Gender

Aspirations differ slightly between women and men. While female respondents are more likely than males to prefer science-related public work and publicly-funded non-scientific jobs (e.g. in ministries), male doctoral researchers rather prefer academic positions or private scientific or non-scientific jobs in industry.

Table 4: Preferred areas after the doctorate by section (in percentages)

	A	B	C	D	E
Academia	77	64	65	60	77
Private scientific jobs	32	38	61	79	44
Science-related public work	63	72	38	30	51
Private non-scientific job	17	36	40	41	34
Publically-funded non-scientific job	50	61	26	18	48
Don't know	7	2	5	4	7

Table 5: Preferred areas after the doctorate by gender (in percentages)

	Male	Female
Academia	69	62
Private scientific jobs	64	50
Science-related public work	42	50
Private non-scientific job	40	32
Publically-funded non-scientific job	33	37
Don't know	3	6

Multivariate Analysis

We conducted a multivariate analysis to examine the net effect of different factors on the willingness to pursue a career in academia. Table 15 in the Appendix presents the results of a logistic regression of the desire to continue working in academia on six predictors: The respondents' section, gender, year of PhD, origin, parental status, and contract situation. Our main findings are the following:

- Belonging to a certain section is significantly related to the willingness to pursue a career in academia. Doctoral researchers in sections A and E are the most interested in moving forward with a job in academia. Respondents of sections B, C, and especially D are less likely to do so.

- An academic career appears to attract proportionally fewer women.
- The drive to continue in academia reaches a low point for doctoral researchers in their third year.
- International doctoral researchers are more motivated than their German colleagues to continue working in academia.
- The effects of parental status and contract situation are not significant.

These results, in particular the gender gap, call for a more in-depth examination of the reasons behind the decision to not pursue a career in academia.

Other Career Paths

Several doctoral researchers also filled out the open question regarding alternative career paths. Among these career paths, teaching is the most popular one. Self-employment and working for non-governmental organizations as well as in scientific communication and management are the options that the doctoral researchers consider as alternative work areas.

8.2 Reasons for Not Pursuing a Career in Academia

The majority of respondents stated the difficulty in getting unlimited contracts, the frequent changes of residence, and the expected lower income as the main reasons for not considering a future career in academia. A lack of qualifications or interest was rarely mentioned as a reason for quitting academia.

These results show that reasons directly affecting doctoral researchers' life circumstances (family and finances) are the most outstanding factors for not pursuing an academic career. This is also supported by the doctoral researchers' answers for the open-ended question, since many mentioned the high stress levels of academic life, poor work-life balance, and poor future career opportunities as reasons against staying in academia.

We find the biggest differences in terms of reasons stated against staying in academia across sections and years of PhD, and between international and German doctoral researchers. Remarkably, the reasons given by men and women usually do not differ significantly. The only exception is

when it comes to payment: Men are more eager to seek a higher income outside academia. Not surprisingly, parents are also more likely to state family responsibilities as an important factor in not pursuing a career in academia.

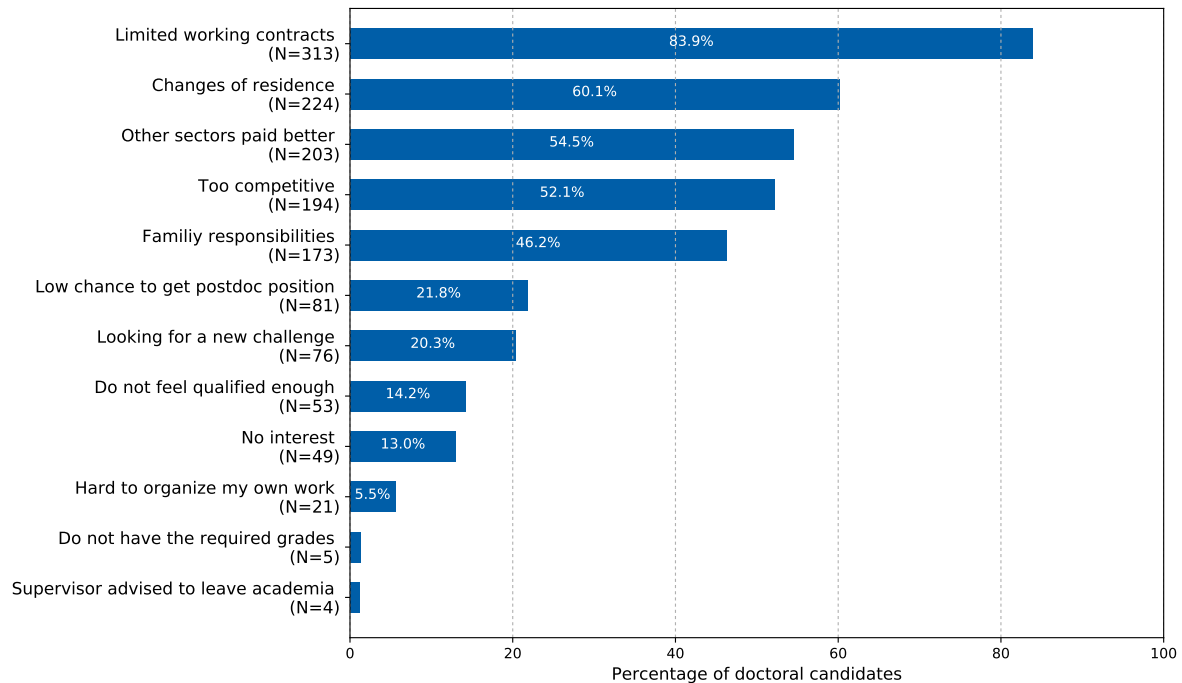


Figure 47: Reasons for not pursuing a career in academia

Sections

Looking at the five most prominent reasons for not staying in academia, we see that over 80% of the doctoral researchers in sections B, C, D, and E are worried about the difficulty of obtaining unlimited contracts. Doctoral researchers in Section A are slightly less concerned by this problem and are also less worried about differences in payment. However, they appear to face a higher level of competition on the academic market. The other factors are relatively balanced across sections.

Year of PhD

Concerns regarding a career in academia appear to change over the course of the doctorate. The issue with non-permanent contracts becomes increasingly important as doctoral researchers progress

Table 6: Reasons for not pursuing a career in academia by section (in percentages)

	A	B	C	D	E
Limited working contracts	69	85	90	82	80
Changes of residence	69	64	63	53	61
Other sectors paid better	23	48	63	61	42
Too competitive	66	53	51	50	50
Family responsibilities	34	44	56	42	45

with their dissertation, to the point that 95% of doctoral researchers in their fifth year or more mention limited contracts as a problem. Changes of residence, competitiveness, and family responsibilities are other reasons that push more experienced doctoral researchers to disregard a career in academia. The issue of payment becomes less salient for doctoral researchers in their third year or more.

Table 7: Reasons for not pursuing a career in academia by year of PhD (in percentages)

	1st year	2nd year	3rd year	4th year	5th year or more
Limited working contracts	73	86	83	93	95
Changes of residence	49	60	60	75	74
Other sectors paid better	57	62	53	48	46
Too competitive	48	49	53	56	58
Family responsibilities	43	46	46	52	54

International doctoral researchers

As we have seen previously, international doctoral researchers are generally more interested in pursuing a career in academia. Those who would prefer to take another path mention limited working contracts and payment as the prime reasons for leaving academia. Looking at the five most important reasons for not staying in academia, German respondents appear to be more concerned about contextual factors such as limited contracts, changes of residence, competitiveness, and

family responsibilities.

Table 8: Reasons for not pursuing a career in academia for international doctoral researchers and others (in percentages)

	German or grew up in Germany	International
Limited working contracts	87	71
Changes of residence	64	44
Other sectors paid better	54	57
Too competitive	55	42
Family responsibilities	50	33

8.3 Information about Career Options

We asked doctoral researchers whether they feel sufficiently informed about their career options. Only 34% indicated that they have sufficient information on this topic. Half of the sample (50%) stated that they do not have sufficient information on their career options, and 16% did not know.

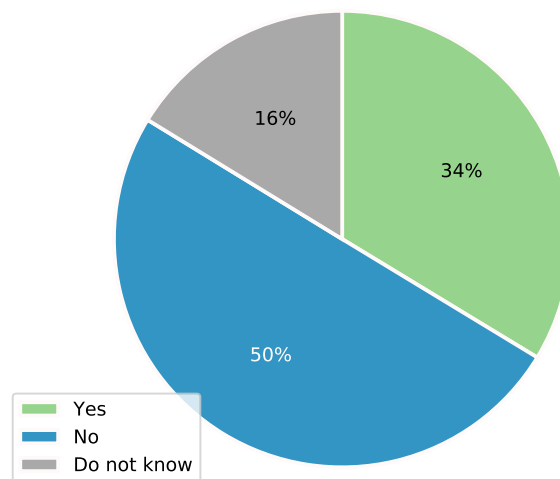


Figure 48: Share of doctoral researchers sufficiently informed about their career options

Sections

We find quite a lot of variation across sections. 46% of the respondents in Section B mention that they are sufficiently informed about their career options, in comparison to 18% in Section E. In the other sections, about one third of the doctoral researchers feel adequately informed about their future employment options.

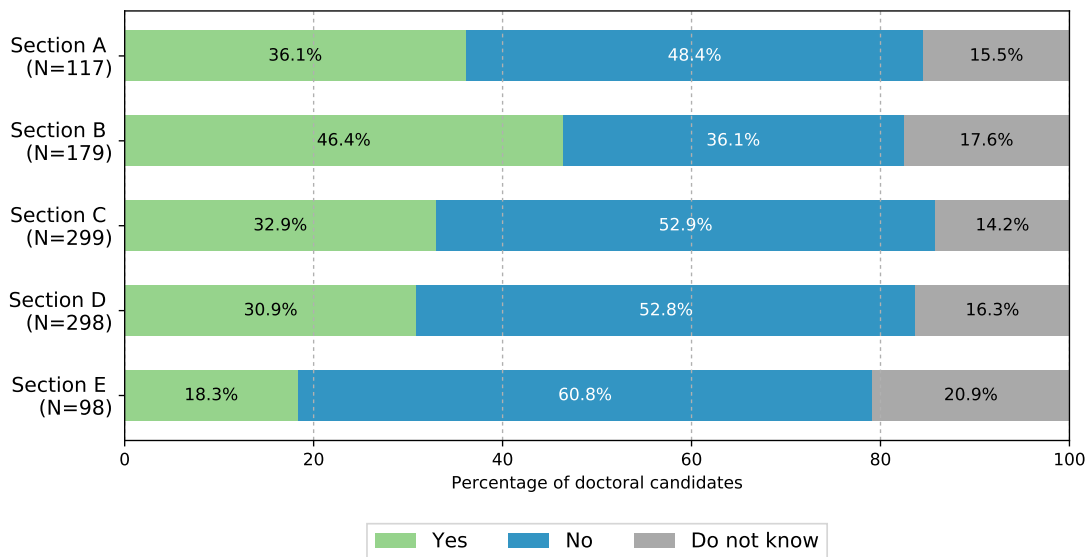


Figure 49: Share of doctoral researchers sufficiently informed about their career options by section

8.4 Steps to Prepare for a Future Career

Finally, in order to learn about the efforts made by doctoral researchers to prepare themselves for their professional future career, we asked what actions they were taking. The response options included building a network; seeking advice from supervisors, mentors, or colleagues; constant job searching; applying to jobs already; and specific training courses.

76% of the doctoral researchers state that they are building a network in order to prepare themselves for their professional career. More than 60% seek advice from their supervisor, mentor, or colleagues. Every second doctoral researcher attends specific training courses and every third constantly looks for a job. Yet only 12% of the doctoral researchers have already applied for jobs. Interestingly, we find no gender differences in the types of actions taken to prepare for a future career. Differences with respect to sections are also relatively small.

9 The Situation of International Doctoral Researchers

Main findings from the following chapter:

- International doctoral researchers make up one third of doctoral researchers in the Leibniz Association. It is important to assess their specific needs and demands.
- There is room to improve the current support structures offered to international doctoral researchers by the institutes. An exchange of best practices between institutes would be promising.
- Almost 50% of international doctoral researchers need more support, and around 40% are restricted by language barriers at work.
- The level and types of support offered as well as the demands of international doctoral researchers vary by section.
- International doctoral researchers funded by stipends and those with childcare obligations represent groups whose targeted support could be reviewed by institutes.

A specific part of the survey was devoted exclusively to the situation of international doctoral researchers. This chapter focuses on the support received by them at their Leibniz Institutes and Research Museums; the satisfaction of these with the current support; and their need for additional assistance. We also examine the acquisition of language skills by international doctoral researchers and the language barriers they face at work.

Doctoral researchers who grew up outside Germany and who do not hold German citizenship are considered to be international.²⁴ The sub-sample of international doctoral researchers comprises 301 respondents and accounts for one third of doctoral researchers in the Leibniz Association.

The questions asked of international doctoral researchers are particularly relevant at the institute level. However, to preserve anonymity, our survey does not include identifiers for specific institutes

²⁴35 respondents without German citizenship who grew up in Germany as well as 9 respondents with dual citizenship (German and other) who grew up outside Germany were not considered to be international doctoral researchers here.

or research museums. Instead, we primarily analyze the results across sections of the Leibniz Association. In addition, we examine the effects of gender, age, year of PhD, contractual situation, and parental status on three variables in more detail: The wish for more support from institutes, the language barriers faced by international researchers at work, and the need for more support in learning German.

We complement the analysis by looking at how international doctoral researchers feel about their integration in their institutes and whether they receive all relevant information in a language they understand. These two questions allow for a comparison with German doctoral researchers.

The sample sizes of international doctoral researchers become small when split by section (Table 9), especially for sections A and E. This should be kept in mind when interpreting results. Distributions barely change with survey weights. Differences between weighted and unweighted results are, in general, minor.

Table 9: Sample distribution of international doctoral researchers across sections

	A	B	C	D	E	Prefer not to say	Total
N	21	50	88	95	35	12	301
Share (non-weighted)	17.8	24.4	32.4	32.9	31.0	54.6	29.3
Share (weighted)	17.4	23.7	31.9	32.2	30.8	NA	28.7

9.1 Overview of the Support for International Doctoral Researchers Offered by Institutes

Institutes can formally organize support for international doctoral researchers by assigning an official contact person in the institute and/or providing various forms of organizational and bureaucratic assistance that enables a smooth start and integration into the new country and work environment.

Overall, 40% of respondents indicate that their institute employs a formal contact person for people from abroad. Areas of support include assistance in daily life, such as finding housing or child-care or helping with official registration and bureaucratic problems. Figure 50 shows the share of respondents who receive formal support from their institutes.

Our results indicate that support is mostly offered for bureaucratic tasks, such as finding health insurance (36%), clarifying residence permits (31%), or going to the registration office (29%). The share of international doctoral researchers who receive support in the other areas remains below 30%. The lowest level of support is provided in finding childcare (11%), finding a medical doctor that speaks a language that the person understands (13%), and translating documents (13%). Among parents, the share who can receive support for finding childcare is even slightly lower (9%). Many international doctoral researchers rely on informal help from their colleagues across all areas. It is also striking that a lot of international doctoral researchers do not know whether support is offered by their institute or not. The fact that over half of the respondents do not know whether or not they can receive support in finding childcare is not surprising, since many doctoral researchers are not affected. This share is 30% for those international doctoral researchers with children.

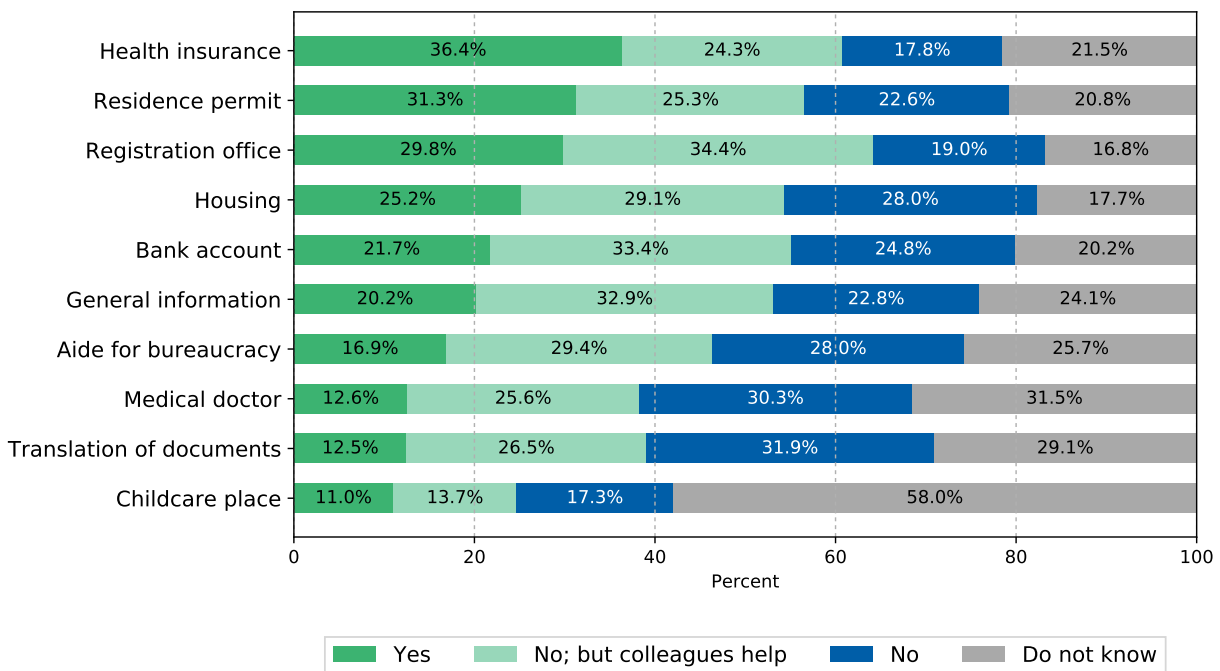


Figure 50: Formal support offered by institutes and informal support for different areas (N=285)

Sections

The share of international doctoral researchers who can receive help from a contact person varies across sections of the Leibniz Association. In Section E, 51% of respondents indicate that they have

access to this service, in comparison with 34% in Section B. While the institutes of Section A have the lowest overall share of international doctoral researchers (Table 9), they provide comparably good support: 48% of them say they can receive support from a contact person.

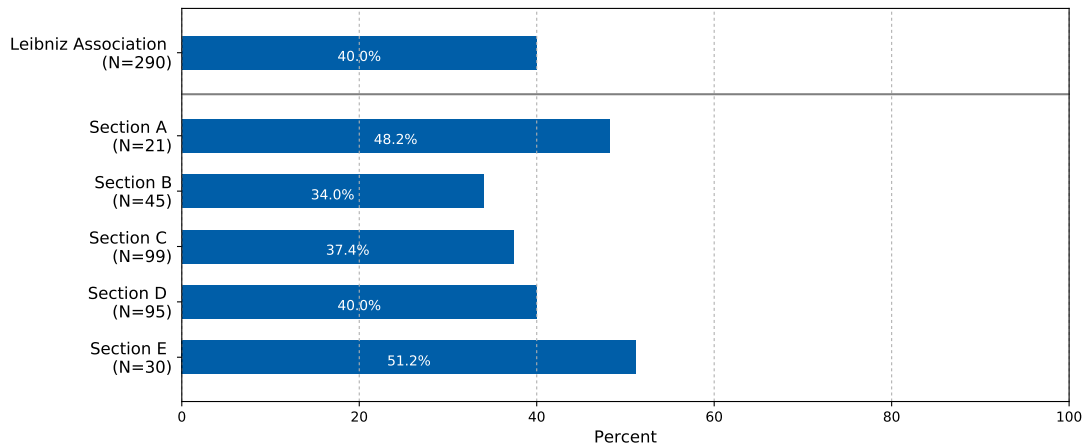


Figure 51: International doctoral researchers with a contact person for people from abroad at their institute by section (N=282)

We find substantial variation in the types of support offered across sections (Figure 52). Gaps in support between sections range from 8 to 38 percentage points, depending on the task. Except for the translation of documents, formal support is lowest in Section B. Across the different areas, the highest share of support is found either in Section C (five areas) or E (four areas). The average share of international doctoral researchers who receive formal support from their institute across all investigated areas is 28% for Section E, 26% for Section C, 20% for Section D, 19% for Section A, and 12% for Section B.

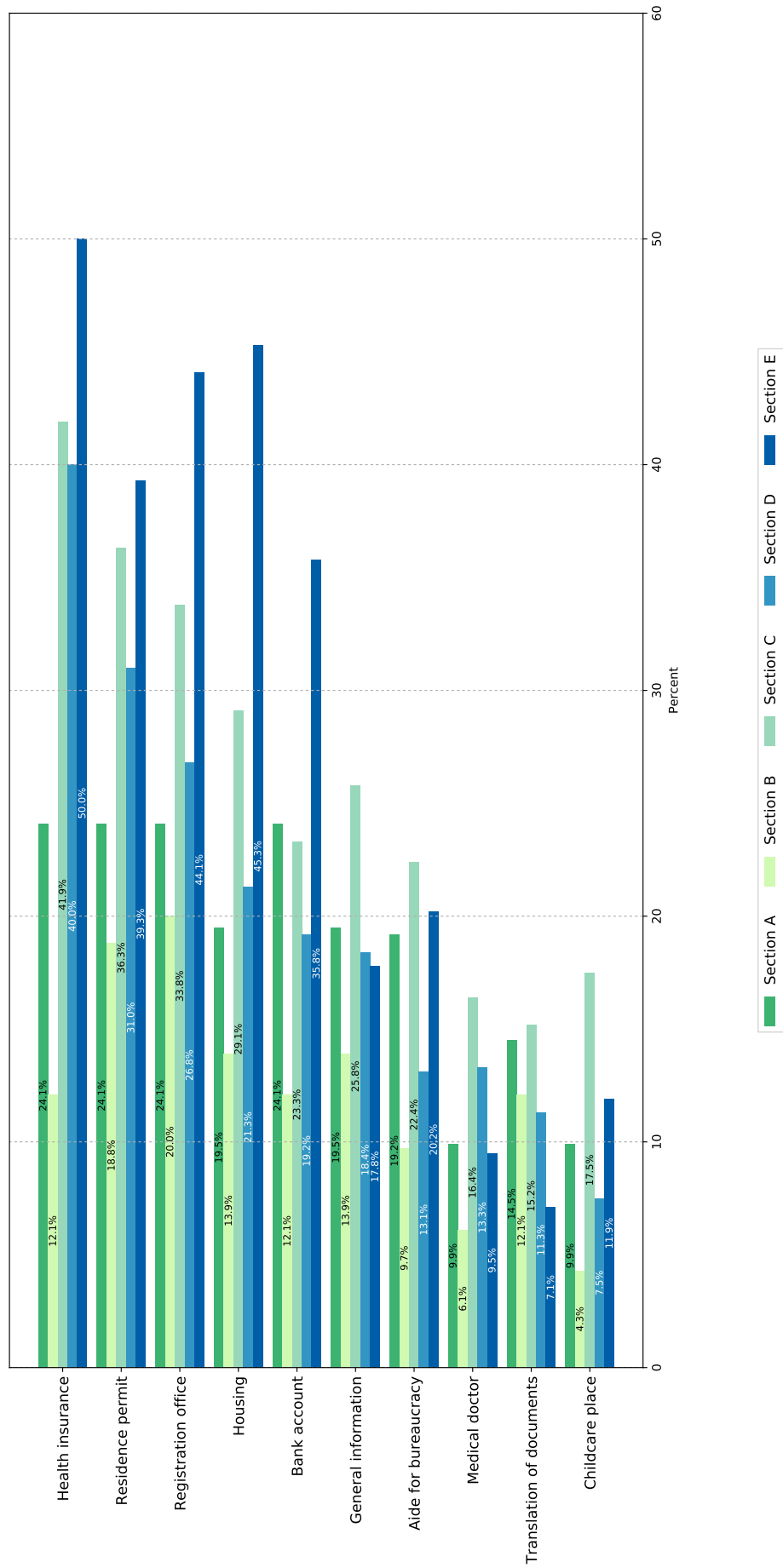


Figure 52: Formal support offered across different areas by section (N=285)

Contact Person at Institute

We looked more closely at the effect of having a contact person on the supply of formal support for international doctoral researchers. We find that the share of those who are offered support tends to be substantially larger across all areas when a contact person is present at the institute (Figure 53). Gaps in support between international doctoral researchers who have access to a contact person and those who do not range from 14 (finding childcare) to 40 percentage points (going to the registration office).

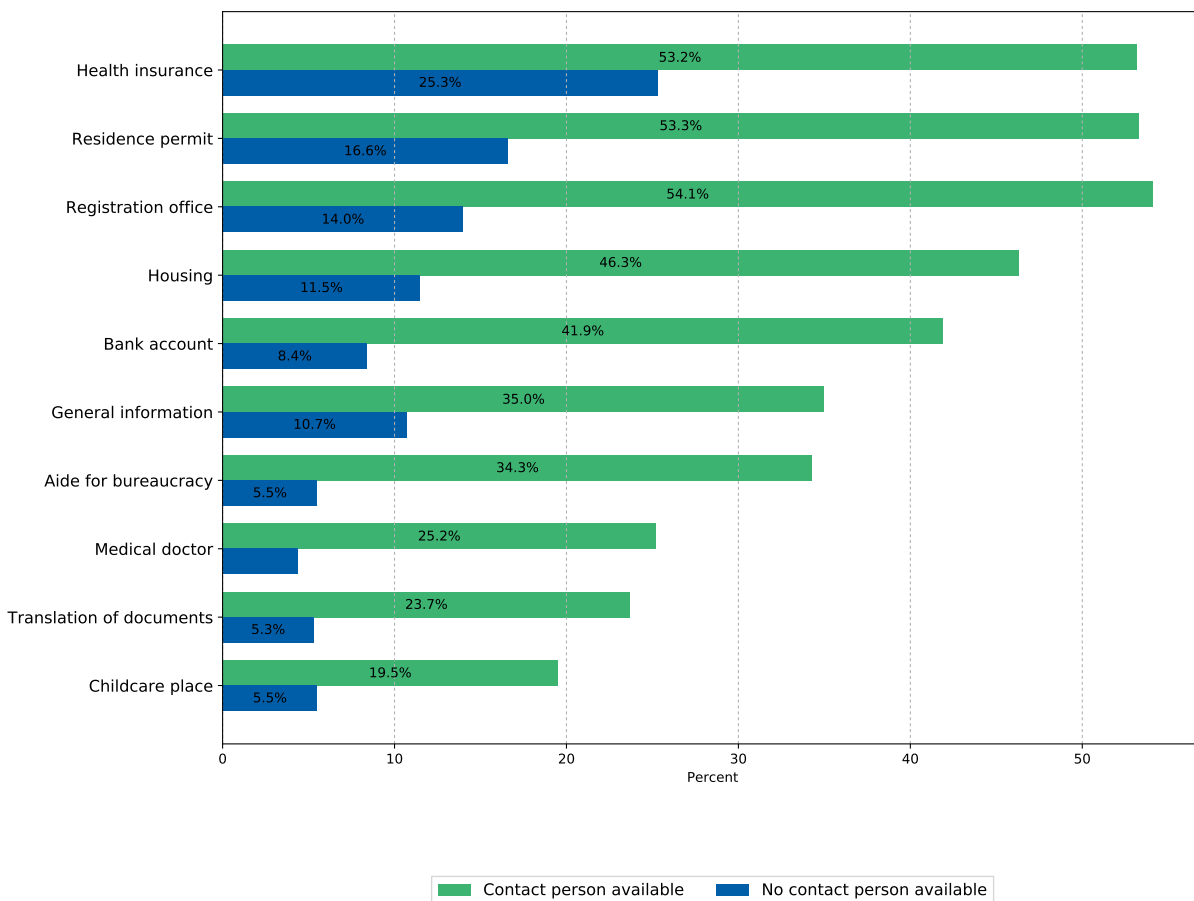


Figure 53: Share of international doctoral researchers with access to formal support from their institutes with (N=48) and without (N=234) a formal contact person at their institute

The presence of a contact person is determined at the institute level and therefore should not be related to personal characteristics. This holds true for gender and age. Nonetheless, we find differences across the year of PhD, parental status, and contract situation.

Year of PhD

International doctoral researchers in an early stage of their PhD project are more likely to state that a contact person is present at their institute (45%). We see a declining trend with the duration of the PhD (Figure 54), down to a minimum of 23% for 4th-year international doctoral researchers. For 5th-year doctoral researchers, the share increases again to 37%. Yet this group comprises only a limited number of respondents.

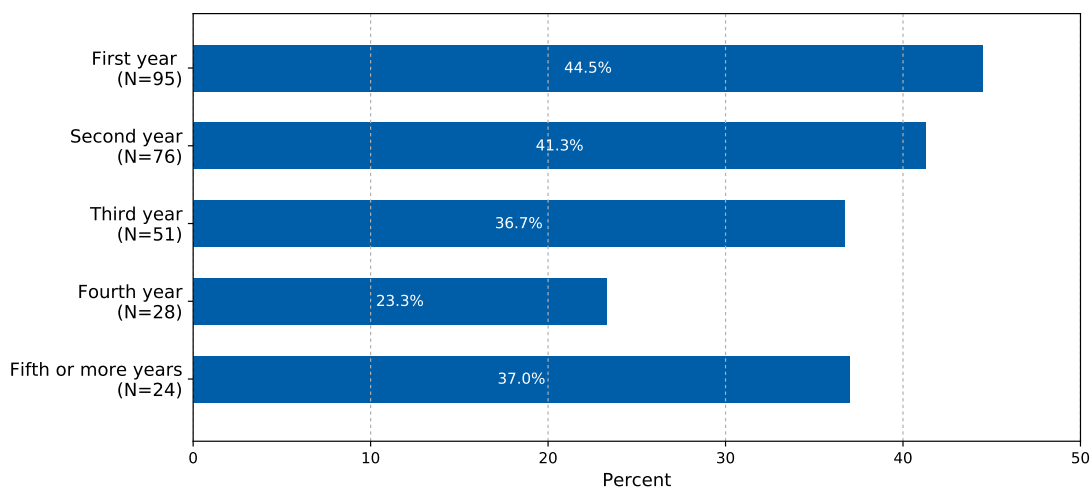


Figure 54: International doctoral researchers with a contact person for people from abroad at their institute by year of PhD (N=276)

Contract Situation and Parents

International doctoral researchers with a working contract are more likely to indicate the presence of a contact person (43%) than are respondents holding a stipend (36%). Parents deviate from the overall average of 40%: 31% of these state that a contact person is available.

9.2 Demand for Further Support and Satisfaction with the Current Offer

Our results indicate that there is room for improving the support structure for international doctoral researchers. It is important to take a look at their specific needs. People might have very different demands, depending, for example, on whether they moved to Germany for their PhD or already studied here before; whether or not they speak some German; their home country (which affects

bureaucratic requirements); or whether they have already lived in a foreign country before. We cannot control for all of these factors, but can provide a general overview of the demand for additional support and the level of satisfaction with the current services offered. Overall, almost 49% of international doctoral researchers currently desire more support or would have desired more support in the past.

Sections

Differences across sections exist (Figure 55), ranging from 28% of international doctoral researchers demanding more support in Section A, to 63% in Section B. The level of support offered and the feeling that it is not sufficient are not necessarily associated. Section B, with comparably low official support, has a high share of people demanding more support, whereas in Section E a similar share of 58% of international doctoral researchers ask for more support, even though the level of support offered in Section E scored much better. These differences imply an opportunity for mutual exchange of experiences and best practices between sections and single institutes in order to improve the overall situation of international doctoral researchers.

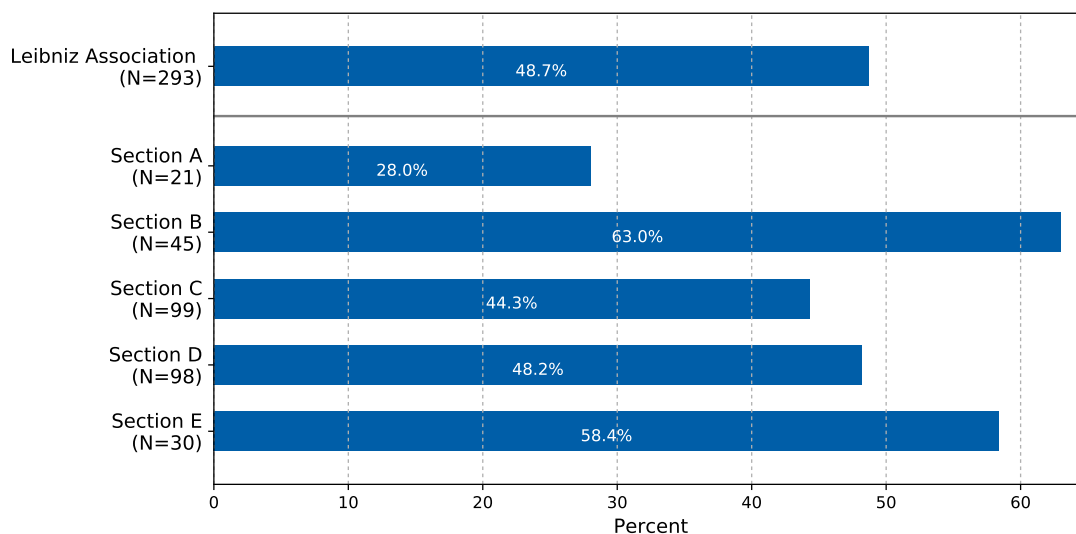


Figure 55: International doctoral researchers who desire more support or would have desired more support in the past by section (N=285)

Gender

We observe a small gender gap with regard to the desire for more support: 53% of female international doctoral researchers ask for more support, compared to 45% of male respondents.

Contract Situation

International doctoral researchers holding a scholarship have a higher tendency to say that support has not been sufficient (56%) compared to their peers who are employed on a working contract (44%).

Parents

Among international doctoral researchers, parents demand more support (58%) than researchers without childcare obligations (49%). This is consistent with our previous results showing that finding childcare is the category with the lowest formal support from the institutes.

Multivariate Analysis

A weighted logit model of the need for more support on section, gender, year of PhD, contract situation, and parental status (Table 16 of the Appendix) shows a statistically significant higher demand for support in sections B and E compared to Section A. Introducing the presence of a contact person as an additional predictor to the model shows that it leads to a statistically significant reduction in the desire for more support. This underlines the important role of offering an institutionalized point of contact for international doctoral researchers.

Open Answers on Support Needed

To shed more light on the specific needs of international doctoral researchers, people who demanded more support were asked in an open-answer question to describe what kind of support they would need. 116 respondents made use of this option. Answers were coded according to the support categories presented in section 9.1. Additional categories were added when needed. 30 respondents, a quarter of those who answered the question, provided more than one area of support. Five of them indicated all listed areas mentioned in section 9.1.

The most important categories for respondents are: **More general information about living and bureaucracy in Germany** (33 people), **more assistance in finding a flat** (24), and **support for going to the registration office** (14). The other areas scored as follows: **Health insurance** (12 people); finding a **medical doctor** who speaks a language the person understands (10); **translation of documents** (10); opening a **bank account** (9); clarification of **residence permit** (9); **accompanying person** for bureaucratic issues (9); and finding a **childcare place** (8). The point that bureaucracy is a big challenge for international doctoral researchers, especially for non-EU citizens, formed part of many answers. *"I have seen that many other international colleagues had been having some problems with German bureaucracy,"* as one respondent describes it. Another states: *"It was easy for me since I come from an EU country and I do not need a permit, but bureaucracy in Germany is [very challenging]."* Here assistance and well-structured information on arrival could provide help.

In this vein, regarding areas that respondents raised that were not included in the survey categorization, the most frequent option was a **designated contact person at the institute** (13). As one respondent frames the beginning of staying in Germany: *"There was no information how to deal with it, what to do, nor was there a person who would be of help with it."* Another respondent underlines the importance of a formal contact person: *"Colleagues' help can be asked but there is a limit to how much you can ask, and there is also the issue of privacy. A professional whose job it is to help is more discreet and more reliable and also, you don't feel like you're constantly taking up people's time."*

Other additionally suggested areas were **more English-speaking staff at the institutes** (11), **academic mentoring** (10), and **support with visa and tax issues** (9 each). **Language** is a major issue for international doctoral researchers, something which this report touches upon in a separate chapter (see 9.4 and 9.5). One respondent highlights the need for language support *"when moving to a country where you do not speak the language and you need it for all bureaucratic issues."* Language barriers also arise in daily work: *"It is hard to understand an equipment with instruction in German"* and *"At least the contract should be in English for foreigners, not in German."*

The last question put exclusively to international doctoral researchers was also an open-answer question, giving them the opportunity to leave additional comments. 61 respondents made use of this opportunity and mainly used it to highlight their problems and need for support. Answers

covered a broad spectrum and were coded in common categories; 24 comments were assigned to an "other" category.

The most important categories were, again, **language barriers, especially at work** (25 comments), and **bureaucracy** (10). Regarding language, some respondents highlight the **mismatch between their expectations of working in an international context and the reality** that German is implicitly required (5). Respondents voiced a **need for proactive and welcoming staff** in order not to be exclusively dependent on informal help (6), or the **need for a contact person** was underlined (3). **More social and cultural events** were also requested (5). Four respondents raised **problems arising from contractual situations**, e.g. regarding the different health-insurance status between stipend holders and people employed on a working contract or being offered extremely short contracts, which causes problems for their visa status.

9.3 Integration in the Institute

Integration in the institute is measured on a four-point scale, from feeling not at all integrated to feeling very integrated. Figure 56 displays the distribution of responses of international and German doctoral researchers. In both groups, the majority feel integrated. However, differences are apparent. 70% of international doctoral researchers feel integrated or very integrated, compared to 86% of Germans.

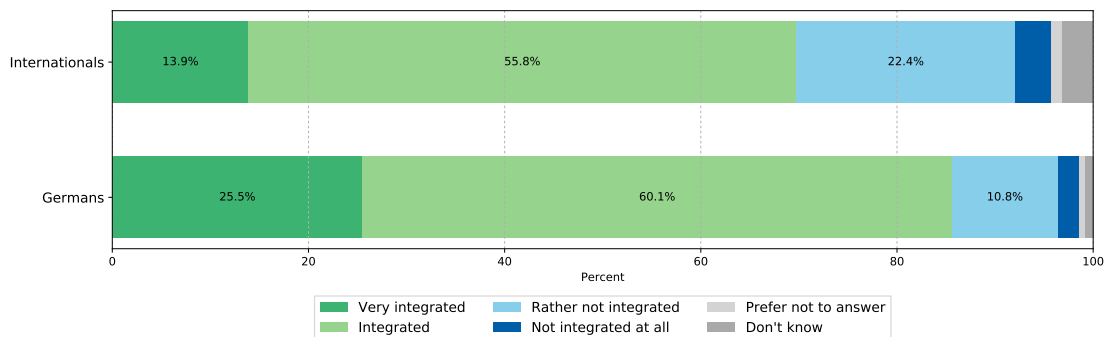


Figure 56: Perception of own integration in the Leibniz Institute, comparing international (N=285) and German doctoral researchers (N=706)

Sections

Section differences regarding integration are analyzed for international doctoral researchers only. We find some variation (Figure 57). Overall, very few international doctoral researchers indicated that they do not feel integrated at all. However, there is a comparably high share of them in Section E who feel rather not integrated or not integrated at all (45%).

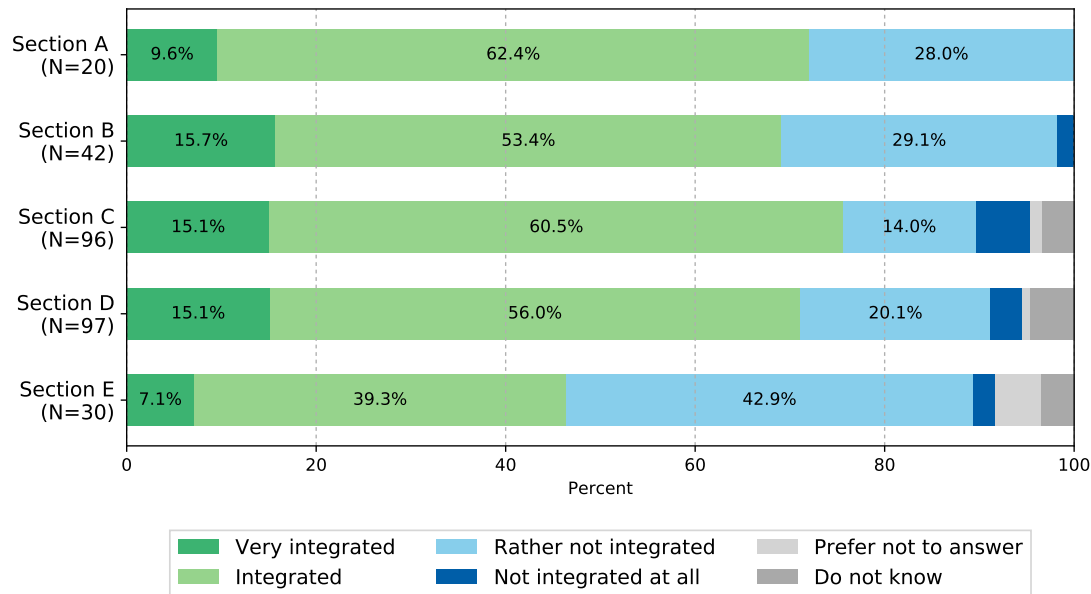


Figure 57: Perception of international doctoral researchers of own integration in the Leibniz institute by section (N=285)

Parents

There is some indication that international doctoral researchers who have childcare responsibilities feel less integrated than their peers without children. 56% of parents feel integrated or very integrated at their institutes, compared to 72% for international doctoral researchers without children. We do not find substantial differences across gender, age, year of PhD, or contract situation.

9.4 Language Barriers

Answers to the open-answer questions already highlighted that language is a cornerstone of the integration of international doctoral researchers in their institute. The language spoken at the work-

place can give rise to language barriers at work and is associated with the problem of not receiving all relevant information (administration, IT, institute central services, as well as information about events) in an understandable language.²⁵

Overall, 41% of international doctoral researchers experience language barriers (Figure 58). 45% do not get all information in a language they understand (Figure 59). 70% of international doctoral researchers who experience language barriers do not receive all information in a language they understand. 29% who stated that they do not experience language barriers still do not get all relevant information in an understandable language. Informal help from colleagues alleviates problems.

Sections

The share of international doctoral researchers having English as a working language at their institute is around or above 90% in all sections except Section A, where the share is 63% (Figure 58). For most international doctoral researchers, German constitutes an additional working language, especially in Section A where it is used by 90% of the respondents. International doctoral researchers from sections D and E most rarely name German as a working language. Overall, 27% only use English at work, compared to 4% who only use German.

There are only small differences between sections regarding language barriers. The lower share of international doctoral researchers speaking English at work in Section A is not associated with substantially greater language barriers (45%).

Regarding the accessibility of information in an understandable language, some differences across sections can be observed (Figure 59). The share of respondents who indicate that they receive information in a language they understand is larger in sections A (77%) and B (64%) than in the other sections (around 50%). Section E has the highest share (23%) of international doctoral researchers who receive neither formal nor informal support. The lowest share is in Section A (5%).

²⁵Among the people who indicated that they “do not have all information available in an understandable language,” only 31 respondents were German. Thus this question is exclusively analyzed using the sub-sample of international doctoral researchers.

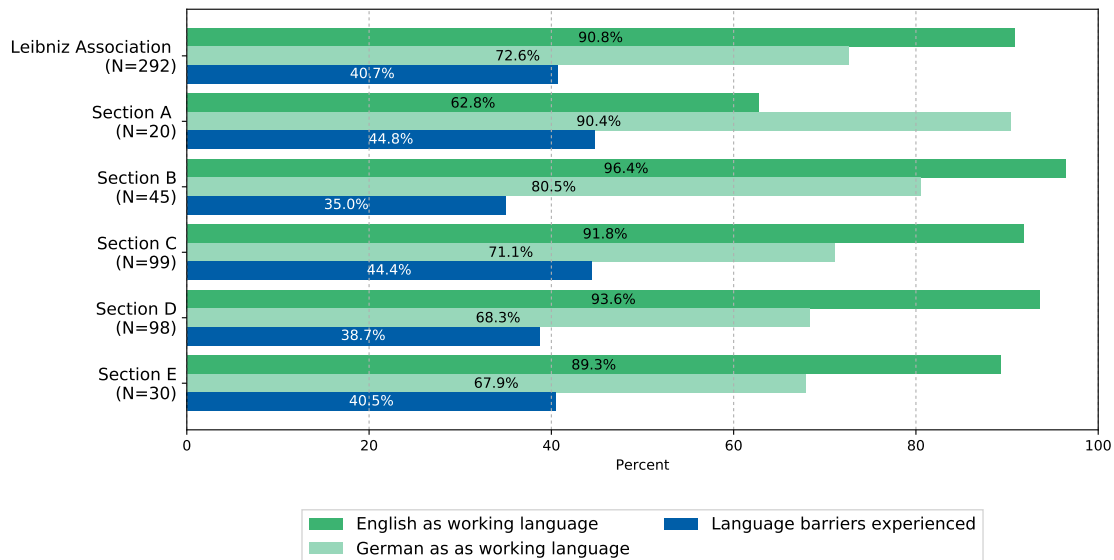


Figure 58: Working languages and language barriers experienced by international doctoral researchers by section (N=285)

Gender

The gender difference in language barriers is rather large. 47% of female respondents encounter language barriers, compared to 34% for male respondents.

Contract Situation

We also find differences between international doctoral researchers with scholarships and those having a working contract. 50% of stipend holders experience language barriers, compared to 36% for international doctoral researchers employed on a working contract.

Multivariate Analysis

A weighted logit model predicting the experience of language barriers and controlling for section, gender, year of PhD, contract situation, and parental status (Table 17 in the Appendix) suggests that the differences regarding gender and contract situation are statistically significant (at the 10% significance level). Introducing the existence of a formal contact person as an additional regressor in the model shows that it significantly reduces the likelihood of experiencing language barriers.

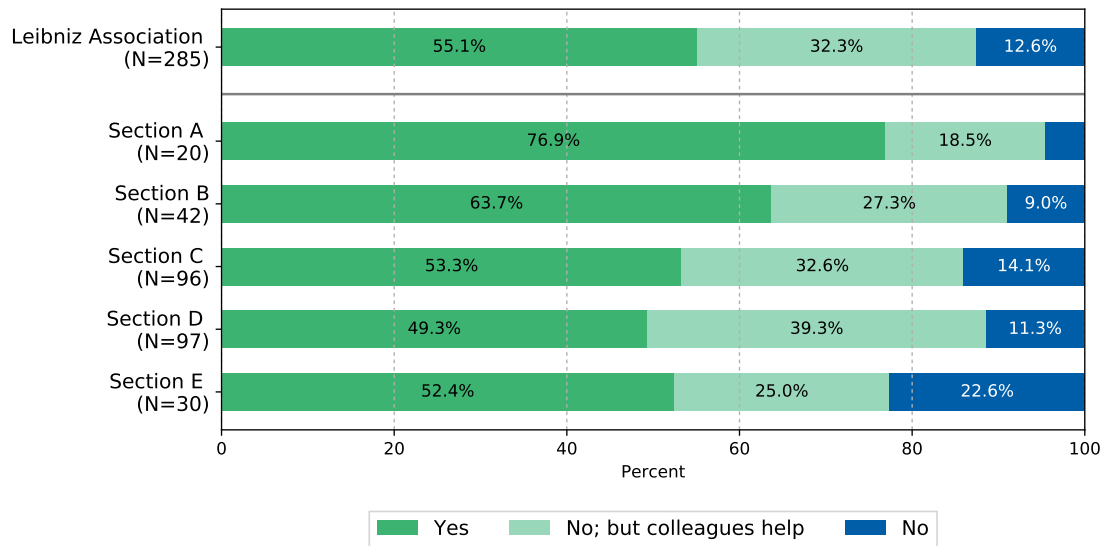


Figure 59: International doctoral researchers receiving all relevant information at their institute in a language they understand by section (N=285)

9.5 Support for Learning German

Figure 60 shows the level and type of support for learning German offered by the institutes. Figure 61 indicates the need for more support to learn the language voiced by international doctoral researchers.

Sections

The level of support offered and needed to learn German varies across sections. Percentages presented in the figures 60 and 61 refer to the share of international doctoral researchers answering “yes” to a provided statement regarding the language support offered and needed. The shares answering “don’t know” are not displayed in the figures but partly are substantial. 25% of the respondents do not know whether or not they can receive funding for external language courses. For the other areas, the share of respondents answering “don’t know” ranges from 5% to 15%.

Sections C, D, and E tend to provide language classes at the institute rather than funding external courses. The share of respondents who declare that their institute provides language classes is highest in Section D, with 68%. Institutes of Section B appear to fund external language courses more often. In Section A, both shares for internal (15%) and external (19%) language courses are

lower compared to the other sections. However, when referring to the support needed (Figure 61), Section A has the highest share of international doctoral researchers who claim to have no need for support to learn German, most probably because they already speak German (53%).

The background of international doctoral researchers will likely differ across sections and single institutes, as these attract people with different skills. Due to its specific thematic areas, Section A might attract foreign doctoral researchers who have already mastered German (e.g. because they studied German). This is consistent with the finding that 38% of international doctoral researchers in Section A demand support for learning German, compared to roughly 60% in all other sections.

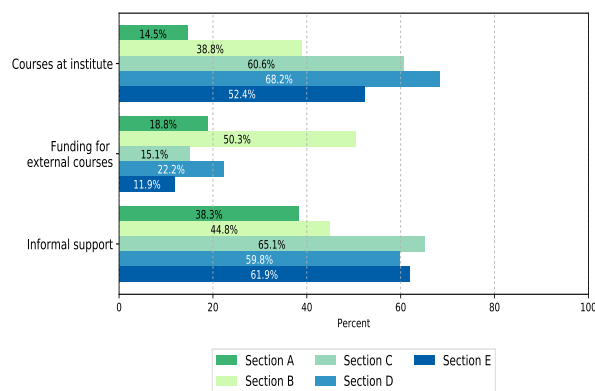


Figure 60: Support offered by institute for learning German (N=293)

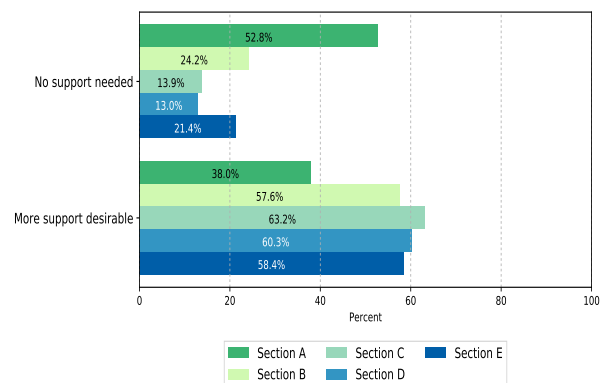


Figure 61: Support needs regarding German language (N=293)

Multivariate Analysis

A weighted logit model predicting the need for more support to learn German and controlling for section, gender, year of PhD, contract situation, and parental status (Table 18 in the Appendix) suggests only a significant difference for the 4th year of the PhD (at the 10% significance level), with a negative effect compared to the 1st year. Introducing the existence of a formal contact person as an additional regressor in the model does not yield a statistically significant effect.

10 Perceptions on the Compatibility between Working in Academia and Private Life

Main findings from the following chapter:

- 35% (strongly) disagree that working in academia is compatible with childcare responsibilities. This is less prevalent in Section B and more prevalent in Section C. This perception is more prevalent among women.
- Thinking that childcare responsibilities are not compatible with academia is positively associated with thinking about not continuing the doctorate.
- 26% of the doctoral researchers indicate that care responsibilities for family members other than children are compatible with working in academia.
- Only 8% of the doctoral researchers perceive living in a partnership and work life in academia as not compatible. 36% think an active social life is not compatible with work in academia, and 26% think the same about hobbies.
- 76% of the doctoral researchers think that working in academia creates too much financial uncertainty. 55% think it requires them to move too often. 35% indicate that working in academia does not allow them to plan their private life.
- Parents have a noticeably more negative perception with respect to the relationship of academic work with financial uncertainty, regional mobility and private-life plans.

In this subchapter, we analyze the perceptions of doctoral researchers with regard to the relationship between their work life in academia and their private life. It is important to mention here that all doctoral researchers were asked to answer these questions, not only those who have care responsibilities towards children or other family members. Work-life balance does not only refer to the balance between work and private care work, but also includes compatibility between work and

other life spheres. Furthermore, the inclusion of doctoral researchers without care responsibilities allows us to find out if both doctoral researchers with care responsibilities and those without have different perceptions of the relationship between their work life in academia and their private life.

10.1 Care Responsibilities Towards Children and Other Family Members

As we have seen in subsection 4.2, around 12% of the doctoral researchers who answered the question indicated that they are parents. Among the parents, 6% do not have a partner. Most parents' youngest children are up to 6 years old. Only 6% of all parents (N=109) indicated that their youngest child is aged seven or older. Furthermore, 65% of the parents (N=103) have one child, 26% have two, and around 9% have three children.

We also asked whether the doctoral researchers have care responsibilities towards other family members beyond children. Among those who answered the question (N=948), around 16% indicated that they do. There are no remarkable gender differences. Among the parents, 21% (n=23) have additional care responsibilities for other family members. Comparing the Leibniz sections with regard to the doctoral researchers' care responsibilities towards family members other than children, we can observe rather large differences that are significant on a 10% level. In Section D, the share of people with care responsibilities beyond children is the highest (around 20%), followed by Section E (around 17%) and Section C (around 16%; see Figure 62).

These differences could be partially explained by differences in the distribution of citizenship status. Section D is the section with the highest share of non-EU international researchers (around 24%), and Section E the second highest (23%). Simultaneously, the group of non-EU international researchers is also the group with the highest share of people who indicate that they have care responsibilities beyond children (29%), whereas only 14% of the German citizens and 6% of the EU international researchers have such responsibilities (see Figure 62). The differences between the three types of citizenship are significant on all levels.²⁶

²⁶The differences between the three types of citizenship must be interpreted carefully, as we do not know the extent to which the doctoral researchers have care responsibilities and what kind of care responsibilities they have. Theoretically, it is possible that care responsibilities are financial as well as physical or emotional in nature. For a better understanding of the relationship between private life and academic work, future surveys should improve the operationalization of care responsibilities.

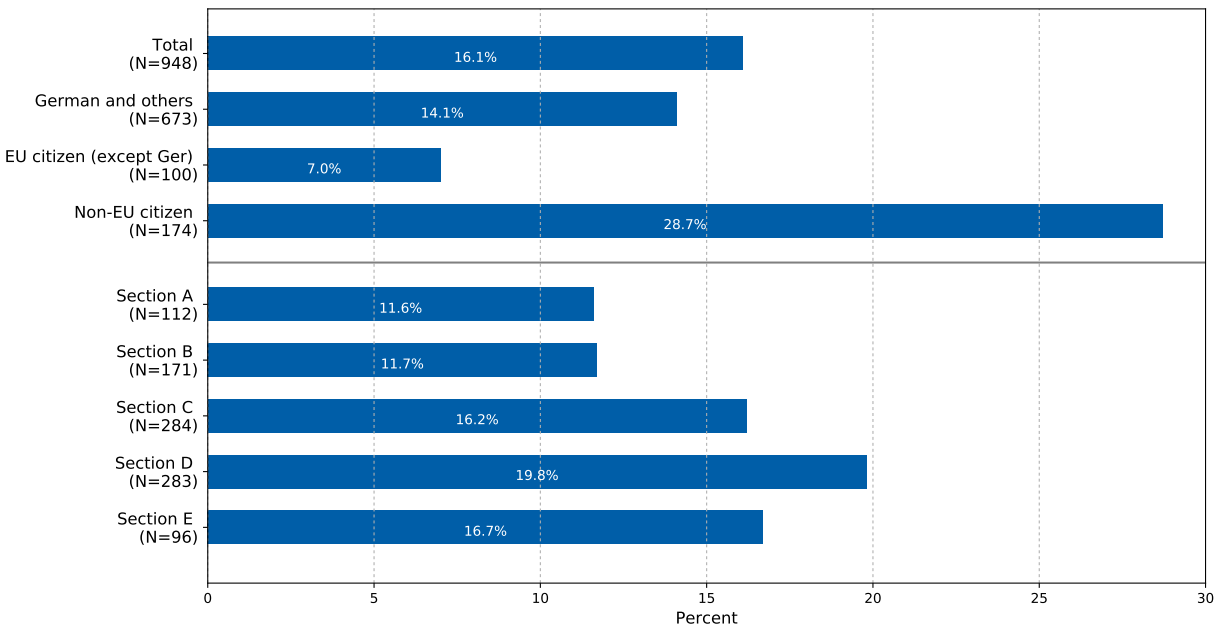


Figure 62: Doctoral researchers with care responsibilities besides children by citizenship status and section

10.2 Perceptions on the Compatibility between Working in Academia and Having Children

In this subchapter, we analyze the doctoral researchers' perceptions of the compatibility between working in academia and caring for children. In order to do so, we are using two items of our questionnaire. The first one is "Working in academia is compatible with care responsibilities for children" and the second one is "Working in academia only allows me having a child/children if my partner or other family members are mainly taking over childcare responsibilities." The respondents were asked to indicate on a scale between 1 to 5 whether they strongly agree (1), agree (2), neither agree nor disagree (3), disagree (4) or strongly disagree (5). In addition to this, the respondents also had the possibility to not answer the questions at all.

A minority of 33% out of all doctoral researchers who answered the question (N = 850) agree or fully agree that working in academia is compatible with childcare responsibilities. A slightly higher share (strongly) disagree with this statement (around 35%), and around 33% are undecided (see Figure 63). One half of the doctoral researchers (50%) think that working in academia only allows them to have children if their partner or other family members are mainly taking over childcare responsibilities (N = 835). Only 16% (strongly) disagree and around one third is undecided

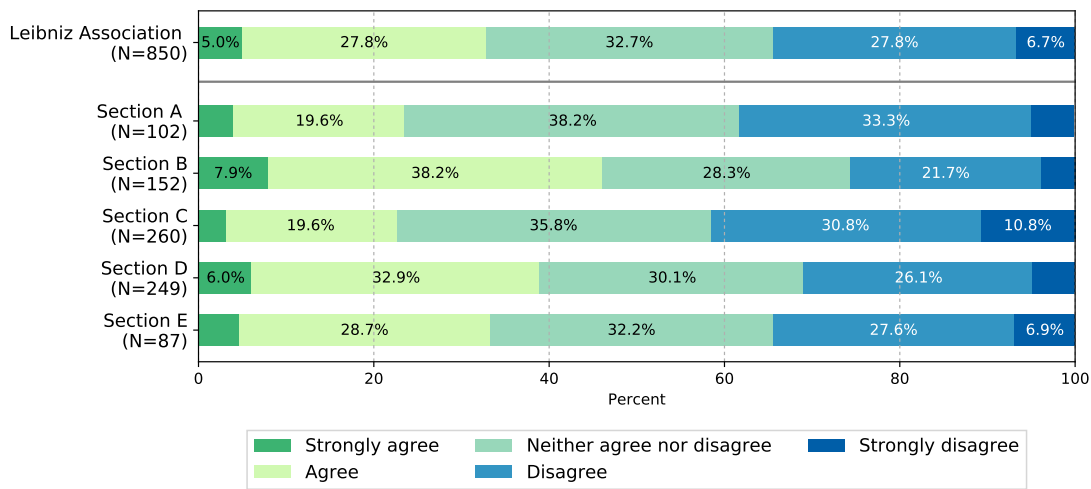


Figure 63: Perceptions on compatibility of working in academia and childcare responsibilities by section

(see Figure 64).

Sections

The answers to these two questions differ remarkably between the Leibniz sections. With regard to the question of whether working in academia is compatible with childcare responsibilities, Section B has the highest share of doctoral researchers who think (agree or fully agree) that this is the case (46%), followed by Section D (39%) and Section E (33%). In Section A (24%) and Section C (23%), the perception of the compatibility is much less positive (see Figure 63).

Similarly, the share of doctoral researchers who do not think that working in academia only allows them to have children if their partner or other family members are mainly taking over childcare responsibilities is highest in Section B (23%), followed by sections A and E (22%), and lowest in sections C and D (12 and 11%; see Figure 64). Overall, we can summarize that Section B has the most positive perception of the compatibility of working in academia and taking care of children, and Section C the most negative.

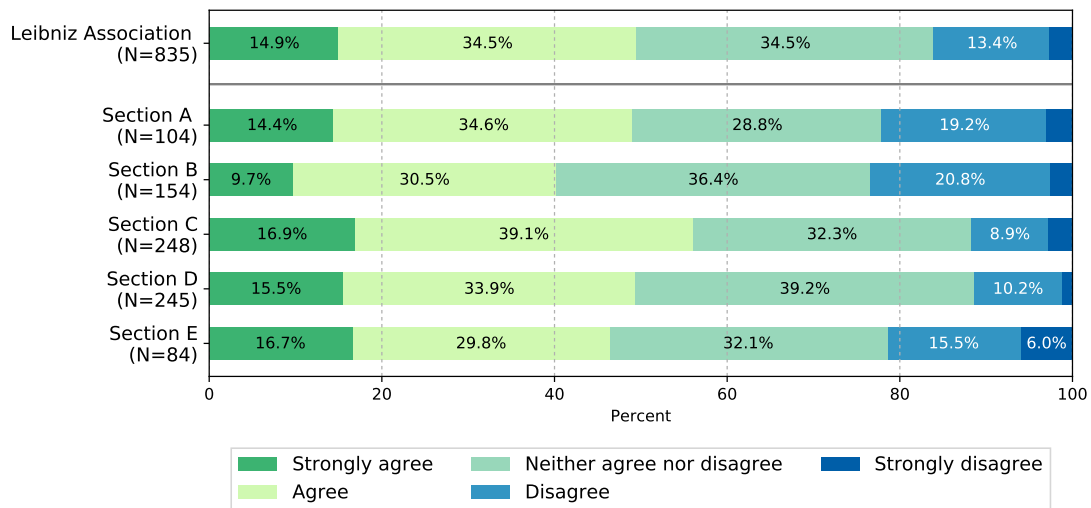


Figure 64: Perceptions on having children only if family members mainly taking over childcare responsibilities by section

International Doctoral Researchers

Comparing the German citizens or those who grew up in Germany with doctoral researchers who did not grow up in Germany or who have non-German citizenship, we cannot observe remarkable differences with regard to both questions.

Gender and Parenthood

The opinions on the compatibility of working in academia and childcare are not significantly different between doctoral researchers with children in their household and those without. We can only observe a marginally more positive opinion among those with children (around 39% agree or strongly agree) than those without (around 32% agree or strongly agree). Nevertheless, if we compare the response behavior between those with one child in the household and those with two or more children, we can observe larger significant differences. Around 25% of those with one child in their household do not agree that working in academia and childcare responsibilities are compatible. This picture is much more negative among those with two or more children in their household. In this group, around 46% do not agree with the above statement (see Figure 65).²⁷

²⁷Please note that a quite high number (n=134) among those who do not have children in their household did not answer the question.

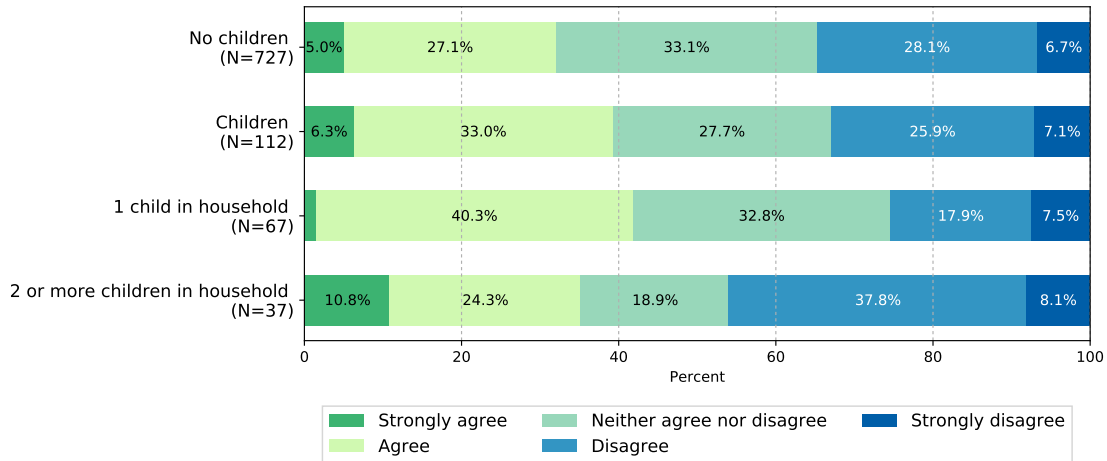


Figure 65: Perceptions on compatibility of working in academia and childcare responsibilities by parental status

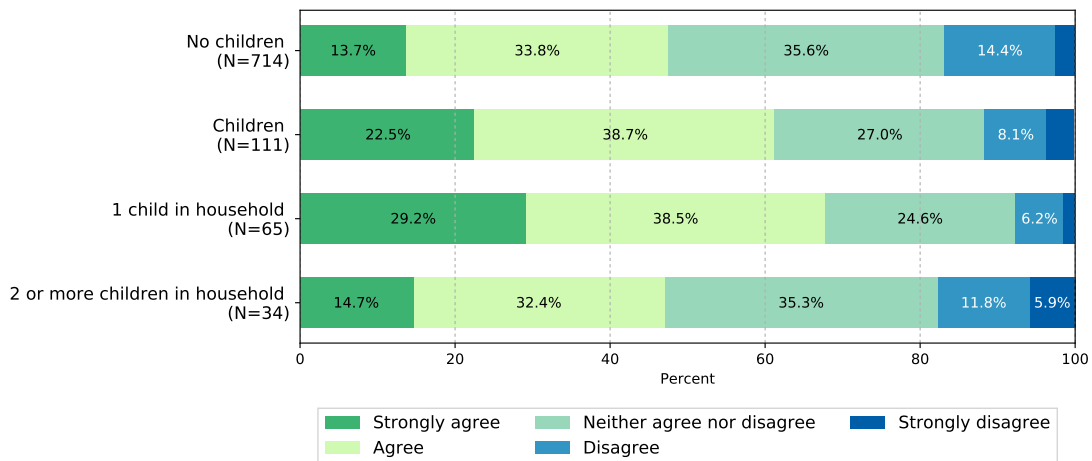


Figure 66: Perceptions on having children only if family members mainly taking over childcare responsibilities by parental status

We can observe larger differences between parents and non-parents if we look at the item "Working in academia only allows me having a child/children if my partner or other family members are mainly taking over childcare responsibilities" (see Figure 66). While almost one half of the doctoral researchers without children (48%) think that working in academia only allows them to have children if their partner or other family members are mainly taking over the childcare responsibilities, almost two thirds of the parents feel the same (61%). Interestingly, the opinion of parents with two or more children in the household is more positive than the opinion of those doctoral researchers who only have one child. But this correlation is statistically not significant.²⁸

With regard to the first question, in which the respondents were asked to what extent they agree that working in academia is compatible with childcare responsibilities, we can observe significant differences between women and men. While the share among female doctoral researchers is below the average of those who think that working in academia is compatible with childcare responsibilities, with 27%, the share among male doctoral researchers is above the average, with 39% (see Figure 67). Large but statistically insignificant differences can also be observed between women with children and men with children. Fathers have a more positive opinion on the compatibility than do mothers (50% of all fathers agree or fully agree, compared to 28% of all mothers). Mothers are also much more undecided than fathers (37% and 20% respectively).

There are no significant gender differences with regard to the question of whether working in academia only allows the respondents to have children if their partner or others are mainly taking over childcare responsibilities (see Figure 68). Men (fully) disagree only slightly more often than women that their partner or others mainly have to take over childcare responsibilities. Interestingly, this is not the case if we compare only mothers and fathers. At 65%, the share of fathers who think that working in academia is only compatible with having children if their partner or other family members are mainly taking care of their children is above the share of the mothers who think the same (57%). But we have to mention that this correlation is not significant. However, if we then only compare men with children and men without children, we can observe a significant correlation between parenthood and the response behavior with regard to childcare. Men with children

²⁸As with the previous question, there was a high number of doctoral researchers without children in their household who did not answer this question (n=146 or 17% out of 860 respondents.)

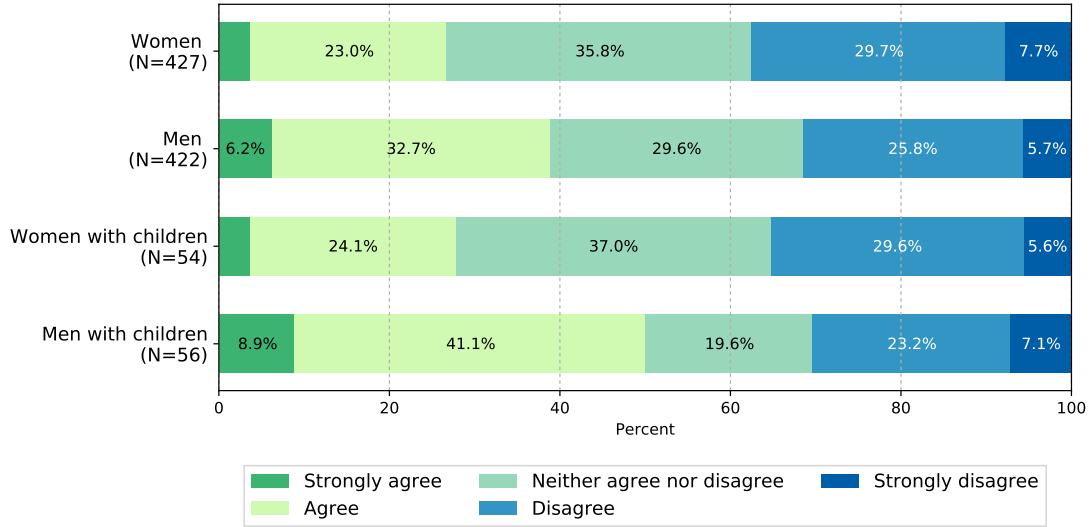


Figure 67: Perceptions on compatibility of working in academia and childcare responsibilities by gender and parental status

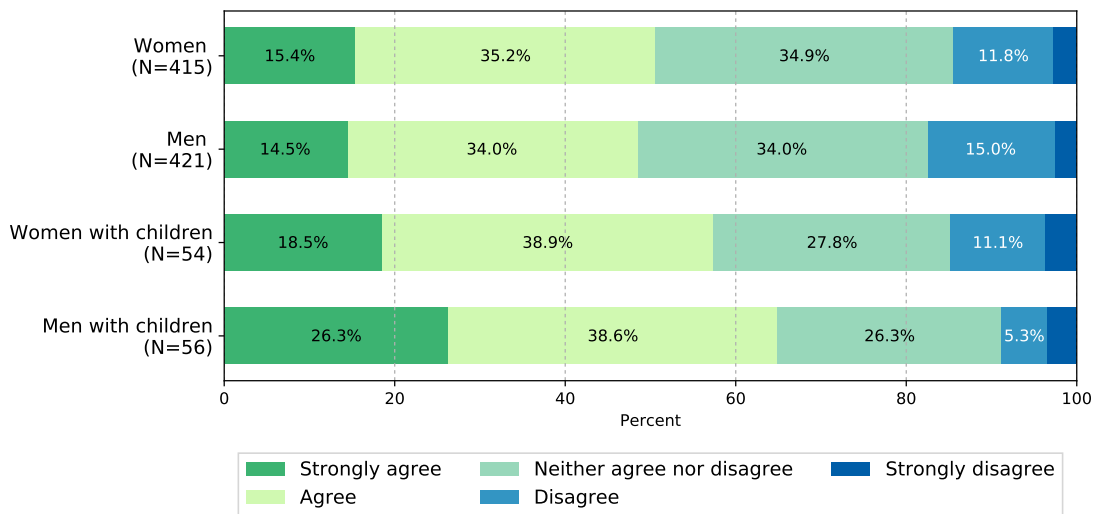


Figure 68: Perceptions on having children only if family members mainly taking over childcare responsibilities by gender and parental status

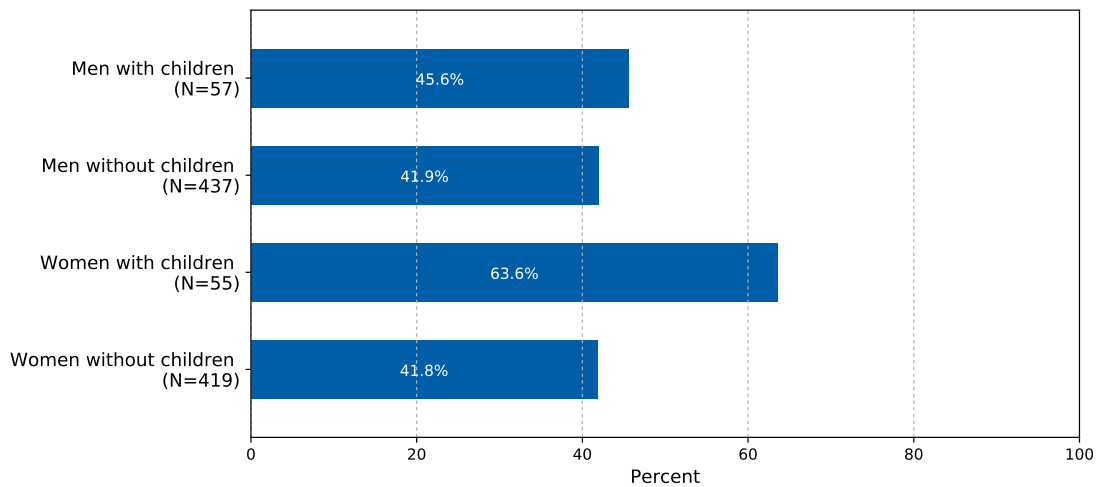


Figure 69: Doubts about continuation of PhD by gender and parental status

(fully) agree much more often (65%) than those without children (49%) that their partner or other family members have to mainly take over childcare responsibilities.

Although the correlations in the subsample of the parents are statistically not significant, we could observe that mothers have a less positive opinion on the compatibility of childcare responsibilities and working in academia. That might stem from different gender-specific parental norms. It is plausible to assume that fathers in academia have on average more support with childcare than mothers. This might be one of the potential reasons why, at 64%, the share of mothers who have doubts about continuing their doctorate (see 13.4) is considerably above the share of the fathers (46%). This correlation is significant on a 10-percent level. In contrast to this, we do not see any significant differences between men and women without children. Here the share of those who have doubts about continuing their doctorate is 42%, and thus below the share among parents. Interestingly, the difference between men with and without children is very small. Therefore, we can conclude that having a child does mainly have an impact on the considerations regarding the continuation of the PhD for mothers and not so much for fathers (see Figure 69).

If, finally, we look at the correlation between the variables which show both the perception of the compatibility between academia and childcare responsibilities and whether doctoral researchers have ever thought about terminating their doctorate, we can observe statistically significant differences. This means that doctoral researchers who have fewer doubts about continuing their PhD also have a more positive perception of the compatibility between childcare and working in academia

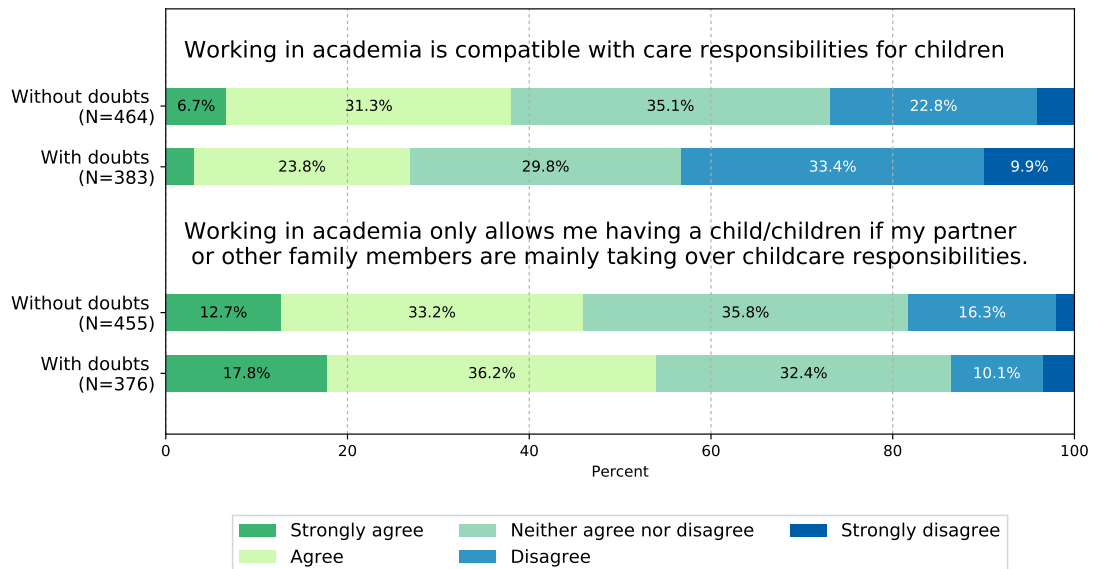


Figure 70: Perceptions on compatibility of working in academia and childcare by doubts about the continuation of PhD

(see Figure 70).

10.3 Perceptions on the Compatibility between Working in Academia and Care Responsibilities for Other Family Members Besides Children

We also asked the doctoral researchers whether they think that working in academia is compatible with care responsibilities for other family members beyond children. Among those who answered the questions (N=826; 17% out of all respondents preferred not to answer), a relative majority is undecided (38%); a little more than two thirds (fully) disagree (36%); and only 26% (fully) agree (see Figure 71).

With regard to the answer option "I prefer not to answer," we see that around one fifth of the international researchers preferred not to answer, and only 15% of the Germans. There are also differences between the Leibniz sections. 21% of all doctoral researchers in Section D did not answer the question; 19% in Section B; 17% in Section E; and 13% in Section A and Section C. At 6%, the share among those with additional care responsibilities is, unsurprisingly, below the share of those without such responsibilities (18%). We have to keep this in mind when interpreting the

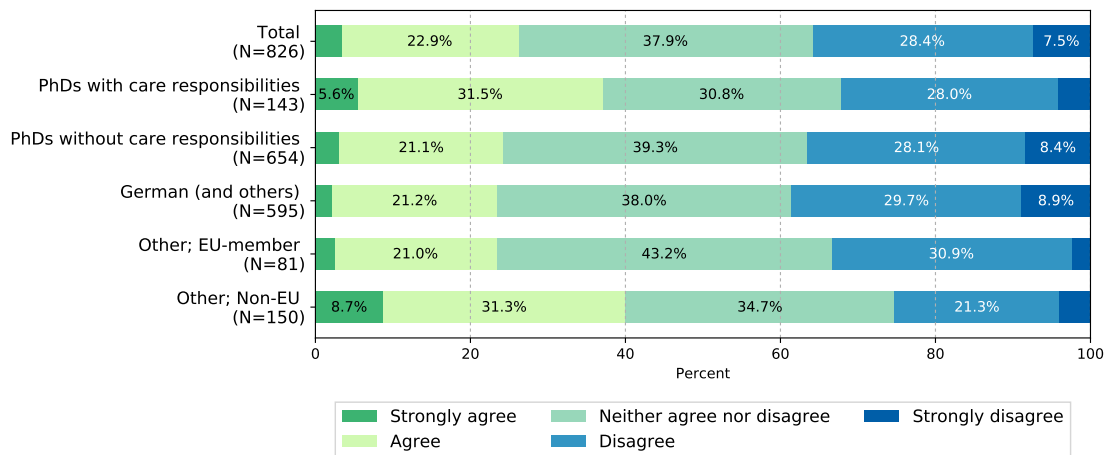


Figure 71: Perceptions on compatibility of working in academia and care responsibilities towards other family members by care responsibilities and citizenship status

distribution of this variable.

International Doctoral Researchers and Doctoral Researchers with Care Responsibilities

Interestingly, non-EU-international researchers, who make up the group with the highest share of those indicating that they have care responsibilities, think much more often (40 %) that working in academia is compatible with care responsibilities than do German and EU citizens (23% and 24% respectively). German citizens have the highest share of those who (fully) disagree (39%), followed by EU citizens (33%), with only one fourth of the non-EU international researchers (fully) disagreeing (25%). The correlation between citizenship and the perception on the compatibility is significant.

Surprisingly, doctoral researchers with care responsibilities (fully) agree much more often (37%) than those without care responsibilities (24%) that this is compatible with working in academia (see Figure 71). As mentioned above, these different distributions could stem from different concepts or areas of care. While physical care might be quite time-consuming, this is not the case with financial care.

Sections

When comparing the Leibniz sections, we can observe some noticeable but statistically insignificant differences. The share of doctoral researchers who (fully) agree that academia and care responsibilities are compatible is highest in Section E (33%), followed by Section D (30%), Section B (30%), and Section A (25%). In Section C, doctoral researchers have the most negative opinion on the compatibility of care responsibilities and academia (see Figure 72).

Gender and Parenthood

There is no significant correlation between gender and the perception of the compatibility of working in academia and care responsibilities towards other family members. However, we can see different distributions among men and women. While 30% of all men who answered the question (fully) agree that both areas are compatible, only 23% of all women do so. Furthermore, at 42%, women are much more undecided than men (34%). Doctoral researchers who have children in their household show a similar response behavior compared to those who do not have children in their household.

10.4 Perceptions on the Compatibility between Working in Academia and Partnerships, Hobbies, and a Social Life

We also asked the respondents whether working in academia is compatible with living in a partnership and with private-life activities, such as meeting friends or family members, or pursuing a hobby. With regard to partnership, only a small minority of 8% doubt that this is compatible with work life in academia. 36% of all doctoral researchers who answered the question think that working in academia causes them to neglect their social-life activities, such as meeting friends or family members, and 26% do not think that academia allows them to pursue hobbies (see Figure 73).

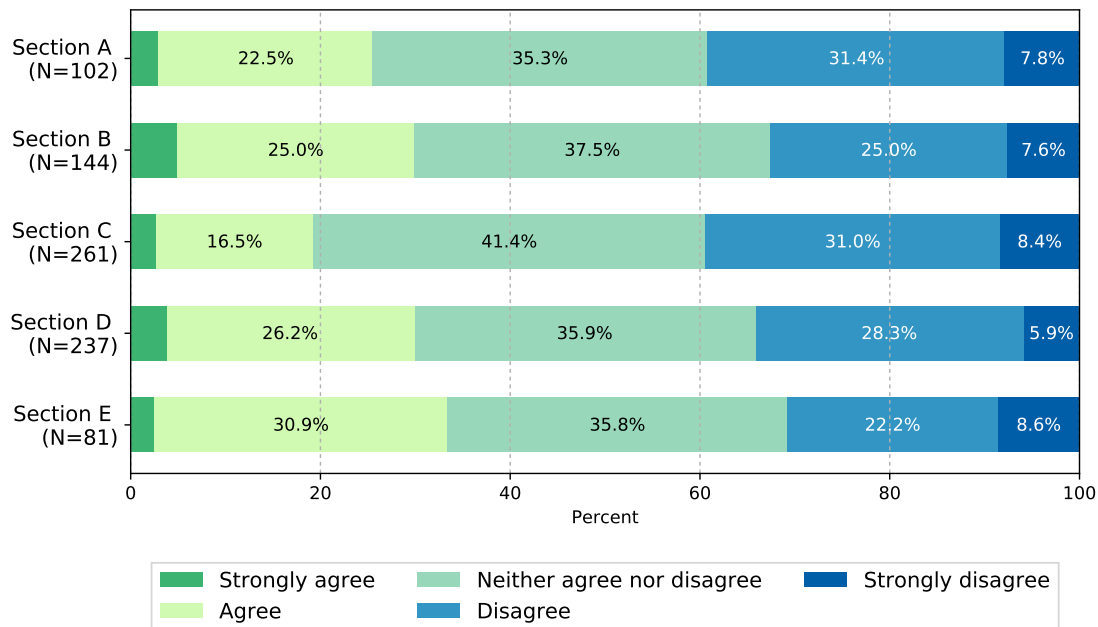


Figure 72: Perceptions on compatibility of working in academia and care responsibilities towards other family members by section

Sections

All variables (partnerships, social life, and hobbies) correlate significantly with the Leibniz section doctoral researchers are affiliated with. In Section A, the share of those who think (agree and fully agree) that working in academia is compatible with living in a partnership is the highest (75%), followed by Section D (74%), Section B (72%), Section C (69%), and Section E (68%).

With regard to the compatibility with a social life, we can observe that Section B has the most positive perception, and Section C the most negative. While in Section B 47% (fully) disagree that working in academia causes them to neglect their social life, this is the case for only 31% in Section C. On the other hand, the share of those who (fully) agree that their social life has to be neglected is the highest in Section C (42%) and the lowest in Section B (29%; see Figure 74). Similarly, we can observe the most positive perception on the compatibility with pursuing hobbies in Section B, the second most positive in Section D, and the most negative in Section C. While in Section B almost two thirds (61%), and in Section D a little over half (52%), of all doctoral researchers think that working in academia is compatible with pursuing hobbies, this is the case for only 39% of the doctoral researchers in Section C (see Figure 75).

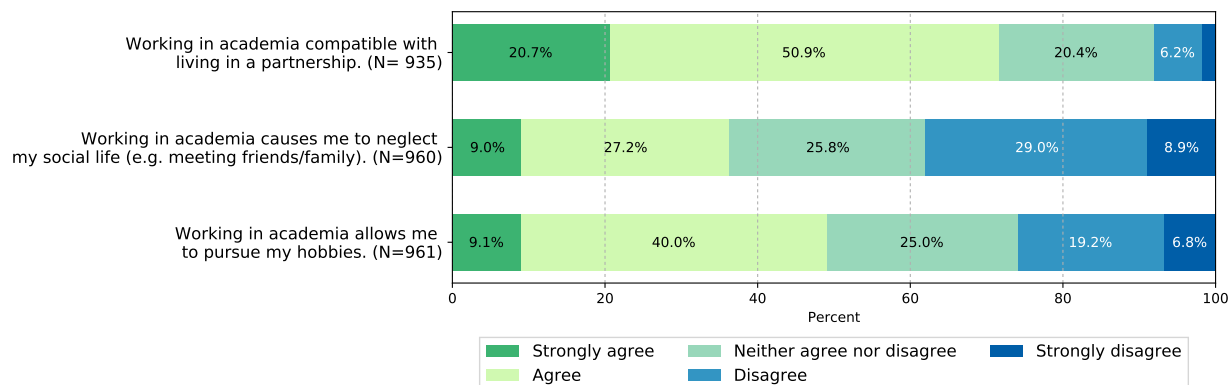


Figure 73: Perceptions on compatibility of working in academia and partnerships, hobbies, and a social life

International Doctoral Researchers

Comparing the three different kinds of citizenship, we can only observe a correlation with the perception on the compatibility with a social life. Non-German EU citizens (51%) think more often than German citizens (34%) or non-EU citizens (36%) that working in academia causes them to neglect their social life. Similarly, EU citizens have the most negative perception on the compatibility with hobbies. Only 44% in this group (fully) agree that academia is compatible with pursuing hobbies. 49% out of all German citizens, and 51% out of all non-EU citizens, think that this is compatible. With regard to living in a partnership, German citizens only have a slightly more positive perception on the compatibility than doctoral researchers with non-German citizenship.

Gender

There are no correlations between gender and the perceptions on the compatibility with partnerships, a social life, and hobbies. The perception on the compatibility of work life in academia with pursuing hobbies is only slightly more positive among men than among women. The distributions of the response behavior with regard to partnerships and a social life are more or less the same among men and women.

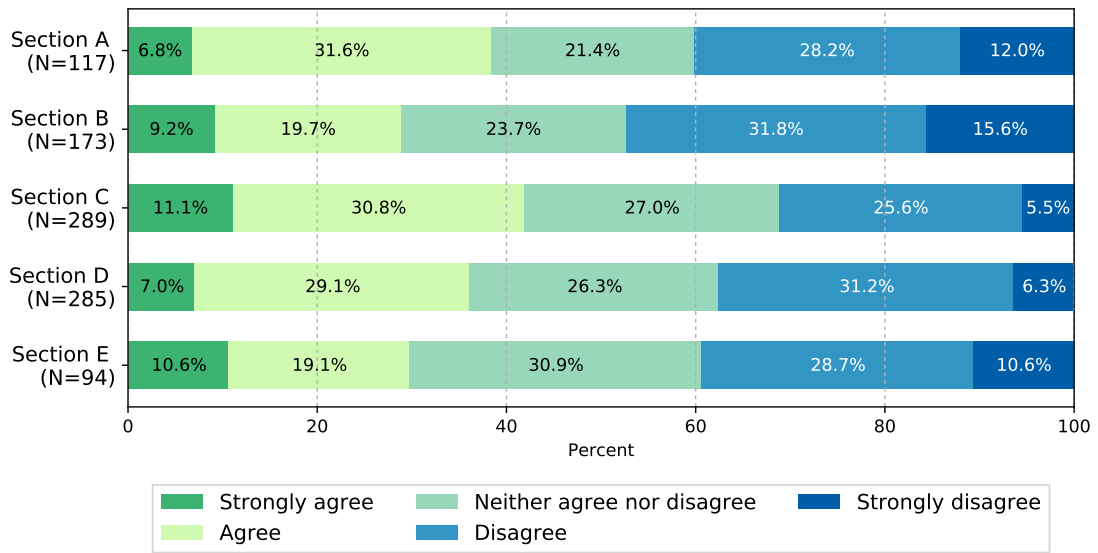


Figure 74: Perceptions on compatibility of working in academia and a social life by section

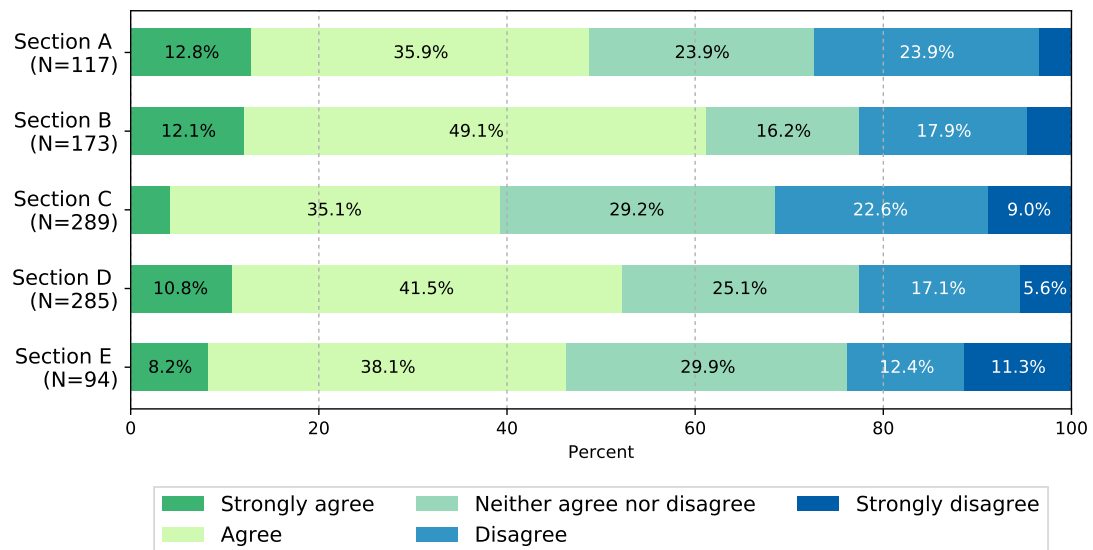


Figure 75: Perceptions on compatibility of working in academia and pursuing hobbies by section

Parenthood

With regard to parenthood, we can observe a significant correlation only with the compatibility with pursuing hobbies. While a little over half (51%) of all doctoral researchers who do not have children in their household (fully) agree that working in academia is compatible with pursuing a hobby, only 38% of all parents agree. And the other way around, only 24% of the doctoral researchers without children and 38% of the parents (fully) disagree that academia is compatible with hobbies. Although there is no correlation between parenthood and the perception on the compatibility with a social life, we can observe slightly different distributions in both groups. Parents (42%) think a little bit more often than non-parents (35%) that working in academia causes them to neglect their social life. We cannot observe remarkable differences in the distributions with regard to the compatibility with partnerships.

10.5 Perceptions on the Relationship of Working in Academia and Making Private-Life Plans, Regional Mobility, and Financial Situation

Finally, we asked the doctoral researchers whether working in academia allows them to plan their private life, whether academic work requires them to move too often, and whether it creates too much financial uncertainty. We can observe the most negative perception with regard to financial uncertainty. Among those who answered the question, a little more than two thirds (76%) think that working in academia creates too much financial uncertainty. More than half (55%) think that working in academia requires moving too often, and a little over one third (35%) do not think that working in academia allows them to plan their private life (see Figure 76).

Sections

There are no remarkable, statistically significant differences between the sections with regard to the perception on financial uncertainty. The share of those doctoral researchers who think (agree and fully agree) that working in academia creates too much financial uncertainty ranges only from 72% in Section B to 79% in Section C.

By contrast, there is a significant correlation between the Leibniz sections and the two other items,

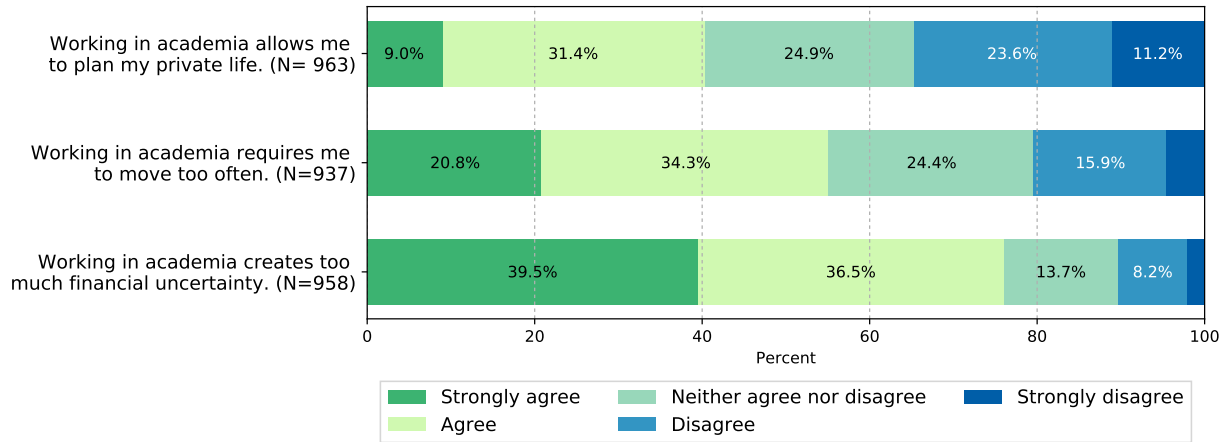


Figure 76: Perceptions on the relationship of working in academia and making private-life plans, regional mobility, and financial situation

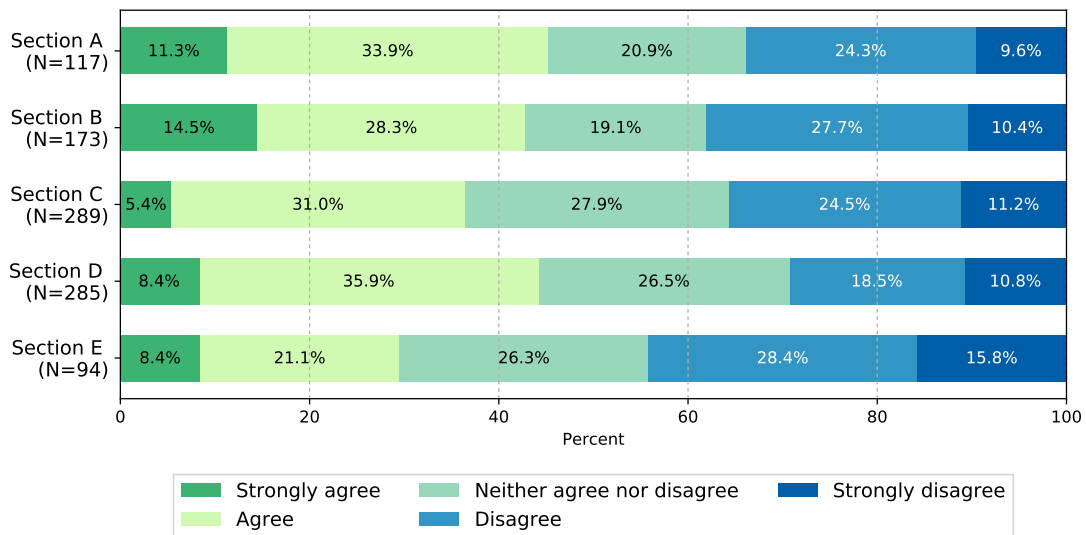


Figure 77: Perceptions on the relationship of working in academia and making private-life plans by section

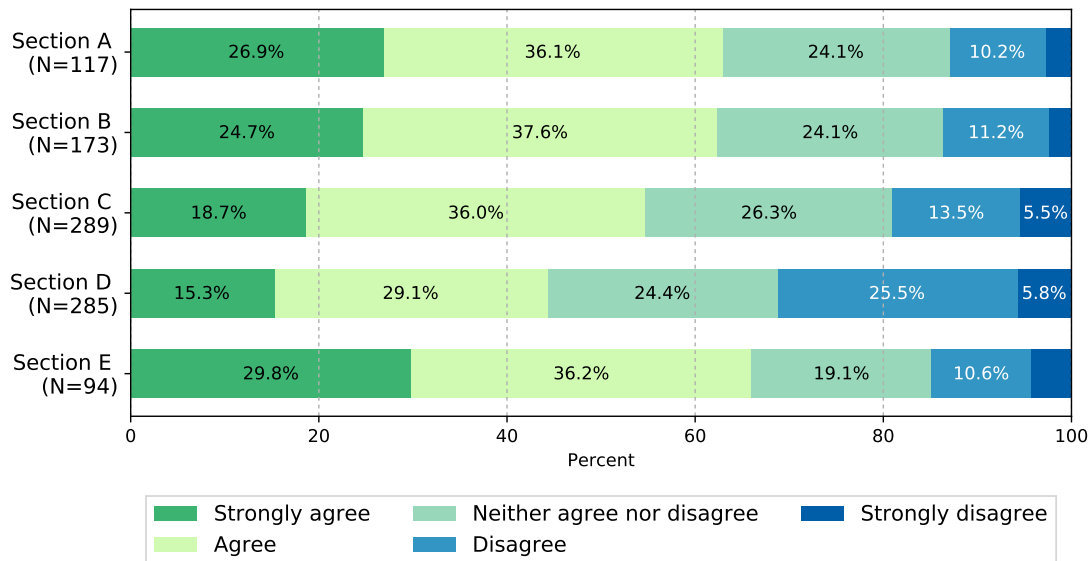


Figure 78: Perceptions on the relationship of working in academia and regional mobility by section

i.e. compatibility with planning one's private life and the perception on regional mobility. Doctoral researchers in Section A (fully) agree most often (45%) that working in academia allows them to plan their private life, followed by doctoral researchers in Section D (44%) and Section B (43%). In Section E and Section C, we can observe the most negative perception. In Section E, only 30% (fully) agree that working in academia allows them to make private-life plans, and in Section C the share is 36% (see Figure 77).

Doctoral researchers in Section D have the most positive perception on the relationship between working in academia and regional mobility. In Section D, 44% of all doctoral researchers (fully) agree that working in academia requires them to move too often. This share is around 20 percentage points higher in Section B (62%), Section A (63%), and Section E (66%; see Figure 78).

International Doctoral Researchers

If we compare the perceptions of the doctoral researchers with different kinds of citizenship, we can observe that German citizens have the most negative perception with regard to private-life plans, regional mobility, and financial uncertainty. By contrast, non-EU citizens have the most positive opinion on these areas of their relationship with academic life. For example, 51% of all non-EU citizens (fully) agree that academic life allows them to plan their private life, whereas

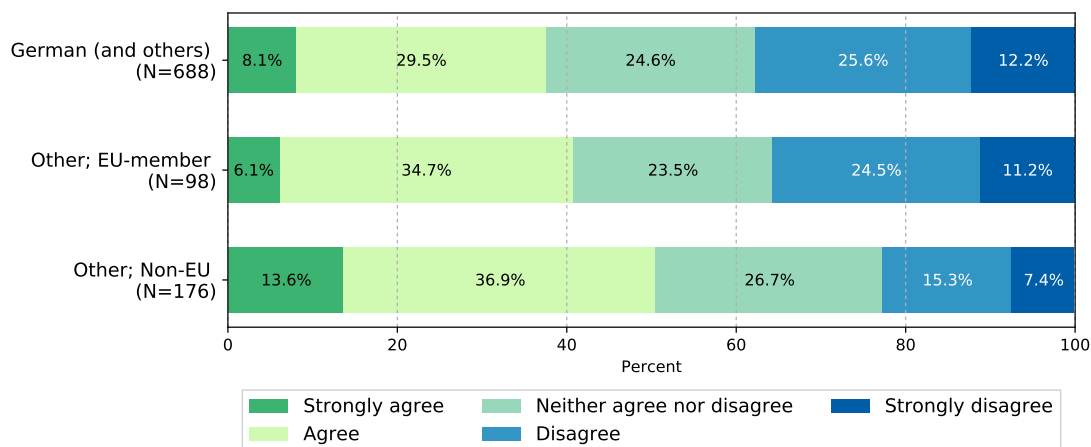


Figure 79: Perceptions on the relationship of working in academia and making private-life plans by citizenship status

only 38% of all German citizens do so (see Figure 79). There is only a significant correlation between citizenship status and the perception on making private-life plans. The correlation with the perception on financial uncertainty is significant only on a 10-percent level.

Gender

With regard to gender, we cannot observe any significant correlations with the three variables. There are only very small differences between women and men. In all three areas, men have a slightly more positive perception than women. For example, 23% of all male doctoral researchers (fully) disagree that working in academia requires them to move too often, whereas only 18% of all women think so.

Parenthood

Unsurprisingly, parents have a much more negative perception with respect to all three dimensions of private life than doctoral researchers who do not have children in their household (see Figure 80). While 42% of doctoral researchers who do not have children (fully) agree that working in academia allows them to plan their private life, the share of parents who feel the same is only 30%. Furthermore, at 85%, parents are more likely to think that working in academia creates too much financial uncertainty than non-parents, with a share of 75%. Both correlations are significant.

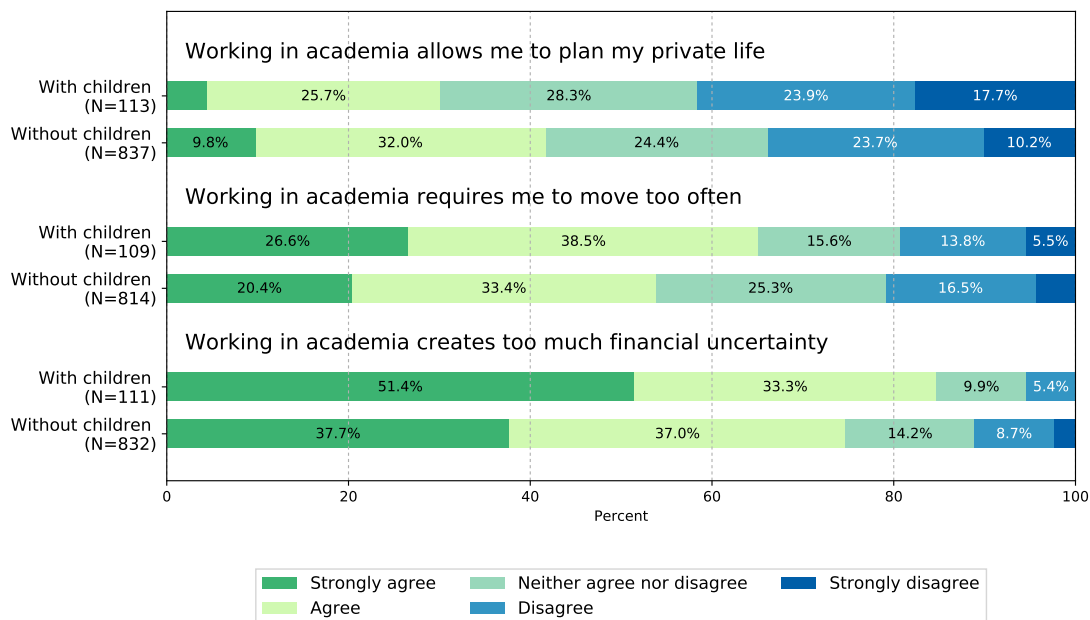


Figure 80: Perceptions on the relationship of working in academia and making private-life plans, regional mobility, and financial situation by parental status

By contrast, the correlation between parenthood and the perception on regional mobility is not significant. Nevertheless, at 65%, the share of parents who (fully) agree that working in academia requires them to move too often is above that of doctoral researchers without children (54%).

10.6 Open Answers on the Relationship between Working in Academia and Private Life Reveal Potential Scope for Improvements

In this subchapter, we want to highlight the potential scope for improvements which could lead to more positive perceptions on the compatibility between working in academia and private life. We are drawing on some of the open answers the respondents provided in the survey. In total, 94 respondents used the opportunity to write down additional aspects in the area of compatibility between working in academia and private life (question E7). We tried to subsume all open answers into separate categories. Since some of the respondents mentioned more than one aspect in the area of compatibility, some responses also fall under more than one category. Additionally, some categories also partly overlap. The latter problem, plus the time pressure on the authors of this report, are the reasons why the categorization does not fulfill the requirement of inter- and intra-

coder reliability for qualitative content analysis. This also implies that the numbers of the cases in one category should be interpreted as tendency rather than as generalizable statistical information. This is also not the goal of this subchapter. Instead, we want to illustrate the problematic aspects in the area of compatibility from the perspective of the respondents.

The first dimension of **financial insecurity and mobility** which is required **due to widespread limited contracts** in academia was emphasized by 28 respondents. From the perspective of these respondents, this causes uncertainty and instability in their private life. Consequently, some scientists have to live in long-distance relationships and feel unable to have children. Under these circumstances, long-term or even mid-term private-life plans are difficult to make. On the other hand, people who already have children cannot build up a social network which supports them in their childcare duties, creating difficulties in the compatibility of work and childcare responsibilities. All in all, the entire situation is perceived by those respondents as being family-unfriendly, which creates the feeling that scientists have to decide between family (partner, children) or a career in academia. For example, one respondent wrote: *“If your partner is also working in science it is very hard to find jobs in the same city or area that both partners can live together, without you or your partner taking disadvantages for personal career options.”* Another person wrote: *“(…) moving frequently around makes you lose all your social network around you, which makes it hard if you have kids, for example, and need someone to look after them if they are ill etc.”* And a third person mentioned that the required mobility *“especially (for) families with children (…) sometimes (…) is difficult for family members to readjust to (…) new environment.”*

As already mentioned above, these insecurities also influence the **decision to have children**. In the open answers, 13 respondents criticized the fact that the conditions in academia do not allow them to respectively plan or start a family. Financial insecurity and the frequent necessity to relocate are not the only aspects they find problematic. The workload in terms of hours per week is perceived as another problem: *“To my opinion, it is a disadvantage to have children and a partnership as a young scientist. There is too less time for family life and the expected work amount. Hence, I feel that it is expected to first take care about the personal career and afterwards, it is acceptable to get children.”* Another person wrote: *“Frequent moves make it difficult to establish a family unit to begin with, especially if one’s significant other is a professional in a different line of work.”*

The **high workload** and **time pressure** is one aspect among others in a third category which we

created on the basis of the open answers. This category, in which we subsumed 29 open answers, describes difficulties with the **flexible working hours**. Very often, flexible working hours are considered to be a good measure in order to create better compatibility between work and private life. This is true to some extent, especially when people can use the flexibility to better synchronize private activities and duties with working time. However, flexible working hours can also imply that people react flexibly mainly towards work requirements rather than it allowing them to meet their private needs and duties. Very often, flexible working time does also imply **additional, unpaid working hours** and, in particular, **unpredictable high workloads**. The boundaries between private and working life thus become blurred. Answers belonging to this category include the following examples:

“Working during weekends and late hours during the week. Traveling for project work intervenes with private plans. Spontaneous work comes up quite often, so you cannot plan anything. (...) This intervenes a lot with my private life and makes my situation nearly intolerable.”

“Many scientists work beyond the paid working hours (some willingly), and this is not tolerated by every partner, which may harm the relationship.”

“I think it is harder to survive in academia with care responsibilities. It would be nice to work real part-time as PhD, not just get paid so. That would make (family) life easier. I always have the feeling not to work enough, because there is no clear cut, how much I ‘have to’ or ‘should’ work. [...]”

“Working in science is like being self-employed at an early stage. You have to give always the maximum and whether it is enough is unpredictable.”

One possible reason for these additional unpaid working hours could be the **competitive working environment**. This competition was mentioned by two respondents: *“There are many ‘unofficial’ work hours that no one talks about. Most of my colleagues are extremely stressed, but won’t admit it to any of our supervisors for the fear of not being considered for a position at our institute.”*

The other person criticizes the competitive aspect of academia explicitly: *“There should be less stress on a single person, less focus on numbers (like impact factors and so on) and more team oriented work. At the end we are all working to improve human knowledge, not to make ourselves professors.”*

The open answers underline the quantitative results with respect to the reasons for doubts for not

continuing the PhD (see 6.7) and the reasons against pursuing a further career in academia (see 8.2). As we have seen in these subchapters, among the most important reasons for not pursuing a career in academia, the respondents in our survey indicated limited working contracts, changes of residence, competitiveness of academia, and family responsibilities. Similarly, doctoral researchers who doubt whether they will continue their doctorate justify this with an unclear career path or financial insecurities. Among parents, another important reason for their doubts is the incompatibility of work life in academia with their family life. Additionally, with regard to the category of flexible working hours, which goes along with time pressure and a high work load, our data show that doctoral researchers are working more hours than they are paid for (see 5.5). Among the open answers, there are single answers which explicitly mention additional measures for a better work-life-balance. Beside "*more permanent positions in the scientific field*," the respondents mentioned the possibility of **working from a home office** (6 answers); the necessity of **setting up meetings during a time when children are in school or kindergarten** (1 answer); a **place in a kindergarten or a babysitter** (1 answer); the possibility to take and better schedule **holidays** (2 answers); and the facilitation of **family reunification** in Germany for international researchers (1 answer).

11 Representation of Doctoral Researchers

Main findings from the following chapter:

- A majority of Leibniz Institutes have a PhD representative who represents their fellow doctoral researchers. This finding is consistent with contact lists of the Leibniz PhD Network.
- Less than one year after the foundation of the Leibniz PhD Network, three out of four doctoral researchers are aware of the network (prior to taking part in the survey).
- The PhD representatives are key persons in spreading news about the Leibniz PhD Network and increasing awareness in the institutes. More than 80% of all respondents got to know the Leibniz PhD Network via the PhD representatives.

The last chapter of this report deals with the representation of doctoral researchers in the Leibniz Association and at their respective institutes. This brief chapter might be of special interest to doctoral researchers who want to contribute to the representation of their interests within their institutes and at the aggregate level within the Leibniz PhD Network.

11.1 PhD Representatives

Ideally, PhD representatives are elected by their fellow doctoral researchers within their institutes. More than 90% of all respondents said that their institute has a PhD council or PhD representative.²⁹ Comparing the number of PhD representatives across sections, the share of respondents working at institutes with PhD representatives differs to a certain extent. For instance, 95.6% of doctoral researchers in Section E work in institutes with PhD representatives, whereas this is only the case for 86.6% of the respondents in Section D. However, these differences are not statistically

²⁹Please note, this number has to be interpreted with caution, since the PhD representatives were also one of the main channels for distributing the survey invitation (see Section 13.2 in the Appendix). These numbers are therefore most probably overestimated.

significant in a bivariate analysis.

Further differences caused by other explanatory variables, such as age, gender, or citizenship status, are not meaningful, because the existence of PhD representatives at a certain institute is *not* causally determined by the characteristics of respondents. Since there are also very few respondents who do not know whether there is a PhD representative at their institute ($N = 70$), we did not analyze this group any further to detect possible mechanisms for a lack of awareness.

11.2 The Leibniz PhD Network

The Leibniz PhD Network was founded in the late summer of 2016 by a group of interested doctoral researchers from various Leibniz Institutes and Research Museums. Since then, it has developed an organizational structure and begun to communicate on a frequent basis with doctoral researchers in nearly all Leibniz Institutes.

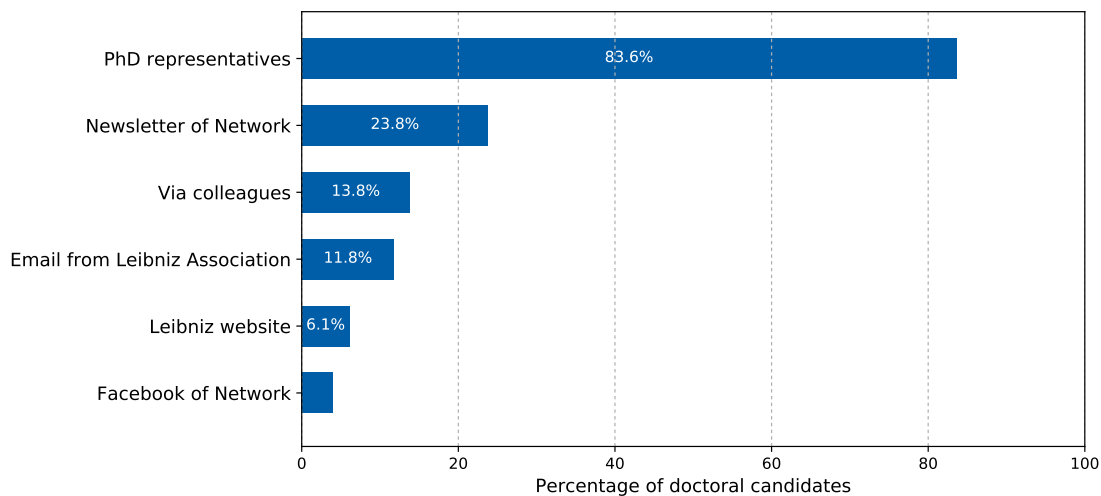


Figure 81: Channels how respondents learned about the Leibniz PhD Network

In the Leibniz PhD Survey, we asked the respondents whether they were aware of the Leibniz PhD Network prior to their participation in the survey. More than two thirds of the respondents were aware of its existence (77.3%). These numbers differ across sections, which shows the room for improving the prominence of the network. While more than 90% of all doctoral researchers in Sec-

tion A are aware of the network, only two thirds of the respondents in Section D know it.³⁰ Also, a multivariate logistic analysis of respondents' knowledge of the Leibniz PhD Network shows that non-EU citizens in particular know the network less often than German doctoral researchers. Respondents' knowledge of the network increases with the duration of the PhD.

We also asked the respondents who knew the Leibniz PhD Network prior to the survey interview how they got to know the network. The data confirms the importance of PhD representatives for spreading news about the network and its activities (see Figure 81). Apart from that, the network's newsletter was a useful tool for informing the doctoral researchers working at Leibniz Institutes.³¹

³⁰The rate of awareness in the other three sections ranges between 78.3% in Section B and 81% in Section C.

³¹In 2018, the newsletter was replaced by a weblog, which can be accessed via <https://leibniz-phd.net>.

12 Summary and Outlook

This report has presented the results of the first survey ever conducted among doctoral researchers in the Leibniz Association. The survey ran at the end 2017 and the beginning of 2018. With more than 1,000 respondents, we consider the survey a huge success. Using data from the Leibniz Association, we have been able to weight our results so that they are representative of the whole population of doctoral researchers.

Overall, we find that an overwhelming majority of doctoral researchers are satisfied with their situation in general and with their supervision. While this paints a nice picture, there is still room for improvement.

For instance, we observe that funding via stipends creates some inequality among doctoral researchers at the Leibniz Association. Financially, stipend holders are worse off than doctoral researchers with a working contract. This inequality also translates into less funding for conferences. Stipend holders are thus less likely to build networks and present their work. Overall, 55% of the doctoral researchers demand higher payment.

Despite the high overall satisfaction, 44% of the doctoral researchers have thought about not continuing their doctorate. The major reason for doing so is an unclear career path (66%). We consider this situation unfortunate.

If we focus more closely on career development, we see that more than 20% of the doctoral researchers do not receive full financial support for conferences with active participation. As mentioned before, those who do not receive support are disproportionately those who hold stipends. In addition, we observe that the vast majority of the doctoral researchers receive training on scientific writing and methods. However, little support appears to be offered to train doctoral researchers in applying for third-party funding. At the same time, half of the doctoral researchers in the Leibniz Association need support for grant applications.

According to our data, international researchers represent one third of the doctoral researchers in the Leibniz Association. They face specific challenges, and 50% of them demand more support. 40% report that they struggle with language barriers at work.

More than one third of the doctoral researchers in the Leibniz Association think that working in academia is not compatible with childcare responsibilities. This view is very prevalent among fe-

male respondents and is positively associated with thoughts about quitting the doctorate. Working in academia is perceived as incompatible with an active social life and hobbies for 36% and 26% of the respondents respectively.

Lastly, 76% of the doctoral researchers think that working in academia creates too much financial uncertainty. 55% think it requires them to move too often. 35% indicate that working in academia does not allow to make private-life plans. This view is particularly prevalent among parents.

The lessons learned from the survey will help us guide the future actions of the Leibniz PhD Network and the Survey Working Group. The analysis showed some scope for improvements to the questionnaire. For instance, some answer categories were seldom used. We will build on this experience and improve the questionnaire. In the next round of the survey, we aim to develop modules on mental health and power abuse. Ideally, this module will also allow us to compare the mental health of the doctoral researchers in the Leibniz Association with the mental health of the overall German population. Moreover, it is our goal to harmonize the questionnaire of the upcoming survey with the questionnaires of the Max Planck PhDnet and the Helmholtz Juniors. The harmonized survey within the N2 network will enable us to compare best practices across non-university research organizations and identify further fields where additional efforts are required.

13 Appendix

13.1 Sections of the Leibniz Association

Table 10: The sections of the Leibniz Association

Section	Description
A	Humanities and Educational Research
B	Economics, Social Sciences, Spatial Research
C	Life Sciences
D	Mathematics; natural Sciences, Engineering
E	Environmental Sciences

13.2 Methodological Summary

The following section provides a brief summary of the methodological background of the Leibniz PhD Survey.

The target population of this survey are all doctoral researchers in the Leibniz Association who were employed during the period of fieldwork at Leibniz Institutes and Research Museums between November 2017 and February 2018.

The questionnaire for the first Leibniz PhD Survey was developed by the network's Survey Working Group. It took examples of the Max Planck PhDnet and Helmholtz Juniors as starting points and was discussed within the working group and with external partners in various Leibniz Institutes, the Leibniz Head Office, and the Leibniz works councils. The full questionnaire is attached to this report in the Appendix. The language of the questionnaire is English.

First of all, it is important to note that the survey is *not* the product of a probability-based random sample of doctoral researchers at Leibniz Institutes. For such a survey design, we would have needed a comprehensive and up-to-date list of all doctoral researchers at every single Leibniz Institute. This kind of sampling frame is currently not available. In December 2017, the Leibniz Association counted approximately 2,500 doctoral researchers and we decided to invite them all to take part in the survey.

Fieldwork

A non-personalized link to access the questionnaire was distributed among doctoral researchers in the Leibniz Association from November 21, 2017 onward. We sent the invitation e-mail to PhD representatives in all Leibniz Institutes, to the Leibniz works councils, and further contact persons at Leibniz Institutes.³² In the period of fieldwork, two reminders were sent via the above-mentioned channels to the doctoral researchers. In early January 2018, we decided to extend the deadline of the survey by three weeks to increase the number of responses. In fact, this deadline extension until February 5, 2018 proved to be very successful. It increased the number of complete responses by more than 20%.

Data Processing and Weighting

Following the data collection, members of the Survey Working Group checked and processed the data. Two members of the Working Group coded the replies given to open answers in the survey; those replies were integrated into existing variables or were used to generate new variables.

Table 11: Number of doctoral researchers employed at Leibniz Institutes and their gender according to the 2017 Leibniz data retrieval (as of December 31)

	Women		Men		Total
	N	(%)	N	(%)	N
Section A	203	(8.0)	95	(3.8)	298
Section B	226	(8.9)	231	(9.1)	457
Section C	452	(17.9)	312	(12.3)	764
Section D	241	(9.5)	521	(20.6)	762
Section E	116	(4.6)	134	(5.3)	250
Leibniz Association	1238	(48.9)	1293	(51.1)	2531

After processing the data, we decided to use the official numbers of the section affiliations and

³²For a short while, the link was also available via the network's Facebook page, but it was taken down again because we feared attracting respondents who do not work within the Leibniz Association.

respective gender distributions shown in Table 11 to compile simple post-stratification population weights. Weighting the sample with the best data available helps us to improve the representativeness of our data, especially if we draw conclusions at the aggregate level of the Leibniz Association. Depending on the section affiliation and gender, every group of respondents received a specific weight to reproduce the cell percentages shown in Table 11 in the aggregate. We calculated 10 different weights for every possible combination of the two variables. In total, the size of our weights ranged between 0.72 to 1.19.³³

³³For instance, female doctoral researchers from Section A added up to 8.4% in our unweighted sample. Since this group was over-represented in the sample, every respondent from this group was weighted with a factor of 0.94. By contrast, male doctoral researchers from Section D were under-represented in our unweighted survey sample (16.9% instead of 20.6%). Respondents from this group received a weight larger than 1.0 as a consequence (1.19).

13.3 Additional Tables and Graphs

Table 12: Predictors of satisfaction in general (B1)

	Coef.	SE
Section, A (ref.)		
B	0.03	(0.12)
C	-0.26*	(0.11)
D	-0.10	(0.12)
E	-0.25	(0.13)
Woman	0.10	(0.07)
Year of PhD, 1st year (ref.)		
2nd year	-0.27***	(0.08)
3rd year	-0.46***	(0.09)
4th year	-0.65***	(0.11)
5th year or more	-0.69***	(0.14)
International doctoral researchers	-0.08	(0.08)
Parent	0.14	(0.11)
Working contract only	0.04	(0.09)
Intercept	5.05***	(0.14)
N	903	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Results with unstandardized OLS coefficients and standard errors. The model incorporates sample weights.

Table 13: Predictors of satisfaction with PhD supervision (B8)

	Coef.	SE
PhD agreement	0.33***	(0.14)
Section, A (ref.)		
B	-0.02	(0.14)
C	-0.39***	(0.13)
D	-0.19	(0.14)
E	-0.37**	(0.17)
Female	0.10	(0.08)
Year of PhD, 1st year (ref.)		
2nd year	-0.25**	(0.11)
3rd year	-0.39***	(0.11)
4th year	-0.48***	(0.13)
5th year or more	-0.48***	(0.15)
International doctoral researchers	-0.06	(0.09)
Parent	-0.11	(0.13)
Working contract only	-0.22**	(0.11)
Freq. interaction with supervisor, never (ref.)		
Less than once a year	-0.24	(0.50)
Yearly	-0.08	(0.48)
Six-monthly	0.44	(0.45)
Quarterly	0.51	(0.44)
Monthly	0.97**	(0.43)
Weekly	1.37***	(0.44)
Almost daily	1.74***	(0.45)
Intercept	4.00***	(0.45)
N	812	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Results with unstandardized OLS coefficients and standard errors. The model incorporates sample weights.

Table 14: Factor loadings of factor analysis for rating of supervision, promax rotation

My supervisor is ...	Factor	
	1	2
... well informed about my field of research.	0.63	-0.01
... available when advice needed.	0.62	0.11
... gives constructive feedback.	0.53	0.36
... respects my ideas for my thesis.	0.10	0.71
... supports career development.	0.52	0.20
... well informed about state of work.	0.75	-0.02
... encourages independence.	0.07	0.61
... treats me politely.	0.05	0.66
... gives reliable and consistent advice.	0.56	0.37

Table 15: Predictors of willingness to pursue an academic career (C4)

	Coef.	SE
Section, A (ref.)		
B	-0.74**	(0.29)
C	-0.74**	(0.28)
D	-1.13***	(0.28)
E	-0.19	(0.34)
Woman	-0.49**	(0.16)
Year of PhD, 1st year (ref.)		
2nd year	0.01	(0.22)
3rd year	-0.55**	(0.21)
4th year	-0.37	(0.25)
5th year or more	-0.08	(0.30)
International doctoral researchers	0.83***	(0.20)
Parent	0.22	(0.26)
Working contract only	-0.33	(0.22)
Intercept	1.87***	(0.37)
N	858	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Results with logit estimates and standard errors. The model incorporates sample weights.

Table 16: Predictors of desire for more support from international doctoral researchers (D4)

	(1)		(2)	
	Coef.	SE	Coef.	SE
Section, A (ref.)				
B	1.37*	(0.58)	1.43*	(0.62)
C	0.68	(0.55)	0.70	(0.60)
D	0.95	(0.54)	0.97	(0.60)
E	1.23*	(0.63)	1.50*	(0.67)
Woman	0.42	(0.27)	0.40	(0.28)
Year of PhD, 1st year (ref.)				
2nd year	0.41	(0.33)	0.41	(0.35)
3rd year	-0.29	(0.39)	-0.34	(0.41)
4th year	0.10	(0.51)	-0.06	(0.52)
5th year or more	0.47	(0.54)	0.50	(0.53)
Parent	0.52	(0.49)	0.42	(0.50)
Working contract only	-0.31	(0.28)	-0.31	(0.29)
Contact person			-1.03***	(0.28)
Intercept	-1.12	(0.60)	-0.74	(0.64)
N	258		255	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Results with logit estimates and standard errors. The models incorporate sample weights.

Table 17: Predictors of experience of language barriers (D6)

	(1)		(2)	
	Coef.	SE	Coef.	SE
Section, A (ref.)				
B	-0.73	(0.61)	-0.75	(0.64)
C	-0.29	(0.56)	-0.29	(0.58)
D	-0.39	(0.57)	-0.40	(0.61)
E	-0.71	(0.65)	-0.60	(0.68)
Woman	0.65*	(0.27)	0.65*	(0.28)
Year of PhD, 1st year (ref.)				
2nd year	0.57	(0.34)	0.55	(0.34)
3rd year	0.41	(0.39)	0.39	(0.40)
4th year	-0.05	(0.48)	-0.17	(0.49)
5th year or more	0.50	(0.55)	0.47	(0.54)
Parent	-0.34	(0.54)	-0.40	(0.54)
Working contract only	-0.60*	(0.29)	-0.60*	(0.29)
Contact person			-0.59*	(0.29)
Intercept	-0.22	(0.64)	0.03	(0.67)
N	257		254	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Results with logit estimates and standard errors. The models incorporate sample weights.

Table 18: Predictors of need for more support to learn German (D7f)

	(1)		(2)	
	Coef.	SE	Coef.	SE
Section, A (ref.)				
B	0.90	(0.73)	0.93	(0.72)
C	0.84	(0.66)	0.86	(0.65)
D	1.19	(0.68)	1.24	(0.68)
E	0.67	(0.77)	0.65	(0.76)
Woman	0.05	(0.34)	0.06	(0.34)
Year of PhD, 1st year (ref.)				
2nd year	0.04	(0.44)	0.14	(0.44)
3rd year	0.09	(0.49)	0.13	(0.50)
4th year	-1.41*	(0.56)	-1.34*	(0.56)
5th year or more	0.53	(0.69)	0.57	(0.68)
Parent	0.62	(0.68)	0.62	(0.67)
Working contract only	-0.06	(0.36)	-0.04	(0.37)
Contact person			0.17	(0.36)
Intercept	0.21	(0.76)	0.06	(0.77)
N	205		202	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Results with logit estimates and standard errors. The models incorporate sample weights.

Table 19: Predictors of parenthood (E2)

	Coef.	SE
Section, A (ref.)		
B	0.25	(0.38)
C	-0.01	(0.40)
D	0.15	(0.40)
E	0.73	(0.42)
Age	0.23***	(0.03)
Woman	-0.12	(0.23)
Year of PhD, 1st year (ref.)		
2nd year	0.20	(0.36)
3rd year	-0.47	(0.39)
4th year	0.77*	(0.36)
5th year or more	1.11**	(0.36)
International doctoral researchers	-0.43	(0.30)
Working contract only	0.02	(0.32)
Intercept	-9.02***	(1.21)
N	900	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Results with logit estimates and standard errors. The model incorporates sample weights.

13.4 Questionnaire of the Leibniz PhD Survey



A3. A.3. Which section of the Leibniz Association is your institute a member of?

If you do not know which section applies, you can have a look here: <http://www.leibniz-gemeinschaft.de/en/about-us/organisation/sections/>

The orange * indicates that this question is mandatory.

Section A: Humanities and Educational Research

Section B: Economics, Social Sciences, Spatial Research

Section C: Life Sciences

Section D: Mathematics, Natural Sciences, Engineering

Section E: Environmental Research

I prefer not answer

A4. A.4. What is your citizenship?

only German

German and others

other citizenship of an EU-member country

other citizenship outside the EU

A5. A.5. What is your gender?

Female

Male

Neither / Other

I prefer not to answer

A6. A.6. What is your age?

Section B: B. General situation at your Leibniz Institute or Research Museum

B1. B.1 How satisfied are you with your situation at your Leibniz Institute or Research Museum in general?

Very satisfied Satisfied Rather satisfied Rather dissatisfied Dissatisfied Very dissatisfied

How satisfied are you



Applications for funding (stipends, project grants, and so on)	<input type="text"/>
Public relation, communication with society	<input type="text"/>
Scientific presentations at meetings/conferences/visits (including preparation)	<input type="text"/>
Applications for research facility time (supercomputers, telescopes, or similar)	<input type="text"/>
Organisation of scientific meetings/conferences	<input type="text"/>
Reviewing articles for scientific journals	<input type="text"/>
Supervision of students or interns	<input type="text"/>
Administrative tasks within the Leibniz Institute	<input type="text"/>
Other tasks	<input type="text"/>
I don't know (100%)	<input type="text"/>

B7. B.4.1 On which other tasks did you spend your working time?

B8. B.5. How long is the total duration of your current contract or stipend?

Only include the duration of the current contract/stipend without considering previous contracts/stipends.

- Up to 6 months
- Up to 12 months
- Up to 18 months
- Up to 24 months
- Up to 36 months
- More than 36 months
- I don't know.

B9. B.6. Prior to current contract, how many contracts or stipends did you have in your Leibniz Institute or research museum?

Please note: Contracts as a student or research assistant (studentische Hilfskraft, wissenschaftliche Hilfskraft; SHK, WHK) does not count here. It is about contracts as a research associate or similar.



B16. B.13. To what extent do you feel integrated into your institute or research museum?

Very integrated Integrated Rather not integrated Not integrated at all I do not know I prefer not to answer

.....

B17. B.13.1 Why don't you feel integrated into your institute?

B18. B.14. Do you have a PhD council or PhD representative at your institute?

Yes

No

I don't know.

B19. B.15. Have you ever thought of not continuing your doctorate?

Yes

No

B20. B.15.1 What was/were the reason(s) for thinking about not continuing your doctorate?

You can choose multiple answers.

- I do not like scientific work anymore.
- I do not like my topic anymore.
- Financial insecurities/problems; not enough money
- Unclear career path, career opportunities
- Work-related difficulties with my supervisor
- Personal difficulties with my supervisor
- No or poor academic results
- Other jobs are more interesting.
- Academic life is not compatible with my family responsibilities.
- I do not feel qualified enough.
- I prefer not to answer.



C2. C.1.1. Which other career support do you get from your institute or research museum?

C3. C.2. Do you have a personal mentor for career development at your institute or research museum?

- Yes
- No
- I don't know.

C4. C.3. Which of the following actions are you undertaking in order to prepare yourself for your professional future career?

Multiple answers possible

- Build a network (conferences, other events)
- Specific training
- Seek advice from your supervisor, mentor or colleagues
- Constant job search
- Apply to jobs already
- None
- Other

Other

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

C5. C.4. Which of the following work areas would you prefer after your PhD?

Multiple answers possible

- Academia, scientific research
- Science-related public work (e.g. science policy, science management, policy advice)
- Publically-funded non-scientific job (e.g. ministries)
- Private non-scientific job (e.g. industry)
- Private scientific jobs in industry (e.g. research and development in industry)
- I don't know.



Other

Other

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

C6. C.4.1 What are the reasons for not considering a future career in academia?*Multiple answers possible*Scientific work no longer interests me. The academic job market is too competitive. It is hard for me to organize my own work. The chance to get into a post doc position is low. The chance to get an unlimited working contract is low. My supervisor advised me to leave academia. I do not have the required grades. I look for a new challenge. Other sectors are paid better. A career in academia requires frequent changes of residence. Academic life is not compatible with family responsibilities. I do not feel qualified enough.

Other

Other

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

C7. C.5. What sorts of professional trainings are offered to doctoral researchers at your institute or research museum?

Is offered at my institute to doctoral researchers	Is not offered at my institute to doctoral researchers	I do not know if it is offered at my institute to doctoral researchers
--	--	--

Scientific writing English courses Courses in German as a foreign language Other language courses Career development (e.g. job fairs, meetings with practitioners, networks, etc.) Scientific methods courses



D5. D.5. What is (are) the work language(s) at your institute?

English

German

Other

Other

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D6. D.6. Do you have language barriers in the work language at your institute?

Yes

No

D7. D.7. Please indicate which of the following statements apply to you in the context of learning German.

Yes No I don't
know.

My institute offers language classes.

My institute offers funding for external language classes.

My institute permits the attendance of language classes during working hours.

My colleagues help me to learn German.

I do not need support for learning German (e.g. because I speak German; I do not need to speak German; etc.).

More support for learning German would be desirable.

D8. D.7.1. Please specify, how this support would ideally look like:



D9. D.8. Do you have additional comments regarding the support of foreign/international doctoral researchers at your institute or research museum?

Section E: E. Relation between Work and Private Life

E1. E.1. What is your current family status?

- Single
- I have a partner/wife/husband
- I prefer not to answer.

E2. E.2. Do you (or your partner) have children, who mainly live in your household?

- Yes
- No
- I prefer not to answer.

E3. E.3. How many people live in your household?

You can skip this question if you prefer not to say.

Number of persons in the age of 18 and older

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Number of persons under the age of 18

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E4. E.3.1 How old is the youngest child?

- < 1 year
- 1 - 2 years
- 3 - 6 years
- 7 - 10 years
- 11 - 14 years
- 15 - 18 years
- 19 - 25 years
- > 25 years
- I prefer not to answer.



E5. E.4. Besides children, do you have care responsibilities in your family? (e.g. parents, grandparents, partner, sisters, brothers, etc. in need for care)

Yes

No

I prefer not to answer.

E6. E.5. On a scale between 1 (strongly agree) and 5 (strongly disagree) please evaluate the following statements in the area of compatibility between working in science and private life.

Working in academia ...

	1 (strongly agree)	2 (agree)	3 (neither agree nor disagree)	4 (disagree)	5 (strongly disagree)	I prefer not to answer.
... is compatible with care responsibilities for children.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... is compatible with care responsibilities for family members besides children.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... is compatible with living in a partnership.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... only allows me having a child/children if my partner or other family members are mainly taking over child care responsibilities.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... allows me to plan my private life.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... requires me to move too often.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... creates too much financial uncertainty.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... allows me to pursue my hobbies.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... causes me to neglect my social life (e.g. meeting friends/family).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

E7. E.6. Here you can add additional aspects in the area of compatibility between working in science and private life:



Thank you for taking the time to respond to the "Survey on the Situation of Doctoral Researchers at Institutes and Research Museums of the Leibniz Association".

The results will be published via the Leibniz PhD Network and can be found later on the homepage of the Leibniz PhD Network: <http://www.leibniz-gemeinschaft.de/karriere/wissenschaftlicher-nachwuchs/leibniz-phd-network/>