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The Mental Health Crisis among Doctoral Researchers – Findings and Best Practices

A harmonized survey conducted among doctoral researchers at the Max Planck Society, Helmholtz and Leibniz Association, reveals that more than 15% of the doctoral researchers suffer from moderate to severe depressive symptoms, and almost 40% from anxiety. Three factors correlate prominently with mental health outcomes: high workload, unsatisfactory supervision and an unsupportive working environment. To address these challenges, we propose various measures such as truthful time tracking, mandatory supervision trainings and the introduction of thesis advisory committees. We also advocate for 4-year contracts and free counselling for all doctoral researchers. By adopting these systemic changes, we hope to cause a shift towards less precarious working conditions for early career researchers and transform academia into a place where good research does not come at the expense of the researcher's mental health.

Introduction

Here is some bad news: we have a mental-health crisis in academia. Here is some good news: mental health issues are slowly getting de-stigmatised. A particular trend is slowly emerging, which entails the idea that achieving a greater scientific standard goes hand in hand with preserving one's mental health. Various surveys, online campaigns on social media such as Twitter, and extensive reports by well-established journals (Nature), are all responsible for propelling this trend forward.

We – the N² Network – strongly support these initiatives as we firmly believe that innovative, creative, and sustainable research is inextricably linked to the good mental health of researchers. Our network consists of the Leibniz PhD Network, Max Planck PhDnet, Helmholtz Juniors and IPP Mainz PhD Network. Together, we represent more than 16.000 doctoral researchers (DRs) and consecutively form one of the largest network of doctoral researchers in Germany. The main aim of our network is to advance the career development and secure good working conditions of DRs – and looking out for our DR's mental health and well-being is a crucial part of that effort. We do so not only through our public outreach on the topic (see for example Peterse et al. 2018), but also by evaluating the situation of our DRs and identifying common concerns through a bi-annual survey among our member institutions.

In 2019, we performed a harmonisedⁱ survey that focused on assessing the current state of mental health of the ~ 5,000 DRs that filled the survey (~30% participation). In addition, we collected information about a multitude of factors governing a DRs daily life, such as working conditions, supervision quality and experiences with power abuse. We aimed to tease apart multiple complex relationships between the conditions that early

career researchers find in academia and mental health outcomes. Here, we would like to share some of the main findings of the survey. In addition, since our network is about observing the current situation and improving it, a key part of this article entails examples for best practices that can help improve the situation.

By drawing inspiration from the survey's data and by outlining best-practice examples, we try to accentuate the unmistakable link between having a healthy working environment and conducting high-quality research. In addition to this, we hope to continuously raise awareness about the mental-health crisis in academia and inspire not only the DRs, but also supervisors, human-resources and management departments, to invest more time and resources into alleviating the negative impact of some of the worrisome aspects of working in modern-day academia. In the following sections, we report results obtained in the Leibniz Association, Max Planck Society and Helmholtz Association individually to allow for comparisons between the three largest non-university research organisations in Germany. Additionally, we use single examples from the survey reports of our institutions to highlight possible factors affecting our DRs mental well being.

Mental health issues are rampant in doctoral researchers

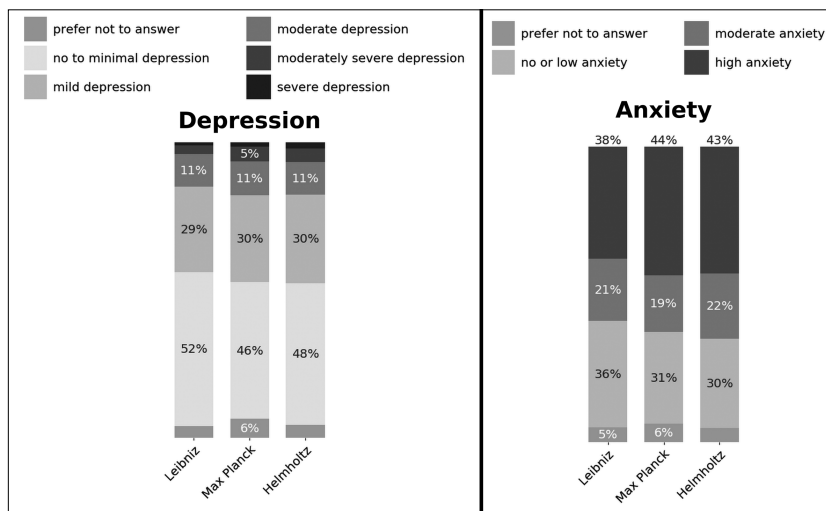
In the 2019 survey we chose two well-established instruments to assess mental health: the PHQ-8 depression (Kroenke et al. 2010) and a short form of the STAI questionnaires (Marteau/Bekker 1992). This enabled us to identify the level of depressive and anxiety symptoms among the participants and compare our findings to si-

ⁱ The same survey was run at the same time in all our member organisations.

milar surveys in other institutions and the general population.

What we found was worrisome: more than 15% of DRs report suffering from moderate to severe depressive symptoms¹ (15% in Leibniz, see Beadle et al. 2019 17.9% in Max Planck, see Olsthoorn et al. 2019 and 17.7% in Helmholtz, see Peukert et al. 2019), which is almost double as high as the numbers among the general population in Germany (9.9% within the age group from 18-29 years, 7.9% for 30-39 years, Maske et al. 2016). Looking at anxiety, roughly 40% of the DRs report a high level of overall anxiety symptoms² (38% in Leibniz, 43.7% in Max Planck, and 42.9% in Helmholtz Juniors).

A recent meta-study (Satinsky et al. 2021), informed mostly by studies conducted in the US, showed a very similar prevalence of 18% for clinically significant depressive symptoms measured using PHQ-9 (CI 14-22%). The same study reports somewhat lower levels of clinically significant anxiety (17%, CI 12-23%) but uses a different scale (GAD) and reports high between-study variance in anxiety symptoms, ranging from as low as 4% to as high as 40%. Taken together these findings show that mental health problems are not unique to German institutions but are rampant in academic institutions around the globe. To learn which of the many factors (see Figure below) might be impacting our DRs' mental well-being, we correlated these factors with the DRs' satisfaction with different aspects of their PhD. In the following section, we will discuss the three factors that we have found to have the strongest correlation on the DRs' mental well-being:



workload, supervision, and work environment and atmosphere. However, we want to stress out that the correlation between these factors and the DRs' well-being is one interpretation of the data, but not necessarily the only one. Namely, the seemingly causal impact we discuss could go in both ways, or even be influenced by other factors outside the survey's scope, eventually adding to more complex scenarios that we cannot disentangle.

Workload

Findings

Considering the workload that DRs are coping with, we see that 3/4 of our DRs work extra hours, with 50% working more than 45 hours a week and 35% working more than 50 hours a week. In addition, only 1/3 take all of

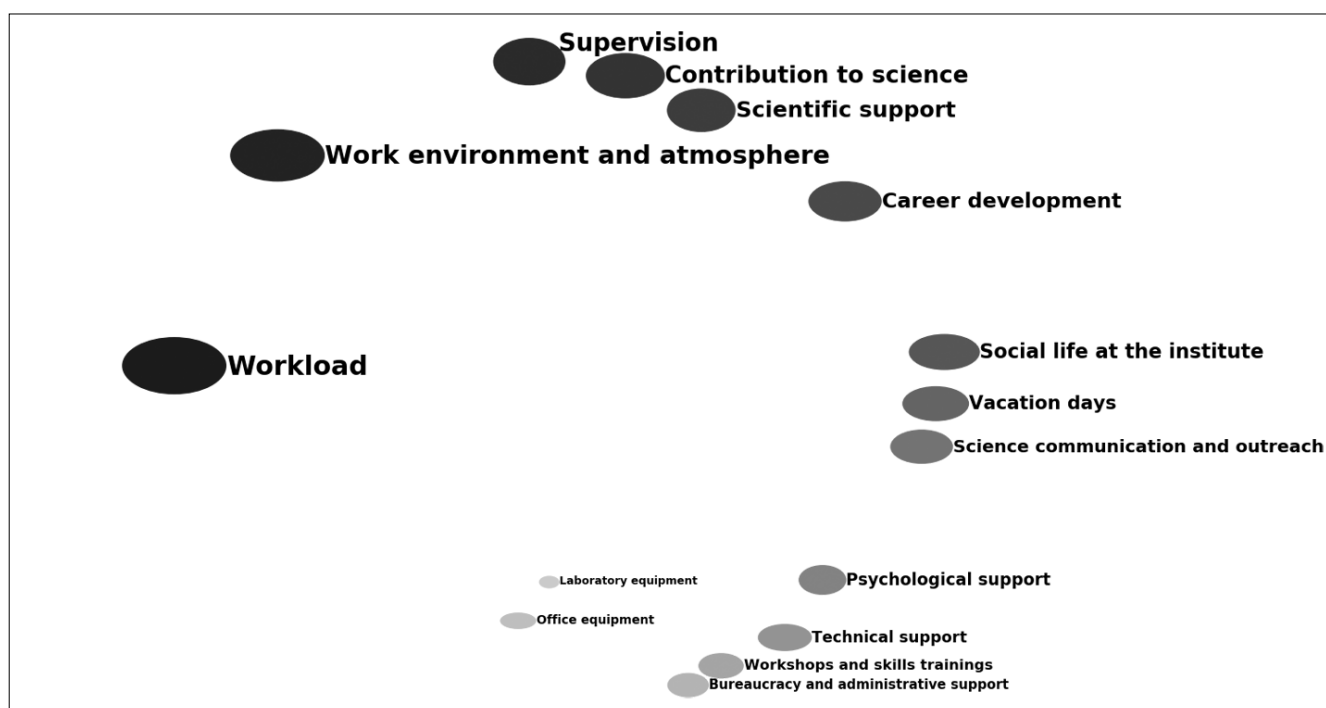
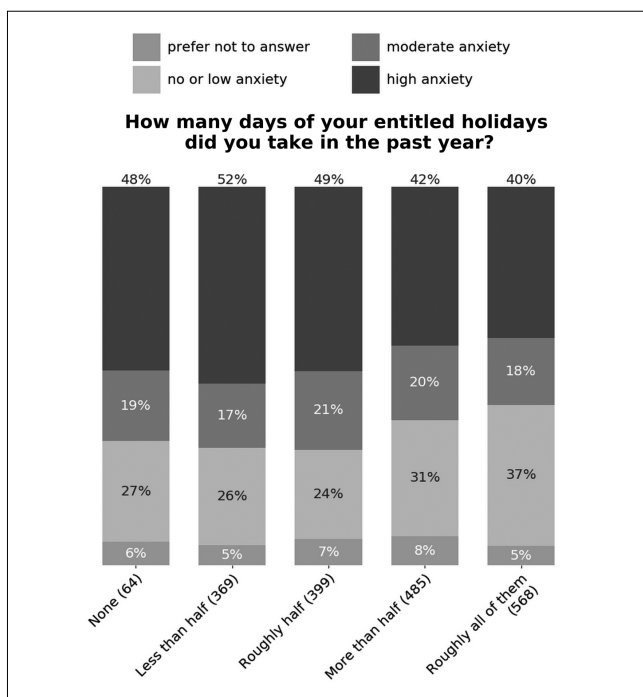


Illustration showing the different aspects of a PhD that are correlated with mental health symptoms. The darker, bigger and further outside a point is, the larger is its influence on the DRs' mental health.

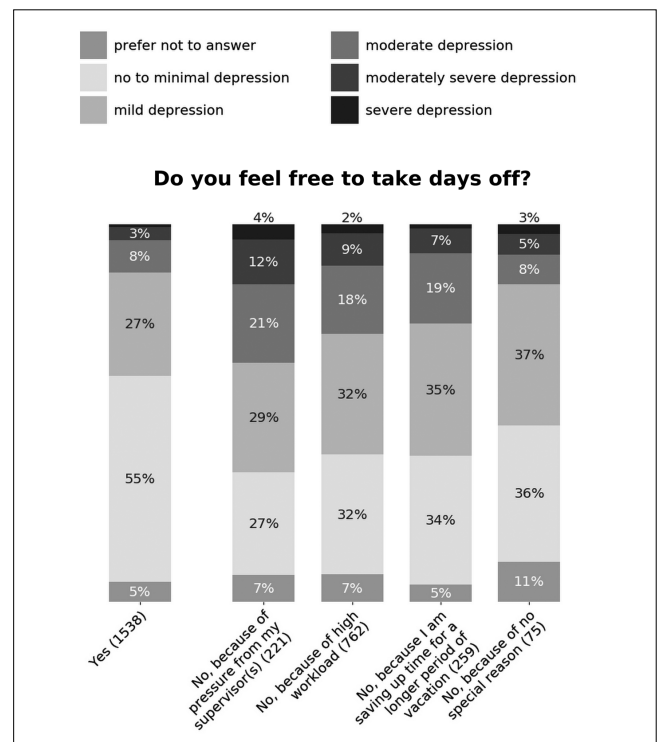
their holidays, roughly 2/3 do not feel free to take their holidays, and most DRs work on weekends at least once per month (Beadle et al. 2020; Olsthoorn et al. 2020; Peukert et al. 2020). The time pressure to complete the PhD and publish, combined with the toxic idea that working long hours leads to better results, as well as strain from supervisors, leads to overworked and exhausted DRs. They feel anxious and guilty to take some time off work. Sadly, working extra hours without taking time off takes its toll on the mental health of the doctoral researchers, as confirmed by the survey's data. All of these factors – working extra hours, not taking holidays and working on the weekends – are positively correlated with symptoms of deteriorating mental health. More specifically, among the DRs, who are taking less than half of their holidays, 26% show moderate to severe depressive symptoms, while this is the case for only 15% of the DRs taking more than half of their holidays.



Even the perception of freedom to take one's holidays shows a similar impact. Of the DRs that feel free to take their holidays about 38% show no or low anxiety symptoms, which is almost twice as much as for the DRs that do not feel free to take their holidays (Olsthoorn et al. 2019).

Discussion & best practices

One of the ways to improve the situation regarding the amount of extra work is to introduce time/hour tracking for DRs. Being researchers ourselves, we understand that working extra hours sometimes is necessary, for example, to finish an experiment or work towards a publication deadline. Nevertheless, we believe that time tracking (if implemented truthfully!) is an effective way to balance periods of high workload and periods of rest, which are necessary to preserve our mental health and empower us to deliver high-quality research sustainably.



Nevertheless, time tracking itself, will not have a significant impact if it is not accompanied by an improvement in DRs' contract durations. Sadly, less than 20% of the DRs have contracts lasting longer than three years inside our networks (Beadle et al. 2019; Olsthoorn et al. 2019; Peukert et al. 2019), which is very often not enough time to complete the doctoral research without overworking since the average duration of a PhD in Germany is 4.7 years (BuWiN 2021). However, providing a default four-year contracts can alleviate a lot of the time pressure that many doctoral researchers feel – especially DRs who need residence permits to stay in Germany which are closely tied to their working contracts.

However, while tracking the number of hours and the change in the duration of the contracts are two concrete steps we can take to improve the issue of overworking, the question how to change the deep-rooted belief that an overworked researcher is a dedicated one, still remains. Some people might argue that even with time counting and longer contracts, no one can really control whether DRs work at home and/or during the weekends. Therefore, the question of how we actually motivate people to take time off, without causing them stress, guilt, or anxiety, remains to be answered.

We believe that only a change in research working culture will allow researcher mindsets to embrace guilt-free time off. However, this change will not come on its own. For a start, peer-to-peer and social activities within research institutions can help us start moving forward. As we are social beings who look up to their peers, observing healthy work-to-life balance examples set from other DRs, can signal those DRs who are overworking and feeling uncomfortable to take time off; to take a step back and regenerate. These initiatives can and should be supported by official bodies within our research orga-

nizations with the aim of critically reflecting the unhealthy overworking and publish-or-perish culture in academia. These official bodies can be, but are not limited to, occupational health and safety offices, works doctors and psychologists, and people in leadership positions who lead by example. Last, but not least, supervisors have the responsibility to look out for their DRs' mental health and encourage them to take time off.

Supervision

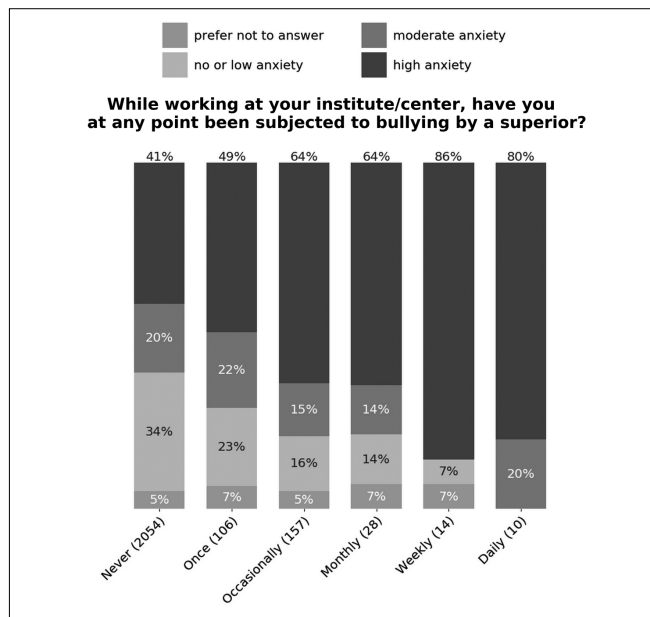
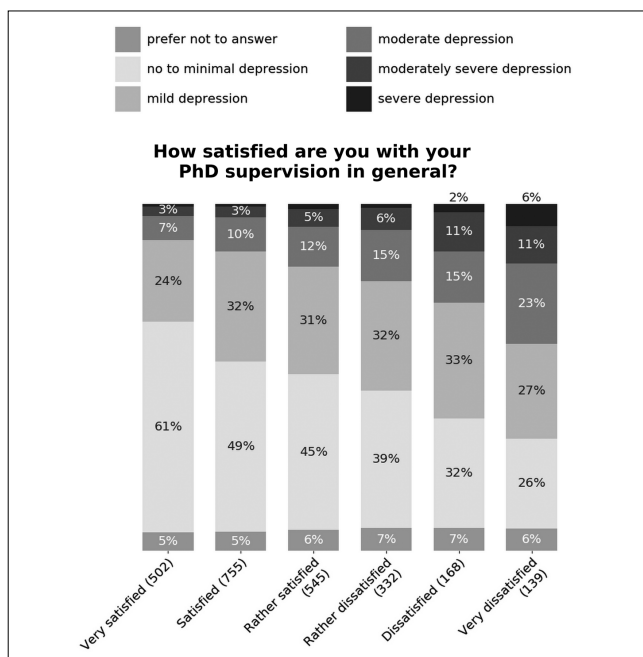
Findings

In general, supervision is one of the most significant factors when it comes to the mental health of DRs. Even though the question *what makes up a good supervisor* is hard to answer from the survey's data, this does not diminish the strong correlation between supervision dissatisfaction and the mental health of the DRs we find: In 2019, 40% of the DRs who were very dissatisfied with their supervision, suffered from moderate to severe depressive symptoms, while this is only the case for 10% of DRs that were very satisfied with their supervision (Olsthoorn 2019).

While this correlation does not prove causality, it makes intuitive sense that the relationship with one's supervisor is a very important factor during a PhD. Therefore helping DRs and their supervisors to find a working relationship that is empathetic, yet professional, and works in both parties' interest is key to improving mental health outcomes of DRs and maintaining high research quality.

One of the reasons why supervisors have such a strong influence on their DRs and their well-being are the steep hierarchies and power-imbalance between supervisors and DRs. This is exacerbated in Germany where supervisors are at the same time responsible for hiring, assessing and supervising their DRs.

These multiple dependencies on a single person become especially worrisome when supervisors abuse their



power and can escalate to bullying and (sexualised) harassment. From the 2019 survey, we know that a significant fraction of DRs experiences bullying (10% in Leibniz, 13% in Max Planck, and 13% in Helmholtz) or sexualised harassment (5% in Leibniz, 5% in Max Planck, and 6% in Helmholtz) from a superior (Beadle et al. 2019; Olsthoorn et al. 2019; Peukert et al. 2019). These numbers show that bullying and sexualised harassment are not isolated cases, but rather a systemic problem that flourishes in the hierarchies and power imbalances that characterise modern academia. To nobody's surprise, experiences with bullying and sexualised harassment are strongly correlated with deteriorating mental health. As a network, we have addressed power abuse in previous articles (N² 2019; Lasser et al. 2021), and we have continuously underlined that in order to protect the DRs from power abuse, we must disentangle employment, grading and supervision, as well as ensure that DRs are properly supervised.

Discussion & best practices

For a start, every supervisor should undergo mandatory leadership and supervision training. In addition, research institutions need to make good supervision front and centre of their recruitment and introduce assessment policies to ensure high and sustainable scientific standards. Our current academic system does neither select for nor reward people with good teaching and supervision skills. Research institutions need to recognize this fact and provide resources and incentives to improve supervision quality. More concretely, leadership and supervision trainings should give supervisors and principal investigators (PIs) the proper tools to give and receive feedback, resolve conflicts, foster their DRs' careers and reflect their own supervision practice. Self-critical PIs that can take feedback and have time to supervise their students will go a long way in protecting their DRs' mental health.

In addition to these trainings, we also propose supervision agreements and/or mandatory thesis advisory com-

mittees (TACs) as tools to hold the supervisors accountable, decrease DRs' dependencies on a single person and resolve conflicts before they escalate. TACs are committees composed of experts who can aid in the supervision process, but who should not be closely collaborating with the primary supervisor. They should regularly assess the progress of the PhD project and provide feedback for both the DR and the supervisor. Judging from the data, DRs who have a TAC and are in close contact with it, also reported higher satisfaction with their supervision and therefore should experience lesser amount of depressive symptoms (Olsthoorn et al. 2019). Additionally, TACs can act as mediators if conflicts appear. In the unfortunate case of a breakdown of the supervisory relationship TACs can be a resource to find a new supervisor that is already familiar with the DR and the research project.

However, it is important to emphasize that we cannot expect TACs to take on the full responsibility when it comes to supervision. The main responsibility to do provide proper supervision must fall primarily on the main supervisor and the TACs should be only an aiding mechanism for the currently-present power imbalance between the supervisors and the DRs.

Work environment: working conditions and social life

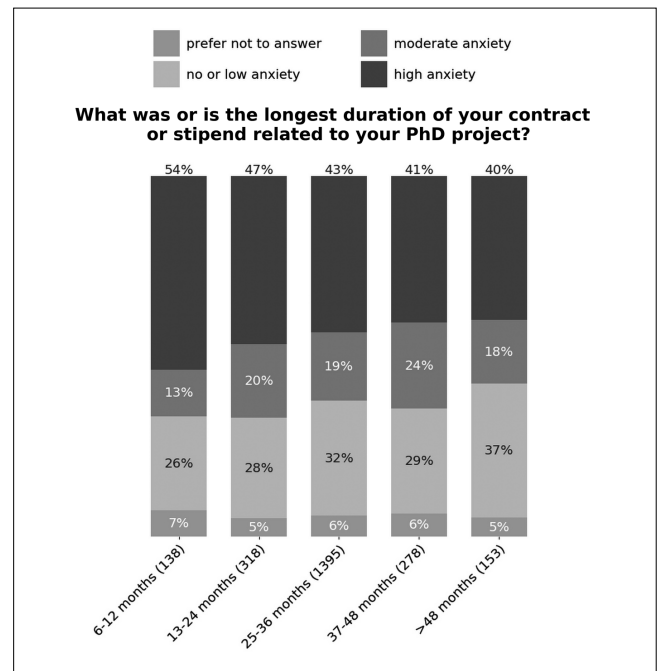
Findings

In addition to the unhealthy work-to-life balance and the dissatisfaction with the supervision, the final factor that considerably influences the mental well-being of DRs is their work environment. The work environment and atmosphere can be grouped in two parts: the *hard facts* – such as working conditions and financial security, and the *soft facts* – such as social life and integration into the community at the workplace.

Considering the DRs' working conditions, financial insecurity seems to be one of the major driving factors for deteriorating mental health. Being paid by a stipend instead of a working contract, having short-term contracts not adjusted to the typical duration of one's PhD as well as lower income levels can severely impact the well-being of DRs.

When it comes to having a stipend, we see an increase of roughly 5% of depressive symptoms in DRs compared to contract-holders. The difference between a stipend and a contract is not only the lower net payment, but also the lack of benefits such as health insurance, contributions to the retirement fund and access to unemployment money after the stipend ends. The situation gets even grimmer for DRs that work unpaid who show an increase of roughly 20% of depressive symptoms compared to the contract holders (Olsthoorn et al. 2019).

In addition to the type of the contract, the duration seems to play an important role as well: DRs who have short-term contracts with a duration of 6 to 12 months, as opposed to DRs with longer contracts (>37 months), show an increase of moderate to severe depressive symptoms from 13% to 26% (Olsthoorn et al. 2019). In addition, the overwhelming majority of DRs is only paid a part-time salary earning on average around 1700€ net per month (1682€ for Leibniz, 1670€ for Max Planck,



1708€ for Helmholtz – Beadle et al. 2020; Olsthoorn et al. 2020; Peukert et al. 2020, 1700€ for all DRs on contracts in Germany (Buwin 2021)), even though they are expected to work full-time.

This exacerbates the problems associated with financial insecurity as DRs do not earn enough to build significant savings. We conclude that the financial insecurity that is caused by short-term and part-time salaries and lack of social security is a major contributor to deteriorating mental health of DRs. Short-term contracts can become especially problematic in the (post-)pandemic period, when we expect DRs to be getting short-term extensions on a more frequent basis.

Discussion & best practices

In order to mitigate the negative impact of financial instability on mental health, we strongly advocate for abolishing stipends, short-term contracts and part-time salaries altogether. Full pay for full-time work and contract durations of 4 years should be the norm rather than the exception.

Hand-in-hand with improving financial stability we should aim at improving the (social) working atmosphere at our research organizations. Luckily, there are many ways how we can achieve this, ranging from onboarding and continuous mentoring programs, social and peer-to-peer activities, and all the way to official and confidential psychological support.

At the core of these activities is the simple idea that welcoming and continuously supporting the DRs gives them a sense of belonging. Through some simple, yet very powerful social tools, the DRs feel not only valued for the research they do, but also motivated and happy to be part of a healthy working environment and community. Building such a healthy work environment begins on the very first working day. We suggest that each institute has a transparent onboarding procedure where DRs are given a welcome package (such as the one in the Leibniz

Associationⁱⁱ) that contains all the relevant information about the facilities, emergency contacts (such as company doctor or mental-health services), or any bureaucratic processes that can cause anxiety among DRs because of their time-consuming and often confusing nature (for example, guidance on enrolling at an University or obtaining a residence permit for international DRs). One must always keep in mind that international DRs are experiencing additional stressors – such as a language barrier, cultural shock, lack of social support network – so, the research institutes should include all relevant information for international DRs in this welcome package and do everything in their power to make the on-boarding as smooth as possible.

However, even though these welcoming packages and the initial guidance they provide are of great help, we emphasize that the more severe mental-health issues may appear later on. Therefore, we propose social support on various levels. Firstly, we advocate for mentoring or buddy initiatives (in addition to the formal supervisors) who can help DRs navigate through non-research related topics such as career planning and foster a community. One Helmholtz centreⁱⁱⁱ has tried to establish such a buddy program and in general, international researchers were very keen on having a buddy. However, during the pandemic this initiative was put on hold, since not many people were willing to take on extra responsibilities or meet new people in person. Therefore, we acknowledge that this initiative depends on the motivation of the people in the institutes – such as PIs, PostDocs and senior DRs – but, we nevertheless encourage institutes to try to implement such buddy programs wherever and whenever possible.

In addition to such one-on-one buddy/mentoring programs, we also consider peer-to-peer support of various forms to be of great importance. At different Max Planck institutes, different ideas and groups have been formed: one institute has established an online mental-health and emotional support group; one has created a list of volunteers who have agreed to be available to talk with their peers; while another organises mental-health first aiders trainings to improve peer-to-peer support. Additionally, the grass-root initiative 'Mental Health Collective' has started organizing weekly tea times to give people a space to talk with each other about mental health related topics. Such initiatives not only improve the working atmosphere within our research institutions, but also provide safe space for peers to share their experiences and to bond through mutual empathy, understanding and support.

Nevertheless, peer-to-peer mental-health initiatives also have their limitations, mostly because DRs are not trained to provide professional assistance for people who experience severe mental-health issues. Therefore, we advocate for providing confidential and free psychological counselling for every DR at every research institute. This does not mean that each institute must have a psychologist on-board full time. Instead, providing psychological help can be achieved by collaborating with psychosocial services of Universities, via the company doctors or by implementing new dedicated organization-wide support systems. A good example of such a

support system is the Max Planck Society's EMAP (Employee and Manager Assistance Program) service and the benefit@work service of one Helmholtz centre. Both of these are external consultation services that offer confidential psychological support to all employees of the organisation – either via the phone or in person. The independence of psychological support structures from the research institute can be especially beneficial when it comes to particularly sensitive cases, for example those of power abuse or sexual harassment.

Finally, hand-in-hand with all of these valuable initiatives, we have to keep on raising awareness about the importance of mental well-being of (doctoral) researchers. As long as mental health remains a taboo topic, initiatives to improve the mental health of researchers will be severely hampered. A great example of an initiative to raise awareness is the mental-health awareness month that was organised in October, 2020 by the Helmholtz Juniors (Helmholtz Juniors 2020). This series of posts on mental health was distributed through all Helmholtz centers in collaboration with Helmholtz Center's PhD representatives and it was received with great enthusiasm and support by the DRs.

Conclusion

Our surveys show that mental health issues among DRs are widespread. We have identified three major areas of concern that are closely tied to mental health outcomes of DRs: workload, supervision and working environment. In this article, we have given an overview over the actions that could be taken in each of these areas to improve the situation:

- Working extra hours should be limited by truthfully implemented time tracking systems that enable DRs to take time off in exchange for working overtime.
- The research culture in institutions should change and stop normalising (or even encouraging) overworking. This change should come both from supervisors that lead by example and early career researchers that support each other and reflect on their work practices.
- The responsibility to supervise DRs should be distributed to more than one person, for example by implementing thesis advisory committees (TACs).
- The current system of combining the responsibilities of supervising, funding and grading should be revised. This means that research centres should also provide transparent mechanisms for conflict resolution and protection of the DRs from power abuse.
- Supervisors should undertake mandatory training to enable them to reflect on their supervision practice and be good mentors for their DRs.
- Working contracts for DRs should be sufficient to guarantee financial stability. This includes a duration that covers the expected extent of the PhD project and a full salary for full-time work as well as social security benefits.

ⁱⁱ https://leibniz-phd.net/wp-content/uploads/2020/07/Leibniz-PhD-Net-work-Welcome-Package_FINAL3.pdf

ⁱⁱⁱ https://www.helmholtz-berlin.de/jobskarriere/promotion/welcome-talks_en.html

- Institutions should invest in building healthy and welcoming working environments. This includes an effective onboarding process and encouragement for bottom-up initiatives by early career researchers.
- Institutions should provide mental health services to their employees. This can be done through dedicated counsellors, cooperations with other institutions to use their mental health services or institution wide external assistance programs.

Through raising awareness and continuously striving to improve the working conditions in our institutes, we hope to systematically tackle the key factors that influence the mental health of the DRs, but also remind people that if they experience mental health struggles, there is no shame in seeking out help. This help should be multi-faceted and available in various forms, but above all, it should be free, confidential, reliable, and easily accessible. Last, but not least, through raising awareness and creating working environments where the mental health of the researchers is taken seriously, we hope to help elevate modern academia to a place where good research does not come at the expense of researcher's mental health.

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¹ Depressive symptoms are derived from the Patient Health Questionnaire module (PHQ-9)(Kroenke et al. 2010). PHQ-9 largely is used to measure current depressive symptoms in the clinical and epidemiological studies and in health surveys. The score on PHQ-9 cannot be corresponded as a diagnosis of a major depressive disorders. The obtained scores were then converted to depression levels as described in the survey reports (Olsthoorn et al. 2019 and 17.7% in Helmholtz, see Peukert et al. 2019): severe depression (20-24 points), moderately severe depression (15-19 points), moderate depression (10-14 points), mild depression (5-9 points), no to minimal depression (0-4 points).

² Anxiety symptoms are derived from a short form of the Spielberger State-Trait Anxiety Inventory (STAI) (Martean/Bekker 1992). It is used to measure trait (the overall level of anxiety) anxiety. Three anxiety levels were defined using the obtained scores as described in the survey reports (Olsthoorn et al. 2019 and 17.7% in Helmholtz, see Peukert et al. 2019): high anxiety (45-80 points), moderate anxiety (38-44 points), no or low anxiety (0-37 points).

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