

SUMMARY REPORT ON DOCTORAL AND SUPERVISORY EXPERIENCE AT THE UNIVERSITY OF HELSINKI

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Professor Kirsi Pyhältö

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1 INTRODUCTION

The University of Helsinki is an international multidisciplinary research-intensive university with a high profile in research and doctoral education. In the Strategic Plan of the University of Helsinki 2021–2030, the University committed to the principles of research-based teaching, continuous re-assessment of its operations, and developing doctoral education and academic careers. At the University of Helsinki, doctoral education is organised into four doctoral schools: the Doctoral School in Environmental, Food and Biological Sciences (abbreviation YEB); the Doctoral School in Health Sciences (abbreviation DSHealth); the Doctoral School in Humanities and Social Sciences (abbreviation HYMY); and the Doctoral School in Natural Sciences (abbreviation DONASCI). The doctoral schools were launched at the beginning of August 2014. The main goal of the four doctoral schools is to provide the framework and conditions for high-quality, research-driven doctoral education for all the doctoral candidates of the University of Helsinki. By promoting the development of effective student-supervisor relationships, founded on both motivation and commitment, the University of Helsinki's aim is to create a favourable environment for the planning, execution and timely completion of doctoral education tailored to each doctoral candidate. At the University of Helsinki, doctoral candidates acquire a proficiency to conduct high-level academic research independently. The doctoral school structure consists total of 32 doctoral programs¹: *DONASCI (seven programs)*, *DSHealth (eight programs)*, *HYMY (eleven programs)*, and *YEB (six programs)*. The doctoral program responsibilities entail student admission, the recruitment processes of salaried doctoral candidates, program curriculum development and planning, appointing a supervisor and follow-up group, and organising program activities, while the faculty is responsible for granting the right to study, thesis examination processes and awarding the PhD. degree. Each doctoral candidate belongs to one doctoral school and program. Candidates are expected to complete the doctoral degree in four years when studying full-time.

This report is part of the research-based development of doctoral education in the four doctoral schools at the University of Helsinki. Its aim is to contribute research-based evidence pertaining to the development of doctoral education at the University of Helsinki by exploring the doctoral and the supervisory experience in the doctoral schools.

1 From 01.01.2022, a total of 33 doctoral programs will be offered

Doctoral candidates' experiences of doctoral education were analysed in terms of four complementary aspects of the training: the doctoral dissertation process, supervision and the research community, well-being, and course work. The supervisory experience involved three complementary themes: doctoral supervision, support for supervisory development, and well-being. The report consists of a summary of the results based on data collected from doctoral candidates and doctoral supervisors at the University of Helsinki in late spring and early autumn 2021. The doctoral experience - and supervisory experience survey have been validated in previous research. Professor Kirsi Pyhältö, Dr. Henrika Anttila and Dr. Lotta Tikkanen compiled this report. Dr Solveig Corner, and Mr Jonas Lindholm contributed to the study by making Swedish translations and by organizing the data matrix. Professor Auli Toom, Dr. Erkki Raulo (Head of Services for Doctoral Education), and Dr. Iro Särkkä, Dr. Alma Kartal-Hodzic and Dr. Anni Tonteri (the doctoral schools' Senior Advisors) contributed to the report by commenting on the surveys and the report draft. The doctoral school senior advisors assisted in data collection. Comments for the surveys were also requested from all the doctoral school directors. The report was funded by the University of Helsinki.

2 PARTICIPANTS AND DATA COLLECTION

2.1 Data collection

The data reported here were collected through the online surveys from doctoral candidates in April-May 2021, and from doctoral supervisors in August-September 2021, at the University of Helsinki. The doctoral experience survey employed questions concerning four main themes: (1) the thesis process, (2) supervision and research community, (3) well-being, (4) doctoral studies, and background questions. The supervisory experience survey entailed questions on two themes: (1) supervision and research community, and (2) well-being. Most scales were measured with 1-to-7-point Likert scales. Both questionnaires were available in Finnish, Swedish and English. The doctoral experience survey was sent to all registered doctoral candidates ($N = 4433$) whereas supervisory experience survey was sent to all the supervisors ($N = 3492$) in the four doctoral schools. The data reported here were analysed using qualitative content analysis and statistical methods including cross-tabulation, chi-squared statistical testing, testing mean differences with parametric and non-parametric tests and correlation analysis. The internal consistencies of the scales were estimated using Cronbach alphas.

2.2 Doctoral supervisors

The survey was completed by 561 doctoral supervisors (275 women, 50%; 266 men, 49%; six non-binary, 1%) from the University of Helsinki. The response rate was 16%. The distribution of men and women is a good representation of the gender distribution of the doctoral supervisor at the University. The supervisors were from all doctoral schools: the Doctoral School in Natural Sciences (DONASCI; $n = 85$), the Doctoral School in Health Sciences (DSHealth; $n = 129$), the Doctoral School in Humanities and Social Sciences (HYMY; $n = 180$), and the Doctoral School in Environmental, Food and Biological Sciences (YEB; $n = 77$). Most of the supervisors (44%; $n = 214$) were working as professors or research directors, and as university lecturers or university researchers (38%, $n = 184$), while a minority were university instructors and post-doctoral researchers (9%, $n = 44$) and tenure track professors (9%; $n = 46$). Half of the supervisors (51%) had been supervising doctoral candidates for more than 12 years ($M = 15$ years; $SD = 9.7$ years). According to the reports, the average number of doctoral candidates under supervision at the time of the survey was four. On average, the number of completed doctoral degrees was seven, yet there was considerable variation between supervisors, and the number of supervised doctoral dissertations ranged from zero to 150. Professors

and research directors had typically supervised a higher number of completed doctoral dissertations and began their careers as supervisors earlier compared to university lecturers, university researchers, postdocs and university instructors. Professors, research directors, and tenure track professors also reported having a higher number of doctoral candidates under their supervision than supervisors in other positions. Most of the supervisors (79%) reported having a suitable number of students to supervise, while a minority considered the number either too high or too low, both with about a ten per cent share. The supervisors reported that their supervisees typically wrote an article-based dissertation (82%) and were engaged in research group (77%). They also reported that their supervisees wrote their dissertations in English (91%). Most supervisors (70%) reported that they were also engaged in informal supervision by supporting candidates who were not officially their supervisees. About half of supervisors (52%) had experience in supervising doctoral candidates that had previously been supervised by another supervisor. Sixty-two per cent of the supervisors had experience in supervising multidisciplinary doctoral dissertations. According to the supervisors, the most typical source of their supervisees' funding was personal grants (44%), and employment at the university (36%). (See Appendix 1 for more information about the supervisors).

2.3 Doctoral candidates

The 768 doctoral candidates (67% women, 31% men, non-binary, 2%) who responded to the survey came from the Doctoral School in Natural Sciences (DONASCI; $n = 106$); the Doctoral School in Health Sciences (DSHealth; $n = 209$); the Doctoral School in Humanities and Social Sciences (HYMY; $n = 370$), and the Doctoral School in Environmental, Food and Biological Sciences (YEB; $n = 64$). The candidates were typically 30–34 years old². In terms of age distribution and the doctoral schools, the sample represented the population well. Women were slightly overrepresented in the data. Also, the disciplinary distribution represented the population well. Responses were received from 152 international and 604 Finnish candidates. The response rate was 17%. According to self-reports, about half the participants (52%) were in the final third of their studies, whereas 33% were in the middle, and 15% at the beginning.

On average, doctoral candidates expected to graduate within 5.8 years. Altogether, 43% of the doctoral candidates expected to finish their doctoral degree within four years. There were significant differences in the estimated graduation

² However, the youngest respondents were under 25 years old, but also the proportion of candidates who were 50 years or older was relatively large.

time between the doctoral schools ($F(3,700) = 9.43, p < .001$): the estimated graduation times of the doctoral candidates at the Doctoral School in Health Sciences (DSHealth) and at the Doctoral School in Natural Sciences (DONASCI) were shorter than doctoral candidates at the Doctoral School in Humanities and Social Sciences (HYMY). The candidates at the Doctoral School in Environmental, Food, and Biological Sciences (YEB) did not differ from candidates at other doctoral schools in the estimated graduation time. No gendered differences were detected in estimated graduation time.

Most candidates reported working full-time on their thesis (62%). Men more often reported that they were working full-time on their dissertation (67%) than women (59%) ($\chi^2(1, N = 727) = 4.99, p < .05$). The doctoral schools differed significantly from each other in terms of the number of candidates working full- and part-time on their doctoral dissertation ($\chi^2(3, N = 741) = 50.19, p < .001$). At the Doctoral School in Natural Sciences (DONASCI), the Doctoral School in Environmental, Food and Biological Sciences (YEB), and the Doctoral School in Humanities and Social Sciences (HYMY) it was more typical to work full-time on the doctoral studies than candidates in the Doctoral School in Health Sciences (See Table 1). Moreover, the candidates in DONASCI worked full-time more often than candidates at HYMY. Estimated graduation time of the full-time candidates was significantly shorter compared to part-time candidates ($p < .001$). There were no statistically significant differences in satisfaction with supervision and with their doctoral studies between the doctoral candidates working full-time on the doctoral studies and those working part-time.

Table 1. Form of thesis, study status, and research group status (alone/group/both) by Doctoral School

| Doctoral School | <i>n</i> | Form of thesis* | | Study status | | Research group status | | |
|--|----------|-----------------|---------|--------------|-----------|-----------------------|-------|------|
| | | Monograph | Article | Full-time | Part-time | Alone | Group | Both |
| Doctoral School in Environmental, Food and Biological Sciences | 64 | 3% | 97% | 72% | 28% | 61% | 6% | 33% |
| Doctoral School in Health Sciences | 209 | 1% | 97% | 44% | 56% | 55% | 18% | 26% |
| Doctoral School in Humanities and Social Sciences | 370 | 42% | 57% | 65% | 35% | 85% | 3% | 12% |
| Doctoral School in Natural Sciences | 106 | 2% | 96% | 83% | 17% | 53% | 16% | 31% |

* The proportion of “I don’t know” answers: 2%

The most typical forms of funding reported by the doctoral candidates were employment at the university (34%) and personal grants (30%). Having no funding was reported by 22% of the candidates, and some other form of funding by 14% of them. The candidates who reported having no funding were less satisfied with their doctoral studies than the candidates who had employment at the university ($p < .05$) or some other form of funding ($p < .05$). The candidates who reported not having funding were also less satisfied with supervision than the candidates who reported having some other form of funding ($p < .05$). There were significant differences in the estimated graduation time based on the primary source of funding: The candidates who were employed by the university were estimated to complete their studies significantly faster compared to the candidates who reported having some other source of funding ($p < .01$) or no funding ($p < .001$). Also, the candidates who had personal grants were estimated to graduate faster ($p < .001$) than the candidates with no funding. No gendered differences were detected in the forms of funding. Doctoral candidates' satisfaction with studies and supervision, and estimated graduation time by background variables are shown in Appendix 2.

Most candidates were writing their thesis in the form of compilation of articles (77%), and 21% as a monograph, while two per cent reported that they did not know what form they would write their thesis in. Women were more often working on a compilation of articles format (82%) than men (72%) ($\chi^2(1, N = 718) = 8.40, p < .01$). A compilation of articles was the most typical thesis form in all four doctoral schools. However, monographs were more typical in the HYMY Doctoral School compared to the other doctoral schools (see Table 1). There were no differences in thesis format between Finnish and international PhD candidates. The form of the dissertation was related to estimated duration of the studies: Candidates who were writing their dissertations as a summary of articles estimated that they would complete their degree significantly faster than the candidates who were writing a monograph ($p < .001$). Doctoral candidates writing a monograph dissertation did not differ from the candidates writing the summary articles in terms of satisfaction with supervision and satisfaction with doctoral studies in general. Most of the candidates (82%) were writing their dissertation in English. Sixty-three per cent of the doctoral candidates had already published their research.

Most of the doctoral candidates (70%) reported working on their doctoral dissertation mainly alone, and a minority (10%) in a group. About one-fifth of the candidates (20%) reported conducting their work both alone and in a group. Some differences were detected between the doctoral schools in the forms of working ($\chi^2(3, N = 729) = 76.13, p < .001$). Doctoral candidates of the HYMY Doctoral School more often reported working on their theses mainly alone (85%) than candidates in the other doctoral schools.

Further investigation showed that the research group status was related to satisfaction with supervision and to the doctoral studies in general. Those candidates who were working at least partially in a group were more satisfied with their supervision ($p < .001$) and with their doctoral studies in general ($p < .01$) than those who were working mainly on their own. The thesis format was not associated with satisfaction in supervision nor in doctoral studies more generally.

Over one-third of the doctoral candidates (38%) reported having experience in cross-disciplinary research collaboration. There were significant differences between doctoral schools in candidates' cross-disciplinary experience ($\chi^2(3, N = 739) = 15.22, p < .001$): Having cross-disciplinary experience was more common in HYMY than in DSHealth. The estimated graduation time of the candidates who had experience in cross-disciplinary collaboration was significantly longer than of the candidates who had no such experience ($p < .05$). There were no differences between the candidates who had experience in cross-disciplinary research collaboration and those who had not in terms of gender, nationality, research group status, or dissertation format. The experience of cross-disciplinary collaboration was not related to satisfaction with supervision or with doctoral studies.

3 DOCTORAL EXPERIENCE

3.1 Reasons for undertaking doctoral studies

Doctoral candidates reported several reasons for undertaking doctoral studies. Table 2 shows that candidates especially emphasised *research interest* including enjoying intellectual challenges, inspiration related to their research topic and their work as a researcher, and *development interest* including a desire to develop their skills and a fascination about finding out new things as the main reasons for undertaking doctoral studies. In addition, *instrumental interest* entailing the desire to work in a research community and getting a better position or better salary or finding the job prospects better after gaining a doctoral degree was perceived as a driver for undertaking doctoral studies, although it was less emphasised than the research and development interest (see Table 2).

Table 2. Doctoral candidates' reasons for undertaking doctoral studies

| | N of items | Alpha | M | SD | Min | Max |
|-----------------------|-------------------|--------------|----------|-----------|------------|------------|
| Research interest | 6 | 0.78 | 5.71 | 0.92 | 1.67 | 7.00 |
| Instrumental interest | 5 | 0.74 | 4.64 | 1.49 | 1.00 | 7.00 |
| Development interest | 5 | 0.70 | 6.27 | 0.73 | 1.40 | 7.00 |

Note: Scale 1-7

In general, high levels of interest were related to high levels of the engagement experienced in doctoral research, satisfaction with supervision and with the doctoral studies, as well as reduced levels of burnout in the doctoral studies (see Appendix 3). In particular, having an interest in research was related to increased levels of research engagement and reduced risk of experiencing stress, exhaustion, and cynicism. Moreover, candidates with high levels of interest were less likely to consider dropping out from their doctoral studies compared to those showing low levels of research interest ($p < .001$), instrumental interest ($p < .01$), and development interest ($p < .05$).

Full-time and part-time doctoral candidates differed from each other in terms of their instrumental and developmental interest. The full-time doctoral candidates reported higher levels of instrumental interest ($p < .05$) than the part-time candidates. They also emphasised developmental interest ($p < .05$) more than the part-time candidates. The candidates who reported working in a research group showed higher levels of instrumental interest than the candidates who reported working mainly on their own ($p < .01$).

Some differences were detected in candidates' interest in doctoral studies between the Finnish and international candidates, and the doctoral schools. The international candidates showed higher levels of research interest ($p < .01$), developmental interest ($p < .05$), and instrumental interest ($p < .001$) than Finnish candidates. Moreover, candidates in the HYMY Doctoral School showed significantly higher levels of research interest in their studies than their counterparts in the YEB Doctoral School ($p < .05$). However, the doctoral candidates in the HYMY Doctoral School reported significantly lower levels of instrumental interest than their peers in DONASCI ($p < .01$) and in DSHealth ($p < .001$).

There were some differences in interest in the doctoral studies based on thesis format and principal source of funding during the doctoral studies. The candidates who were conducting their thesis in a form of a compilation of articles reported higher levels of instrumental interest than the candidates who were working with a monograph thesis format ($p < .01$). The doctoral candidates with no funding for their studies reported significantly lower levels of instrumental interest than the candidates who reported having employment at the university ($p < .05$), a personal grant ($p < .05$) or some other form of funding ($p < .05$).

Differences between female and male doctoral candidates were found in their developmental interest: female candidates reported higher levels of developmental interest than male candidates ($p < .01$). There were no differences in various interests between the candidates who were in different phases of their doctoral studies nor between the candidates whose studies were prolonged (eight or more years) and the candidates whose studies were not. However, high levels of instrumental interest were related to completion of doctoral studies in a shorter time ($r = -.117, p < .01$). Doctoral candidates' interest by background variables are shown in Appendix 4.

3.2 Temporal locations of doctoral candidates' positive and negative key experiences

Doctoral candidates reported a variety of positive and negative key experiences embedded throughout their doctoral studies. Some experiences had more fundamentally changing impacts on the doctoral journey than others. The intensity, duration and personal significance of reported episodes varied. Both positive and negative key experiences occurred throughout the doctoral studies. The doctoral candidates emphasised milestones related to the progress of the doctoral research. Figure 1 shows that over 60% of doctoral candidates reported meaningful positive and negative experiences (Positive: $n = 467$; Negative: $n = 476$) during the first three years of the doctoral studies. There were no statistically significant differences in temporal location of the positive or negative experiences between the four doctoral schools.

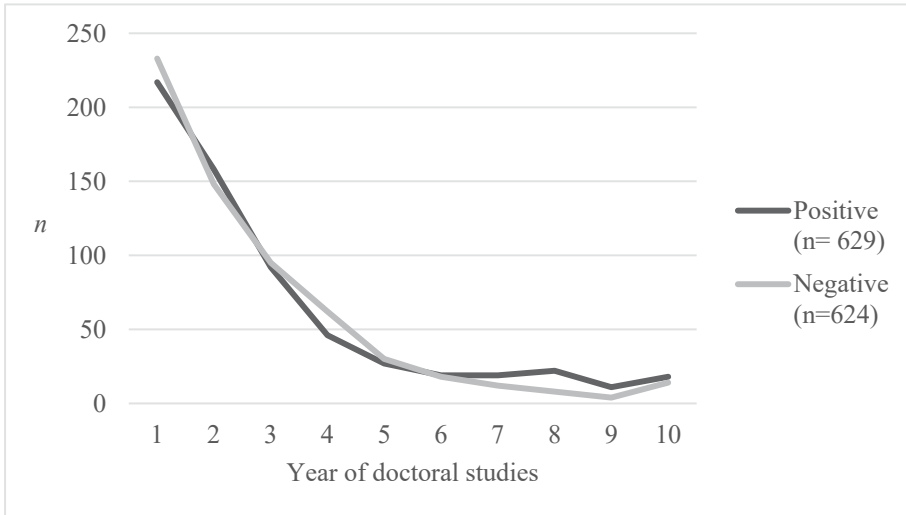


Figure 1. The temporal location of the positive and negative key experiences.

3.3 The quality of the key experiences

Both the positive and the negative key experiences were embedded in eight aspects of doctoral experience, including *structures and resources, research communication, research community interaction, doctoral research, supervision, professional and career development, personal, and the COVID-19 pandemic*. The most typical positive experiences were related to *structures and resources, research communication, research community interaction, and doctoral research*, while the most common negative experiences were related to *structures and resources (see Table 3)*. The positive experiences were typically related to having funding, adequate research facilities and a good balance between research and other academic duties. In turn, an insecure financial situation, short term contracts, the weak position of being a grant researcher and the high level of bureaucracy in the doctoral studies, were perceived as being highly problematic.

Table 3. Positive and negative experiences within the doctoral journey.

| | Positive | | Negative | |
|-------------------------------------|------------|----|------------|----|
| | <i>n</i> | % | <i>n</i> | % |
| Structures and resources | 153 | 23 | 160 | 25 |
| Research communication | 143 | 22 | 77 | 12 |
| Research community interaction | 130 | 20 | 67 | 11 |
| Doctoral research | 128 | 19 | 74 | 12 |
| Supervision | 57 | 9 | 103 | 16 |
| Professional and career development | 38 | 6 | 32 | 5 |
| Personal | 12 | 2 | 53 | 8 |
| COVID-19 pandemic | 2 | 0 | 62 | 10 |
| Total | 663 | | 628 | |

Doctoral candidates' descriptions of positive experiences related to *research communication* included written and oral communication on their doctoral research. Getting published was particularly reported as being an important positive milestone, while problems in publishing were considered to be a source of strain.

Participation in *research community interaction*, such as working in a research group, peer interaction, and in particular the ability to participate in international conferences and networking with other researchers were reported as sources of positive experiences. In turn, experiencing oneself as an outsider, dismissive or/and negative feedback, a lack of support from others, and destructive friction in the research community such as a competitive or a hostile academic atmosphere and conflicts between candidates and other members of the community, were perceived as being impediments and sources of distress.

Positive key experiences related to candidates' doctoral research project entailed reaching significant milestones, including overcoming problems related to research work, making discoveries, and mastering new methods. In turn, the negative experiences related to conducting *doctoral research* that entailed failed experiments, challenges in getting data or results, and problems in research designs and research instruments.

Key experiences related to *supervision* were also reported. Negative experiences related to supervision such as insufficient supervision, a lack of encouragement, interest, and support from the supervisors as well as problems in the supervisory relationship, such as supervisors' discouraging comments or lacking expertise, were more often reported than positive experiences related to supervision. Positive experiences related to supervision included encouragement, support, and constructive feedback received from the supervisors, and supervisors' expertise and commitment to the supervisory relationship.

The doctoral candidates' descriptions of key experiences related to *professional and career development*. Those candidates who reported such experiences typically perceived as highly positive the learning of work-related competencies (both academic and non-academic) and becoming more autonomous and skilled as a researcher. In turn, a lack of the ability required in a researcher or professional career, insufficient knowledge, and skills to carry out doctoral research, and challenges with self-regulation constituted the negative experiences.

Candidates' descriptions of interactions between their *personal* life and doctoral studies included problems in balancing with the doctoral studies, full-time work or with personal life challenges (problems with health, death of a friend or family member causing distress).

Some doctoral candidates also described key experiences related to COVID-19. For instance, the doctoral candidates reported problems and lack of progress in their doctoral research due to limited data collection opportunities, and the lack of or reduced access to research participants, because of the lock-down. In addition, they described erosion of support networks, less frequent supervision and problems related to working and taking courses remotely. The candidates also suffered from reduced access to the institutional resources. Some also reported that due to the pandemic, they needed to focus on other aspects of life (work, family, etc.) and reduce the hours devoted to doctoral research.

Further investigation showed that the positive experiences were related to engagement in doctoral research, satisfaction with the doctoral studies and cynicism (for more detailed information, see Appendix 5). More specifically, the candidates who reported a significant positive experience related to their doctoral research or supervision ($p < .05$) experienced higher levels of research engagement than those candidates who emphasised positive experiences related to the research community interactions. The candidates who described a positive experience related to research communication reported being more satisfied with the doctoral studies than the candidates whose positive experience was related to research community interaction ($p < .05$). Moreover, the candidates who described a positive experience related to supervision experienced lower levels of cynicism than candidates who reported a positive experience related to research community interaction ($p < .01$).

In turn, negative experiences were related to engagement in doctoral research, stress, exhaustion, cynicism, and satisfaction with supervision and with doctoral studies (for more detailed information, see Appendix 5). The candidates who described negative experiences related to supervision reported lower levels of research engagement than candidates whose negative experience was related to structures and resources ($p < .01$). Moreover, the candidates who reported negative experience related to structures and resources reported lower levels of stress compared to candidates who described a negative experience related to

supervision ($p < .001$), COVID-19 pandemic ($p < .05$), or research community interaction ($p < .05$). The candidates who reported negative experiences related to supervision experienced higher levels exhaustion than those whose negative experience was related to doctoral research ($p < .05$), research communication ($p < .05$), or structures and resources ($p < .001$). A similar relationship was detected between the cynicism experienced and supervision: the candidates who reported a significant negative experience related to supervision experienced higher levels of cynicism than those who reported negative experiences related to doctoral research ($p < .01$), COVID-19 pandemic ($p < .05$), professional and career development ($p < .05$), and structures and resources ($p < .001$). The candidates who reported significant negative experiences related to supervision were also less satisfied with supervision than candidates reporting other types of negative experience ($p < .01$). In addition, the candidates who reported a negative experience related to research community interaction were less satisfied with supervision than candidates describing negative experiences related to COVID-19 pandemic ($p < .01$) or structures and resources ($p < .05$). Furthermore, the candidates describing negative experiences related to supervision were less satisfied with their doctoral studies than candidates who reported a negative experience related to doctoral research ($p < .001$), COVID-19 pandemic ($p < .001$), professional and career development ($p < .05$), research communication ($p < .001$), and structures and resources ($p < .001$).

There were significant differences between full-time and part-time candidates' positive key experiences ($\chi^2(7, N = 652) = 24.17, p < .01$). Full-time doctoral candidates more typically described positive experiences related to structures and resources (28%) than part-time candidates (17%). On the contrary, the positive experiences related to supervision were more often described by part-time candidates (14%) than full-time candidates (6%). Finnish doctoral candidates more often emphasised positive experiences related to structures and resources (27%) than international candidates (13%). The candidates working on an article-based dissertation more often emphasised positive experiences related to research communication (26%) than those working on a monograph (9%). No gendered differences were detected in positive experiences.

The candidates who were working on a monograph more typically described negative experiences related to structures and resources (40%) than the candidates who were working on an article-based dissertation (21%) ($\chi^2(7, N = 610) = 21.41, p < .01$). No significant differences in negative experiences were detected between male and female candidates, or between Finnish and international candidates.

4 DOCTORAL SUPERVISION AND RESEARCH COMMUNITY INTERACTION

4.1 Supervisors' perceptions of factors influencing on the decision to commit to supervising a new doctoral candidate

In general, supervisors estimated candidates' motivation, alignment with their own research interests, and quality of the research proposal as being the most significant factors influencing the decision to commit to supervising a new doctoral candidate, while the candidate's master's thesis grade and prior research experience, outputs, and publications were emphasised to lesser extent (see Table 4). Yet, considerable variation between the supervisors occurred (see Appendix 6).

Table 4. Factors influencing on the decision to commit to supervising

| | <i>n</i> | <i>m</i> | <i>sd</i> |
|--|----------|----------|-----------|
| Master's thesis grade. | 549 | 4.44 | 1.56 |
| Quality of research proposal. | 545 | 5.66 | 1.44 |
| References/testimonials. | 548 | 4.64 | 1.59 |
| Availability of financial support. | 554 | 5.15 | 1.72 |
| Alignment with your own research interests. | 552 | 6.17 | 1.03 |
| Prior research experience, outputs, and publications of the candidate. | 551 | 4.46 | 1.53 |
| Candidate's motivation for wanting to do the doctorate | 555 | 6.56 | .714 |

Note: Scale 1-7.

Some differences between the schools were identified. The supervisors from the DsHealth reported that the undergraduate thesis grade influenced their decision less often than supervisors from other doctoral schools ($p < .001$). The quality of research proposal affected the supervisors' decision to commit to supervising a new candidate at HYMY more often than supervisors from other doctoral schools ($p < .001$). Also, the supervisors of the YEB candidates more often emphasised the quality of the research proposal than supervisors of the candidates in DSHealth ($p < .001$) and DONASCI ($p < .001$). However, the supervisors at HYMY reported that candidates' references/testimonials ($p < .001$), availability of financial support ($p < .001$), and alignment with their own research interest ($p < .01$) influenced their decision to a lesser extent compared to supervisors in other doctoral schools. Prior research experience, outputs, and publications were emphasised more often by the DSHealth supervisors than the supervisors at HYMY

($p < .05$), while supervisors at HYMY emphasised candidate's motivation more often than supervisors in DSHealth ($p < .01$).

Some gendered differences were detected in supervisors' estimations of the influencing factors: women reported that the alignment with their own interest ($p < .01$) and candidates' motivation for wanting to do a doctorate ($p < .01$) influenced their decision more often than men did. There was also variation in the factors affecting their decision to commit to supervising a new candidate between the supervisors with different types of position. The professors/research directors and tenure track professors reported that master's thesis grade affected their decision more often than post-doctoral researchers/university instructors ($p < .05$). University lecturers/university researchers ($p < .05$) and tenure track professors ($p < .01$) reported that candidates' references/testimonials were an influencing factor more often than professors/research directors. Professors/research directors reported more often that candidate's prior research experience, outputs, and publications affected their decision than university researchers/university lecturers ($p < .01$) or post-doctoral researchers/university instructors ($p < .01$). The frequency of being engaged in co-supervision was not related to the supervisors' perceptions of factors influencing their decision to commit to supervising a new candidate.

Further investigation showed that the supervisors who typically supervised full-time candidates reported more often that the master's thesis grade ($p < .001$), references/testimonials ($p < .001$), availability of the financial support ($p < .001$), and previous research experience, outputs and publications of the candidate ($p < .05$) affected their decision than those who typically supervised part-time candidates. In turn, the supervisors who typically supervised part-time candidates reported that the quality of the research proposal affected their decision ($p < .01$) more often than those supervising mainly full-time candidates. In addition, those primarily supervising the authors of monograph theses considered master's thesis grade ($p < .001$) and quality of the research proposal ($p < .001$) to be more important factors influencing their decision to commit to supervising a new doctoral candidate compared to those primarily supervising the authors of article-based theses. In turn, those primarily supervising candidates working on an article-based thesis believed that references/testimonials ($p < .001$), availability to obtain financial support ($p < .001$), and alignment with own research interests ($p < .001$) to be more important than those primarily supervising monograph theses. Moreover, supervisors' whose doctoral candidates were typically engaged in a research group emphasised references/testimonials ($p < .001$), availability of financial support ($p < .001$), alignment with own research interest ($p < .001$), the candidate's prior research experience, outputs, and publications ($p < .05$) motivations for doing the doctorate ($p < .01$) more often than supervisors whose supervisees were mainly working alone. In turn, the supervisors whose supervisees were typically working

alone emphasised the master’s thesis grade ($p < .01$), the quality of the research proposal ($p < .001$) more often than supervisors whose supervisees were working in a group. The supervisors who reported that their supervisees were typically employed by the university emphasised the candidate’s references/testimonials ($p < .01$), previous research experience, outputs, and publications ($p < .05$), and availability of financial support ($p < .001$) more often than supervisors whose candidates’ work was funded by a personal grant. In addition, the supervisors whose candidates typically did not have funding emphasised availability of financial support less often than candidates with all forms of funding ($p < .001$).

4.2 Experiences with co-supervision and organisation of supervision across the doctoral schools

According to the supervisors, the most typical way of orchestrating supervision within their context was one-to-many i.e., each doctoral candidate having a team of two or more supervisors (see Table 5). The one-to-one-model of organising doctoral supervision was also commonly described. In turn, many-to-many (i.e., a cohort of candidates being supervised by a group of supervisors) or many-to-one, (i.e., a single supervisor advising a group of candidates), were rarely described. However, there were significant differences in the ways of orchestrating supervision between doctoral schools ($\chi^2(12, N = 466) = 61.48, p < .001$): One-to one supervision was more common in DONASCI than in the other doctoral schools. One-to-many supervision was more frequently reported by supervisors at HYMY than at other doctoral schools. Such supervision was more common at DSHealth than DONASCI.

Table 5. Experience in engaging co-supervision and organisation of doctoral supervision within the context

| | <i>n</i> | % |
|---|----------|----|
| In my context, supervision is typically structured as: | | |
| One-to-one | 105 | 20 |
| One-to-many | 376 | 71 |
| Many-to-one | 23 | 4 |
| Many-to-many | 27 | 5 |
| How often you have been engaged in co-supervision? | | |
| Never | 97 | 17 |
| Rarely | 84 | 15 |
| Occasionally | 132 | 24 |
| Frequently | 190 | 34 |
| Always | 54 | 10 |

Sixty-eight per cent of the supervisors reported that they had been engaged in co-supervision at least occasionally, though variation between the doctoral schools occurred ($\chi^2(6) = 26.07, p < .001$). Supervisors from the YEB doctoral school were more often involved in co-supervision compared to their peers from other doctoral schools. Typically, two supervisors were involved in co-supervision. Altogether, 44% reported that they used a supervisory agreement “memorandum of understanding” with their supervisees.

4.3 Source of supervision according to the doctoral candidates

Most of the doctoral candidates reported being supervised by two or more supervisors (71%), whereas 28% had only one supervisor (see Table 6). Candidates rarely reported not having a supervisor. A gendered difference in the number of supervisors was detected ($\chi^2(2, N = 732) = 9.50, p < .01$): women more often reported having two or more supervisors (75%) than men (64%). There were no significant differences between full-time and part-time doctoral candidates or between Finnish and international doctoral candidates in the number of supervisors.

Table 6. Source of supervision.

| Main supervisor | <i>n</i> | % |
|-------------------------|------------|-----------|
| One supervisor | 210 | 28 |
| Two or more supervisors | 533 | 71 |
| I have no supervisor | 3 | 0 |
| Someone else | 1 | 0 |
| Total | 747 | 99 |

Some differences between the doctoral schools in the source of supervision were detected ($\chi^2(3, N = 727) = 24.09, p < .001$). In the HYMY Doctoral School it was more common to have two or more supervisors (79%) compared to DONASCI (58%) and DSHealth (66%).

Most of the candidates (56%) had a thesis committee appointed for them. There were considerable differences between the schools in terms of number of the candidates having a thesis committee ($\chi^2(3, N = 747) = 318.53, p < .001$). In DSHealth (95%), in YEB (88%), and in DONASCI (76%), doctoral candidates typically had thesis committees, whereas in HYMY a quarter of the candidates (25%) had appointed thesis committees. Moreover, the DSHealth candidates had a thesis committee appointed for them more often than candidates at DONASCI. Most candidates who had already had a meeting with their thesis committee (*n*

= 266) considered the meeting to be at least somewhat useful to them (61%), but there was considerable variation in the candidates' experiences on the usefulness of the meeting.

4.4 Frequency of supervision – supervisors and doctoral candidates' views

The supervisors and the doctoral candidates' perceptions of frequency of supervision varied from it taking place daily to less than every six months (see Table 7). The candidates most typically reported receiving supervision monthly (34%), while the supervisors reported their doctoral candidates typically received supervision weekly (43%). The reported frequency of supervision differed between the doctoral candidates and the supervisors ($\chi^2(5, N = 1297) = 84.90, p < .001$). The supervisors more often reported supervising an individual candidate weekly (43%) compared to the candidates' perceptions (26%). In addition, the candidates more often reported receiving supervision less frequently than every six months (7%), while only 1% of supervisors reported the frequency of supervising an individual candidate as being rarely.

Table 7. Frequency of supervision

| Frequency of supervision | Candidates | | Supervisors | |
|--------------------------|------------|-----------|-------------|------------|
| | <i>n</i> | % | <i>n</i> | % |
| Daily | 18 | 2 | 23 | 4 |
| Weekly | 195 | 26 | 240 | 43 |
| Once a month | 250 | 34 | 173 | 31 |
| Once every two months | 136 | 18 | 93 | 17 |
| Once every six months | 88 | 12 | 24 | 4 |
| Less frequently | 54 | 7 | 3 | 1 |
| Total | 741 | 99 | 556 | 100 |

The candidates who received frequent supervision (at least once in a month, $n = 458$), were less likely to consider dropping out from their studies ($\chi^2(1, N = 734) = 4.83, p < .05$), and were less likely to have prolonged study periods ($\chi^2(1, N = 710) = 56.75, p < .001$) compared to the candidates who received supervision less than once a month ($n = 276$). They were also more satisfied with supervision ($p < .001$) and with their doctoral studies ($p < .001$) than candidates who perceived receiving supervision less than once a month. Frequent supervision was also associated with timely completion of the doctorate. The candidates who received frequent supervision thought that they would complete their doctoral degree sooner than their counterparts who received supervision less frequently ($p < .001$). No

gender differences were detected in terms of the frequency of supervision. However, international doctoral candidates reported receiving supervision more frequently than their Finnish peers ($\chi^2(1, N = 732) = 9.50, p < .01$). Also, the candidates who were conducting their doctoral dissertation as a summary of articles reported receiving supervision more frequently than the candidates working on the monograph dissertation format ($\chi^2(1, N = 720) = 68.21, p < .001$).

The doctoral candidates who reported working full-time on their theses typically received supervision more frequently than those who worked part-time ($\chi^2(1, N = 730) = 26.74, p < .001$). Doctoral candidates who reported working mainly on their own received supervision less frequently than those working at least partly in a research group ($\chi^2(1, N = 721) = 60.79, p < .001$). There were also considerable differences between doctoral schools in the reported frequency of supervision both by the doctoral candidates ($\chi^2(3, N = 725) = 105.77, p < .001$) and by the supervisors ($\chi^2(3, N = 469) = 98.04, p < .001$). The proportion of candidates receiving supervision less than once a month was largest at HYMY (56%) (See Appendix 7). Accordingly, the proportion of supervisors who reported supervising their individual doctoral candidates less frequently than once a month was largest at HYMY (48%).

4.5 Doctoral candidates and supervisors' perspectives of good supervision

Both doctoral candidates and the supervisors described *informational support*, *emotional support*, *instrumental support*, and *co-constructive support* as the primary characteristics of high-quality supervision. Informational support such as supervisory commitment, frequent meetings and being available, giving practical help and advice concerning the research topic and research methods, planning the research, and reporting on it were emphasised as central qualities of good supervision by the doctoral candidates. In turn, supervisors described frequent meetings, being present for the candidates, helping them with their research by giving concrete advice concerning research topics, designs, methods, analysis, and reporting from the results and research as the core of informational support. They also emphasised doctoral students' own responsibility and the reciprocal nature of supervision regarding the informational support. Also, receiving and giving *emotional support* from the supervisor, including encouragement, constructive feedback, promoting candidate's active agency and caring for candidates' well-being and progress, were considered important both by the candidates and the supervisors. Supervisors and candidates rarely described *instrumental support* such as providing research facilities or writing recommendations, helping with funding, providing access to research facilities were rarely described as a core characteristic of high-quality supervision. Similarly, *co-constructive support*,

such as creating new ideas, knowledge, methods, research-innovations together or brainstorming were rarely described as key feature of good supervisory neither by the supervisors nor the candidates, but when reported, it was considered to be highly engaging by the candidates. The characteristics of good supervision often complemented each other, constituting the complementary aspects of high-quality supervision. There were no significant differences in the frequency of reporting informational, emotional, instrumental, or co-constructional support between the candidates or supervisors of different doctoral schools.

Doctoral candidates and supervisors emphasised similar characteristics of good supervision. Both doctoral candidates and supervisors emphasised informational and emotional support as the primary feature of good supervision (see Figure 2).

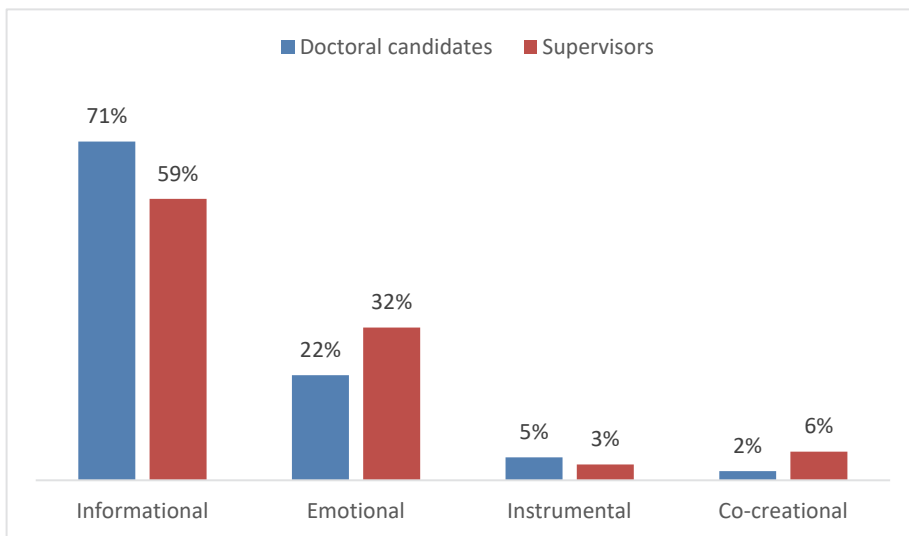


Figure 2. Doctoral candidates and supervisors' perceptions about good supervision

In general, the doctoral candidates were quite satisfied with the supervision ($M = 5.33$, $SD = 1.66$). The candidates who had considered dropping out of their studies were less satisfied with supervision than those who had not considered it ($p < .001$). There were no differences in satisfaction with supervision between full-time and part-time candidates, between native and foreign candidates, or between women and men. There were no significant differences in candidates' satisfaction with supervision across the doctoral schools. Satisfaction with supervision by doctoral schools are shown in Appendix 2.

Twelve per cent of the candidates had changed their supervisor, whereas 17% had considered doing so. The candidates who had changed their main supervisor

were less satisfied with supervision ($m = 4.93, sd = 1.97$) than those who had not changed their supervisor ($m = 5.38, sd = 1.62, p < .05$). There were no significant differences between doctoral schools in the proportion of candidates who had changed their supervisor or considered it. The proportions of candidates within doctoral schools who had changed supervisor or were considering it are shown in Appendix 8. The most common reasons for changing supervisor were problems in the supervisory relationship (53%). External reasons (28%) such as supervisor retirement or changing their place of work and reasons related to research and changing the thesis topic (19%) were also reported. The candidates who had considered changing their primary supervisor were less satisfied with supervision ($m = 3.45, sd = 1.81$) than the candidates without such intentions ($m = 5.76, sd = 1.28, p < .001$).

4.6 Supervisors' experiences with the supervisory relationship

On average, the supervisors perceived that the interaction with the doctoral candidates was functioning well ($M = 6.05, SD = .67$). For example, they thought that their supervisees communicated effectively and understood the expectations the supervisors had of them. However, some variations between the supervisors were detected. Women believed that the supervisory interaction to be highly functional more often than men ($p < .001$). Also, the DSHealth supervisors thought that the interaction with the candidates was more functional than DONASCI supervisors ($p < .01$). Moreover, the supervisors who thought that the number of supervisees as being suitable perceived the interaction as functioning well more often than the supervisors who believed the number of supervisees to be too small ($p < .05$) as well as those supervisors who reported supervising their candidates at least once a month compared to their colleagues who reported supervising less frequently ($p < .01$). No differences were detected in supervisors' estimations on the quality of supervisory interaction regarding candidates' study status (full-time/part-time), research group status (alone/in a group) or thesis format (monograph/summary of articles). Supervisors' estimations of the quality of supervisory interaction by background variables are shown in Appendix 9.

4.7 Doctoral candidates' experiences with supervisory and research community support

On average, the doctoral candidates perceived that they received adequate support from their *supervisors* ($M = 5.40, SD = 1.33$) and the *research community* ($M = 4.64, SD = 1.07$) (see Table 8). Doctoral candidates reported that they were treated with respect by their supervisors, were able to discuss the problems related to

their doctoral studies openly with their supervisors, that the supervisors were interested in their work, and that they received encouragement, advice and constructive criticism when needed. Their experience was that they were accepted and appreciated by the research community, received encouragement and support from other doctoral candidates and that there was a good sense of collegiality between the researchers.

Table 8. Doctoral candidates' perceptions about supervisory and research community support.

| | N of items | Alpha | M | SD | Min | Max |
|----------------------------|-------------------|--------------|----------|-----------|------------|------------|
| Supervisory Support | 11 | 0.95 | 5.40 | 1.33 | 1 | 7 |
| Research Community Support | 11 | 0.92 | 4.68 | 1.29 | 1 | 7 |

Note: Scale 1-7

Doctoral candidates from different doctoral schools had some differences in their perceptions about research community support. Candidates in HYMY were slightly less satisfied with research community support than the candidates in the DSHealth ($p < .001$) and the DONASCI ($p < .001$). However, no differences in the supervisory support experienced were detected between the doctoral schools. Supervisory support and research community support by background variables are shown in Appendix 4.

High levels of reported supervisory and research community support were related to experiencing engagement in doctoral research, satisfaction with the doctoral studies and supervision, and lower levels of experienced burnout (see Appendix 10). The candidates who had considered dropping out of their doctoral studies reported lower levels of supervisory support ($p < .001$) and research community support ($p < .001$) than those who had not considered dropping out. Those candidates who worked in the research group experienced higher levels of both supervisory support ($p < .001$) and research community support ($p < .001$) than their counterparts working mainly on their own. Moreover, the candidates who undertook an article-based thesis reported higher levels of research community support compared to those who were writing a monograph ($p < .001$). The candidates whose doctoral studies were prolonged reported significantly lower levels of supervisory ($p < .001$) and research community support ($p < .001$) than those whose studies were not prolonged.

4.8 Doctoral candidates' experiences with international and national research collaboration

The most typical form of research collaboration that the doctoral students had experience engaging in was participation in international and national conferences. Forty-five per cent of the candidates had participated in international courses and summer schools, and 33% had co-authored papers with international researchers. A minority of the candidates (13%) had participated in a researcher exchange arrangement during their studies (see Table 9).

Table 9. National and international research collaboration.

| | <i>n</i> | % |
|--|----------|----|
| I have presented at international conferences | 477 | 63 |
| I have presented at national conferences. | 451 | 59 |
| I have participated in international courses or summer schools. | 348 | 45 |
| I have co-authored papers with international researchers. | 254 | 33 |
| I been involved in researcher exchange during my doctoral studies. | 100 | 13 |

There were some differences in doctoral candidates' experiences of research collaboration across doctoral schools. The candidates from the HYMY doctoral school had presented at national conferences (65%) more often compared with candidates from DSHealth (53%). Having experience of co-authoring with international researchers was more common among candidates from DONASCI (51%), YEB (42%) and DSHealth (45%) than those from HYMY (20%).

The doctoral candidates writing an article-based dissertation had participated in researcher exchange during their doctoral studies more often than those who were writing a monograph dissertation ($\chi^2(1, N = 736) = 4.54, p < .05$). In addition, the candidates writing an article-based thesis had co-authored articles with international collaborators more often ($\chi^2(1, N = 737) = 22.41, p < .001$) than candidates who were writing a monograph dissertation. There were also differences in the experiences of international and national research collaboration between full-time and part-time doctoral candidates. Full-time candidates had participated in international courses or summer schools more frequently than part-time students ($\chi^2(1, N = 746) = 7.73, p < .01$). They had also presented at national conferences more often than the part-time doctoral candidates ($\chi^2(1, N = 750) = 3.93, p < .05$).

There were also differences in research collaboration experiences between the candidates who had participated in cross-disciplinary collaboration and candidates who had not engaged in it. The doctoral candidates who had participated in cross-disciplinary collaboration had participated in conferences more often than those

who had no experience of cross-disciplinary collaboration: national conferences ($\chi^2(1, N = 750) = 18.64, p < .001$) and international conferences ($\chi^2(1, N = 750) = 17.40, p < .001$). They also had co-authored papers with international researchers ($\chi^2(1, N = 747) = 7.25, p < .01$) and participated in international courses or summer schools ($\chi^2(1, N = 746) = 36.01, p < .001$) as well as had experience of researcher exchange during their doctoral studies ($\chi^2(1, N = 746) = 17.14, p < .001$) more often than candidates with no experience of cross-disciplinary collaboration.

Also, research group status was related to research collaboration experiences. The candidates who reported working at least partly in a research group had co-authored papers more often with international researchers than those who worked mainly on their own ($\chi^2(1, N = 741) = 30.18, p < .001$). Moreover, international doctoral candidates had participated in international courses or summer schools ($\chi^2(1, N = 749) = 10.65, p < .01$) and researcher exchange ($\chi^2(1, N = 749) = 21.42, p < .001$) more often than Finnish candidates. The international candidates also had co-authored papers with international researchers more often than Finnish candidates ($\chi^2(1, N = 750) = 11.86, p < .01$).

4.9 Supervisory competencies and development

In general, supervisors thought that their supervisory competencies, including being confident about their supervisory skills and competence to be an effective supervisor, as being high ($M = 5.35$) (see Table 10). They also reported enjoying supervision and saw it as contributing to the quality of their research. The length of supervisory experience ($r = .227, p < .001$) and the number of dissertations supervised ($r = .178, p < .001$) were positively related to perceived supervisory competencies. Also, supervisors' experiences of professional support from their research community ($r = .308, p < .001$) and the number of activities the supervisor employed to enhance their supervisory practice ($r = .246, p < .001$) were positively associated with perceived supervisory competencies. No gendered differences in perceived supervisory competencies were detected. There were also no differences between the doctoral schools, format of the thesis supervised (monograph versus article-based dissertation) nor experienced in engaging co-supervision. Perceived supervisory competencies by background variables are shown in Appendix 9.

Table 10. Supervisory competencies, professional support from the research community

| | <i>N</i> of items | Alpha | <i>M</i> | <i>SD</i> | Min | Max |
|--|-------------------|-------|----------|-----------|------|-----|
| Supervisory competencies | 6 | .73 | 5.35 | .79 | 1.33 | 7 |
| Professional support from the research community | 5 | .88 | 5.18 | 1.15 | 1 | 7 |

Note: Scale 1–7

On average, supervisors reported that they received adequate professional support from their research community, including professional recognition, and experiencing a constructive atmosphere ($M = 5.18$), though there was variation between the supervisors. Professors/research directors reported higher levels of professional support within the research community than university researchers/university lecturers ($p < .01$). The supervisors whose supervisees were working in a research group reported higher levels of professional support than those whose supervisees were working independently ($p < .05$). The length of supervisory experience was positively related to the professional support experienced ($r = .129, p < .01$). However, the frequency of being engaged in co-supervision was not related to professional support. No gendered differences or differences between the doctoral schools or faculties in experiences of professional support were detected. No differences in professional support perceived as coming from the research community were detected either based on supervisees' thesis format or study status. Experiences of professional support from the research community by background variables are shown in Appendix 9. High levels of professional support were related to estimating one's supervisory competencies sufficient ($r = .340, p < .001$).

Table 11. Supervisors' engagement in professional development activities

| Professional development activities | <i>n</i> | % |
|--|-----------------|----------|
| Evaluate my supervisory practice with my candidates | 305 | 54 |
| Discuss my practice with my colleagues | 439 | 78 |
| Read the scholarly literature surrounding supervisory practice | 153 | 27 |
| Consult my university's policies on doctoral education | 338 | 60 |
| Participate in supervisory training/workshops/forums/seminars | 215 | 38 |

Most supervisors (73%) reported being engaged in at least two professional development activities to enhance their supervisory practices. The most typical development activity reported by the supervisors was discussing supervisory practices with colleagues, followed by consulting the university policies about doctoral education and evaluating the practices with the doctoral candidates (see Table 11). Some differences between the supervisors were detected in their activity in developing their supervisory practices: The proportion of supervisors who reported being engaged in three or more development activities was larger at HYMY than at DONASCI and YEB. Women were also more active in engaging in development activities than men ($\chi^2(5, N = 541) = 49.98, p < .001$). However, no differences in engaging in development activities were detected based on length of supervisory experience.

5 DOCTORAL STUDIES

5.1 Satisfaction with doctoral studies and dropping out

Overall, the doctoral candidates were somewhat satisfied ($M = 4.60$) with their doctoral studies. Most of the candidates (64%) did not intend to drop out. Finnish doctoral candidates were more satisfied with their doctoral studies than international doctoral candidates ($p < .05$). There were no gendered differences in satisfaction with doctoral studies. There were no statistically significant differences between the doctoral schools in either satisfaction with doctoral studies or consideration of dropping out of the doctoral studies.

Those doctoral candidates who had considered dropping out were significantly less satisfied with their studies than candidates who had not considered dropping out ($p < .001$). Candidates with dropout intentions also suffered more from exhaustion ($p < .001$), cynicism ($p < .001$) and stress ($p < .001$) than candidates without such intentions. Moreover, the candidates who had considered dropping out reported significantly lower levels of research engagement compared to the candidates without such intentions ($p < .001$).

5.2 Doctoral candidates' perceptions of coursework and practices of the Doctoral Schools

In addition to writing a doctoral thesis, a doctoral degree at the University of Helsinki includes courses, seminars, and a public thesis defence. The requirements for a doctoral degree include 40 credits of postgraduate courses. In terms of doctoral studies and assessment of a thesis, the University of Helsinki follows a set of policies and practices: doctoral courses must support the dissertation and provide the disciplinary and transferable knowledge and skills required for research work and other demanding expert assignments; admissions decisions are based on pre-determined and published criteria and systematic admissions of doctoral programs; in addition to the research plan, all doctoral students draw up a personal study plan; the progress is updated once a year with the supervisor online in the doctoral studies planning and reporting tool known as *Thessa* at the University of Helsinki, and in thesis committee meetings (the thesis committee consists of at least two experts; the committee members must hold a doctoral degree and have substantial knowledge in the field of the project); and the assessment criteria for each thesis grade must be clearly described.

Table 12. Satisfaction with the coursework and practices of doctoral schools

| | <i>n</i> | <i>m</i> | <i>sd</i> |
|--|----------|----------|-----------|
| Guidance and help related to doctoral studies is available, if needed. | 756 | 4.83 | 1.57 |
| The instructions and forms related to doctoral studies are easily available. | 759 | 3.91 | 1.66 |
| I know what to do (e.g., from whom to ask advice) if I face problems in my doctoral studies. | 755 | 4.24 | 1.82 |
| The instructions and forms related to doctoral studies are clear. | 758 | 3.88 | 1.68 |
| The courses provided by the doctoral program are in line with my needs. | 749 | 4.42 | 1.62 |
| The courses provided by the doctoral school are in line with my needs. | 751 | 4.47 | 1.58 |

Note: Scale 1–7.

Doctoral candidates typically reported that the courses provided were in line with their needs (see Table 12). However, there was considerable variation in candidates' perceptions about the usefulness of the courses. Doctoral candidates were quite satisfied with the availability of guidance and help. They also knew where to seek help when facing problems, although the variation in the answers was considerable. The candidates were slightly less satisfied with the availability and clarity of the instructions and forms related to the doctoral studies. There were some differences in doctoral candidates' satisfaction with the courses and practices between the doctoral schools (see Appendix 11).

Doctoral candidates' experiences in the more useful courses ranged from *discipline-specific courses* to *generic* ones (see Figure 3). They also described a range of forms of instruction. The *research communication courses* (43%), including courses on scientific writing and publishing, language, and oral presentation skills, were especially perceived as being useful. Students also emphasised the usefulness of the *discipline-specific courses* (24%), such as courses related to their field of study and thesis topic. This also included courses related to research ethics, which was frequently emphasised by the doctoral candidates. In addition, courses on *research methods* (17%) were considered to be valuable. Some candidates also described courses related to *professional and career development* (7%), such as courses on employability and entrepreneurship, time management and leadership, applying for *funding*, and *project management* training (6%), and *pedagogical courses* (4%), as being important and highly useful.

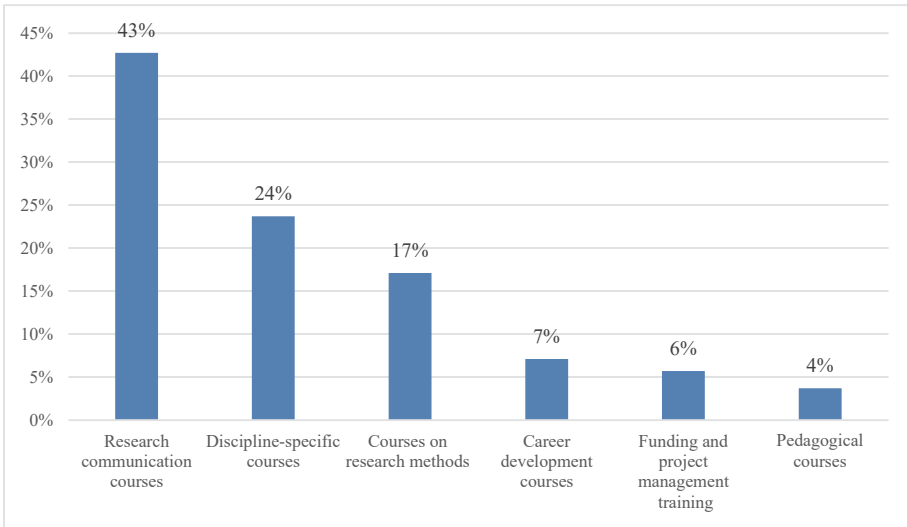


Figure 3. The more useful course/workshop according to doctoral candidates

5.3 Doctoral candidates’ experiences of the impact of COVID-19

In general, doctoral candidates’ experiences with the COVID-19 pandemic were that it had had a negative impact both on the progress of their doctoral studies and their study related well-being (see Table 13). However, the variation between the candidates’ estimations of the impact was significant. Some differences between the doctoral schools in COVID-19 pandemic impact were detected: the candidates in the DONASCI more often experienced that the COVID-19 pandemic had led to a decrease in their study-related well-being than candidates in the DSHealth ($p < .01$). Candidates’ experiences of COVID-19 by background variables are shown in Appendix 12.

Table 13. Doctoral candidates’ experiences of COVID-19

| | <i>n</i> | <i>m</i> | <i>sd</i> |
|--|----------|----------|-----------|
| The COVID-19 pandemic has hindered the progress of my doctoral studies | 756 | 4.12 | 2.14 |
| The COVID-19 pandemic has reduced my doctoral study-related well-being | 755 | 4.39 | 2.01 |
| The COVID-19 pandemic has reduced my doctoral study-related well-being | 751 | 3.01 | 1.84 |

Note: Scale 1-7.

No gender differences were detected in the experiences of COVID-19. There were also no differences in the impact experienced by the candidates between those who were completing their thesis in a form of a monograph and those who were working on a summary of articles. However, the experience of international candidates was more often that the COVID-19 pandemic had hindered the progress towards completing their doctorate than Finnish doctoral candidates ($p < .01$). In addition, the candidates who reported working at least partially in a research group more often reported that the COVID-19 pandemic had reduced their study-related well-being than those working mainly alone ($p < .05$).

The full-time candidates more often reported that the COVID-19 pandemic had both reduced their study-related well-being ($p < .001$) and hindered the progress in their doctoral studies ($p < .001$) than the part-time candidates. In turn, part-time candidates more often experienced that the COVID-19 pandemic had promoted the progress of their doctoral studies than full-time candidates ($p < .05$).

Experiences of negative impact of COVID-19 on study progress in the doctorate and well-being were related to increased levels of stress, study burnout and reduced levels of research engagement (See Table 14). The candidates' experiences of the negative impact of COVID-19 on their well-being and study progress was also related to diminished satisfaction with their work-life relations.

Table 14. Correlations between the perceived impact of COVID-19 pandemic and work-life balance and study well-being

| | 1. | 2. | 3. |
|---|--------|--------|-------|
| 1. The COVID-19 pandemic has hindered the progress of my doctoral studies | | | |
| 2. The COVID-19 pandemic has reduced my doctoral study-related well-being | .61** | | |
| 3. COVID 19 pandemic has promoted the progress of my doctoral studies | -.44** | -.26** | |
| 4. Work-life balance | -.20** | -.25** | -.07 |
| 5. Research engagement | -.09* | -.13** | .12* |
| 6. Stress | .21** | .30** | -.08* |
| 7. Exhaustion | .17** | .29** | -.03 |
| 8. Cynicism | .20** | .25** | -.07* |

** $p < .001$, * $p < .05$

When describing negative key experiences (see 3.2 Temporal locations of doctoral candidates' positive and negative key experiences), the candidates also described experiences related to the COVID-19 pandemic. The full-time doctoral

candidates more often reported negative experiences related to the COVID-19 pandemic (14%) than part-time candidates (4%).

5.4 Supervisors' experiences on COVID-19 impact

Most supervisors (66%) reported that their supervisory responsibilities had not changed due to the outbreak of COVID-19. However, 24% of the supervisors reported that the pandemic had increased their supervisory responsibilities, while 10% thought that their supervisory responsibilities were now less than in the past. In general, the supervisors said that the COVID-19 pandemic had had a negative impact on the doctoral candidates' progress and well-being, while they perceived that the pandemic had influenced supervision to a lesser extent (see Table 15). The variation between the supervisors' estimations of the impact of the pandemic occurred. The supervisors in various positions at the university also differed in their perceptions of the impact of the pandemic on the doctoral candidates and supervision. The tenure track professors perceived that the pandemic had negatively influenced their work as a supervisor more often than post-doctoral researchers/university instructors ($p < .05$). They also perceived more often that the pandemic had hindered the progress of their doctoral candidates than professors/research directors ($p < .05$), and post-doctoral researchers/university instructors ($p < .05$). Moreover, the tenure track professors thought that the pandemic had a negative impact on their candidates' well-being more often than professors/research directors ($p < .01$), university researchers/university lecturers ($p < .05$) and post-doctoral researchers/university instructors ($p < .001$). Also, some disciplinary differences in perceived COVID-19 impact were detected across the faculties. The supervisors in the Faculty of Educational Sciences perceived that the pandemic had influenced their work as a supervisor significantly less often than supervisors in the Faculties of Biological and Environmental Sciences ($p < .01$), Medicine ($p < .05$), Science ($p < .01$), and independent institutes ($p < .05$).

The supervisors, who typically supervised full-time candidates, estimated that the impact of the pandemic had influenced their supervisees' well-being negatively ($p < .001$) and progress ($p < .05$), and their own work as a supervisor ($p < .001$) more often than those who supervised part-time candidates. No gendered differences were detected in supervisors' perceptions of the impact of COVID-19, or differences based on the candidates' thesis format or research group status. Supervisors' estimations of the impact of the COVID-19 pandemic on supervision and supervisees by background variables are shown in Appendix 13.

Table 15. Doctoral supervisors' experiences of the impact of COVID-19

| | <i>n</i> | <i>m</i> | <i>sd</i> |
|--|----------|----------|-----------|
| The COVID-19 pandemic has negative impact on my work as supervisor. | 549 | 3.78 | 1.84 |
| The COVID-19 pandemic has hindered the progress of my doctoral candidates. | 551 | 4.60 | 1.82 |
| The COVID-19 pandemic has impacted negatively on the well-being of my doctoral candidates. | 547 | 4.87 | 1.57 |

Note: Scale 1-7

Supervisors believed that the COVID-19 outbreak had challenged some supervisory activities (see Table 16). Supervisors reported that recognising when doctoral candidates needed help and supporting the candidates in managing their well-being had become challenging due to the COVID-19 pandemic. In turn, supervising remotely, preparing online viva voces, and helping candidates to change their focus were perceived as being less challenging by the supervisors. Some disciplinary differences in supervisors' perceptions of how challenging it was to supervise online/remotely were detected. The supervisors in the Faculty of Educational Sciences perceived supervising online/remotely as being challenging less often than supervisors in the Faculties of Agriculture and Forestry ($p < .01$), Biological and Environmental sciences ($p < .01$), Medicine ($p < .01$), and Science ($p < .001$). In addition, the supervisors in the Faculty of Social Sciences reported challenges in supervising online less often than supervisors in the Faculties of Science ($p < .01$) and Medicine ($p < .05$). The supervisors' perceptions of challenges by faculties and other background variables are shown in Appendix 14.

The supervisors who supervised candidates working at least partly in research groups perceived online/remote supervision as being more challenging than those who supervised candidates working on their own ($p < .05$). They also reported challenges in recognising when supervisees needed help more often than those supervising candidates working on their own ($p < .05$). Significant differences were also detected in perceived challenges between supervisors who typically supervised full-time candidates and those supervising part-time candidates. The supervisors who supervised full-time candidates perceived challenges in online/remote supervision ($p < .001$), helping doctoral candidates to change the projects/focus ($p < .01$), recognising when candidates needed help ($p < .001$), and supporting them ($p < .001$) more often than those supervising part-time candidates. Post-doctoral researchers/university instructors perceived supervising online/remotely and supporting the doctoral candidates significantly less challenging than supervisors in other positions at the university ($p < .05$). Moreover, post-doctoral researchers/university instructors perceived fewer challenges in recognising when supervisees needed help compared to tenure track professors ($p < .01$) and university researchers/university lecturers ($p < .05$). No gendered differences

or differences based on supervisees' thesis format were detected in perceived challenges induced by the pandemic.

Table 16. Supervisors' perceptions of the challenges of supervision caused by the COVID-19

| | <i>n</i> | <i>m</i> | <i>sd</i> |
|--|----------|----------|-----------|
| Supervising online/remotely | 550 | 3.52 | 1.78 |
| Preparing and conducting online viva voces | 480 | 3.56 | 1.55 |
| Helping doctoral candidates change projects/focus | 542 | 3.56 | 1.68 |
| Recognising when someone I supervise needs help | 549 | 4.67 | 1.63 |
| Supporting my doctoral candidates, including managing their well-being | 547 | 4.64 | 1.59 |
| Helping doctoral candidate(s) with data collection/analysis | 537 | 3.55 | 1.67 |

Note: Scale 1-7

5.5 Doctoral candidates' career plans

Nearly half of the doctoral candidates were interested in academic careers (45%), whereas 35% would prefer a career outside academia. One-fifth of the candidates considered both academic and non-academic career options or perceived themselves as having hybrid career. Doctoral candidates typically perceived themselves having careers either in public or para-public organisations.

Full-time candidates were more typically interested in an academic career (53%) than part-time candidates (28%) ($\chi^2(3, N = 249) = 60.62, p < .001$). The candidates from the various doctoral schools also differed from each other in their career plans ($\chi^2(9, N = 553) = 89.95, p < .001$). The proportion of candidates who were interested in pursuing an academic career was larger in the HYMY doctoral school than in DSHealth or YEB. Also, the candidates at DONASCI were interested in pursuing an academic career more often than candidates at YEB. Furthermore, the international doctoral candidates were more often interested in an academic career than their Finnish peers ($\chi^2(3, N = 561) = 17.57, p < .01$). No gender differences in career plans were detected.

6 DOCTORAL CANDIDATES AND SUPERVISORS' WELL-BEING

6.1 Doctoral candidates' experiences of stress, doctoral study burnout and research engagement

On average, the doctoral candidates were at moderate risk of developing study burnout (see Table 17). They experienced moderate levels of *exhaustion* ($M = 3.68$) and *cynicism* ($M = 3.60$), though variation between the candidates occurred (see Table 19). They also reported experiencing elevated levels of *stress* ($M = 4.61$). At the same time, the doctoral candidates reported experiencing high levels of *engagement* with their doctoral research ($M = 4.84$), including experiences of vigour, dedication, and absorption in their research.

There were no statistically significant differences in experiences of exhaustion, cynicism or levels of stress between the doctoral candidates from different doctoral Schools. However, the candidates in the HYMY Doctoral School experienced significantly higher levels of research engagement than candidates in the YEB Doctoral School ($p < .01$).

Table 17. Doctoral candidates' experiences of research engagement and study burnout

| | <i>N</i> of items | Alpha | <i>M</i> | <i>SD</i> | Min | Max |
|---------------------|-------------------|-------|----------|-----------|-----|-----|
| Research engagement | 9 | 0.95 | 4.84 | 1.35 | 1 | 7 |
| Exhaustion | 5 | 0.84 | 3.68 | 1.48 | 1 | 7 |
| Cynicism | 6 | 0.87 | 3.60 | 1.48 | 1 | 7 |
| Stress | 1 | | 4.61 | 1.75 | 1 | 7 |

Note: Scale 1-7

The candidates who were writing their dissertation in the form of a summary of articles reported significantly higher levels of stress ($p < .05$) and lower levels of research engagement ($p < .01$) than those who were working on a monograph. There were no differences in the levels of exhaustion and cynicism based on the thesis format. No gendered differences in the levels of stress, exhaustion, cynicism, or research engagement were detected either. In addition, no differences in the reported levels of exhaustion, cynicism, or research engagement were detected between the candidates who had participated in cross-disciplinary collaboration and those who had not.

Full-time candidates reported higher levels of stress ($p < .01$) and exhaustion ($p < .001$) than part-time candidates did. Also, an association between the funding and experiences of exhaustion and stress were detected: Those who reported employment at the university as a principal source of funding reported higher levels

of stress ($p < .01$) and exhaustion ($p < .01$) than those who reported not having funding for their doctoral studies. International doctoral candidates reported significantly higher levels of research engagement ($p < .05$), stress ($p < .05$), and exhaustion ($p < .05$) than Finnish candidates.

The phase of the doctoral studies was related to experiences of stress, exhaustion, cynicism, and research engagement. The candidates who were at the beginning of their doctoral studies experienced higher levels of research engagement and lower levels of stress, exhaustion, and cynicism than the candidates who were in the middle (Research engagement: $p < .05$; Stress: $p < .05$; Exhaustion: $p < .01$; Cynicism: $p < .001$) or in the final third of their doctoral studies (Research engagement: $p < .001$; Stress: $p < .05$; Exhaustion: $p < .001$; Cynicism: $p < .001$). In addition, the candidates who were in the middle of their studies reported lower levels of exhaustion ($p < .05$) and cynicism ($p < .05$) than the candidates who were in the final third. The candidates whose doctoral studies were prolonged reported significantly higher levels of exhaustion ($p < .01$) and cynicism ($p < .01$) than the candidates whose studies were not.

On average, the doctoral candidates were typically quite satisfied with their work-life relations ($M = 4.51, SD = 1.17$). For example, they reported that the work as a researcher was in line with their personal values and that they were able to combine their career with other life goals. The candidates who were satisfied with their work-life relations also reported higher levels of research engagement and lower levels of stress, exhaustion and cynicism. The doctoral candidates who were working part-time on their doctoral studies were significantly more satisfied with the work-life relations than full-time candidates ($p < .001$). Also, the Finnish candidates reported being more satisfied with the work-life relations than international candidates ($p < .001$). The candidates who were writing up their thesis in the form of a summary of published articles were more satisfied with work-life relations than those working on a monograph ($p < .05$). There were no significant differences in the candidates' satisfaction with work-life relations between the doctoral schools or between women and men. Doctoral candidates' research engagement, stress, burnout, and work-life balance by background variables are shown in Appendix 15.

6.2 Supervisors' experiences of stress, burnout and work engagement

On average, the supervisors were subject to a moderate risk of developing burnout symptoms. They experienced moderate levels of *stress* ($M = 3.97$), *exhaustion* ($M = 3.36$), and *inadequacy* ($M = 3.25$) and low levels of *cynicism* ($M = 2.52$), though variation between the supervisors occurred (see Table 18). At the same time, the

supervisors reported experiencing high levels of *work engagement* ($M = 5.63$), including experiences of vigour, dedication, and absorption in their work.

Some disciplinary differences in experiences of stress and exhaustion between the supervisors were detected. The supervisors from the Faculty of Biological and Environmental Sciences reported higher levels of stress than supervisors from the Faculty of Educational Sciences ($p < .05$) and higher levels of exhaustion than supervisors from the Faculties of Agriculture and Forestry ($p < .05$), Education Sciences ($p < .05$), and Medicine ($p < .01$). No differences were detected in work engagement, stress, and burnout between supervisors at different doctoral schools. Doctoral supervisors' work engagement, stress, and burnout by faculty and doctoral school and other background variables are shown in Appendix 16.

Table 18. Doctoral supervisor' experienced work engagement, burnout and stress

| Factor | N of items | Alpha | M | SD | Min | Max |
|-----------------|-------------------|--------------|----------|-----------|------------|------------|
| Work engagement | 9 | .91 | 5.63 | .87 | 2 | 7 |
| Exhaustion | 5 | .79 | 3.36 | 1.33 | 1 | 7 |
| Cynicism | 3 | .80 | 2.52 | 1.32 | 1 | 7 |
| Inadequacy | 3 | .71 | 3.25 | 1.40 | 1 | 7 |
| Stress | 1 | - | 3.97 | 1.77 | 1 | 7 |

Note: Scale 1-7

Further investigation showed that women reported experiencing higher levels of exhaustion ($p < .05$), and inadequacy ($p < .01$) than men. The supervisors who perceived the number of supervisees as being too high reported higher levels of stress ($p < .05$) and exhaustion ($p < .05$) than those who perceived the number of supervisees as being suitable. In addition, the supervisors who perceived the number of supervisees as too small reported higher levels of cynicism than those who reported suitable number of supervisees ($p < .01$). The supervisors who perceived the number of supervisees as suitable also reported lower levels of inadequacy than those who perceived the number of supervisees as too high ($p < .01$) or too low ($p < .01$).

There were also significant differences in work engagement, stress, exhaustion, cynicism, and sense of inadequacy between the supervisors in different positions. Tenure track professors reported experiencing higher levels of exhaustion than professors/research directors ($p < .01$). Professors/research directors reported lower levels of inadequacy and higher levels of work engagement than university researchers/lecturers (Inadequacy: $p < .01$; work engagement: $p < .001$) and postdocs/university instructors (Inadequacy: $p < .01$; work engagement: $p < .05$). Professors/research directors also reported lower levels of cynicism than university researchers/lecturers ($p < .01$), and lower levels of stress than tenure track professors ($p < .01$) and university researchers/lecturers ($p < .05$). The

supervisors supervising primarily full-time candidates reported significantly higher levels of stress than those supervising part-time candidates ($p < .05$). The supervisors whose supervisees were engaged in a research group reported higher levels of work engagement ($p < .01$), and lower levels of cynicism ($p < .05$) than those whose supervisees were working mainly independently. No differences were detected between the supervisors supervising candidates writing a monograph versus a article-based dissertation.

Supervisors' perceptions of the quality of interaction with supervisees were positively related to work their engagement, and negatively to exhaustion, cynicism, and inadequacy (See Appendix 17). The good supervisory competencies experienced were also related to increased levels of work engagement and lower risk of suffering from stress, exhaustion, cynicism, and inadequacy. Receiving support from colleagues, including enjoying professional recognition and constructive climate, was related to a lower risk of experiencing stress, exhaustion, cynicism, inadequacy, and elevated levels of work engagement.

7 SUMMARY OF THE RESULTS

The results presented in this report provide information on doctoral and supervisory experiences at the University of Helsinki. Our aim with this report was to contribute to the research-informed development of doctoral education at the University of Helsinki by examining the primary regulators of the doctoral journey, and the learning and working environment provided by the University from doctoral candidates' and supervisors' perspectives. The main findings can be summarised as follows:

Doctoral supervision: The quality and the quantity of supervision contributed to both candidates' progress through their doctoral studies and doctoral their study well-being. The frequent supervision was related to several positive attributes, including a shorter time spent completing the degree, satisfaction with supervision, satisfaction with the doctoral studies, not intending to drop out, and lower risk prolonging the doctoral studies. Most doctoral candidates reported receiving supervision at least once a month. Those writing an article-based dissertation, international candidates and those engaged in research teams reported receiving supervision more frequently than their peers. In general, doctoral candidates reported receiving enough supervisory support. The high-quality supervisory support was related to experiencing engagement in doctoral research, satisfaction with their doctoral studies, reduced risk of burnout and lower risk of dropping out from the studies. Both the doctoral candidates and the supervisors emphasised informational and emotional support as being an especially central characteristic of high-quality supervision. Most supervisors considered the number of doctoral candidates under their supervision suitable. Considering the number of supervisees suitable was related to reduced risk of suffering from stress, exhaustion, cynicism and inadequacy among the supervisors. Experiencing one's supervisory competencies as being good and positive relationships with the supervisees were related to increased levels of work engagement and a lower risk of suffering from stress and developing burnout symptoms. The supervisors typically thought that their supervisory competencies were high and that the supervisory relationship was good.

Research community support: Having sufficient research community support had several benefits for the doctoral candidates, including experiencing higher levels of engagement in doctoral research, satisfaction with the doctoral studies, lower levels of burnout, reduced risk of dropping out from the and lower odds of prolonged time undertaking the studies. In general, the candidates reported

receiving sufficient research community support. Being involved in a research team was also of benefit to candidates. Those engaged in a research team received supervision more frequently, experienced higher levels of research community support, and were more satisfied with the supervision than their counterparts working independently on their dissertation. One-third of the doctoral candidates reported working at least partly in a research team. Professional support was also important for the supervisors. Receiving adequate professional support from the research community was related to lower risk of experiencing stress, exhaustion, cynicism and inadequacy and elevated levels of work engagement among the supervisors.

Well-being: On average, both the doctoral candidates and supervisors were at moderate risk of developing burnout symptoms. At the same time, the candidates reported experiencing high levels of engagement with their doctoral research or work, including experiences of vigour, dedication, and absorption in their research. Increased levels of engagement and reduced levels of stress, exhaustion and cynicism were related to reduced risk of dropping out and completing the degree in a timelier fashion. Full-time candidates reported higher levels of stress and exhaustion than part-time candidates. They were also less satisfied with their work-life relationship than part-time candidates. No gendered differences in the levels of stress, exhaustion, cynicism, or research engagement experienced were detected among the doctoral candidates, and no differences were detected between the doctoral schools in doctoral candidates' experiences of stress, exhaustion or cynicism.

COVID-19 impact: In general, both the doctoral candidates and their supervisors thought that the COVID-19 pandemic had hindered their study progress and reduced the candidates' study well-being. According to the candidates' experiences, the negative impact boiled down to the reduced access to data or participants, erosion of scholarly support networks, reduced access to institutional resources, poor work-life balance, and mental health problems. Findings further implied that the international candidates, those conducting their doctoral studying full-time, engaging in research teams, candidates from the natural sciences and those at the mid-phase of their studies were at increased risk of suffering from negative COVID-19 pandemic influences. In general, it seemed that the supervisory experience was influenced to a lesser extent by the pandemic. Yet supervisors also reported challenges caused by the pandemic. They reported that particularly recognising when doctoral candidates needed help and supporting the candidates, in managing their well-being, had become more challenging due to the COVID-19 pandemic.

In general, the results suggested that doctoral education at the university has considerable strengths, while there is also room for improvement. It seems that investing in cultivating supervisory practices and doctoral candidate's research community integration and support potentially would have several benefits both for doctoral candidate's study progress and well-being. At the same time, it appeared that not all the candidates had equal access to supervisory and research community resources. Moreover, the pandemic has had a negative influence on study progress and well-being, potentially further increasing inequalities among the doctoral candidates. This implies that actions in sustaining and re-building supervisory and research community support are needed at the several levels of our doctoral education system to buffer long term negative influences of pandemic and bridging the equality gaps. Research community support and quality and quantity of supervisory interactions appears to play a role also in supervisory development and their work well-being. This implies that access to sufficient resources and support for supervision would not only enhance the positive doctoral experience and degree completion, but also the supervisors' work well-being. Results of this report give rise to five general recommendations:

1. Investing in cultivating supervisory practices and research community integration
2. Detecting equality gaps in doctoral education and bridging them.
3. Investing in promoting doctoral candidates' well-being by cultivating the doctoral education practices
4. Providing resources and opportunities for professional development for supervisors.
5. Committing to research-informed development, tracking and decision making in doctoral education.

Developing doctoral education should be a joint effort among the members of the research community. For this reason, we decided not to provide a set of detailed recommendations based on the results, instead the results and their implications for developing doctoral education at the University of Helsinki will be discussed at a series of workshops to be held in spring 2022 with the core doctoral education stakeholders, including doctoral schools, programs, supervisors and doctoral candidates. We hope that this will launch shared sense-making benefiting the scholarly communities in making research-informed decisions regarding their doctoral education practices and policies. We also hope that the results will profit the on-going curriculum development work in the doctoral programs at the University of Helsinki. The data collected for the report will be further utilised in research on doctoral education to benefit research, development and doctoral education policies locally and globally.

APPENDICES

Appendix 1

Number of supervisees, experience in supervising multidisciplinary research, supervisory change, use of supervisory agreement and supervisees' thesis format, research group status and source of funding.

| | <i>n</i> | % |
|--|----------|----|
| In my opinion, the number of doctoral candidates under my supervision is | | |
| Suitable | 434 | 79 |
| Too high | 49 | 9 |
| Too small | 65 | 12 |
| Experience of supervising multidisciplinary doctoral thesis | | |
| Yes | 345 | 63 |
| No | 204 | 37 |
| Have you ever taken on a doctoral candidate who was previously working with another supervisor? | | |
| Yes | 293 | 52 |
| No | 238 | 43 |
| Unsure | 27 | 5 |
| Do you utilise supervisory agreement ('memorandum of understanding') with your doctoral candidates? | | |
| Yes | 241 | 44 |
| No | 307 | 56 |
| The doctoral candidates under my supervision typically work on a | | |
| Monograph | 98 | 18 |
| Summary of articles | 456 | 82 |
| The doctoral candidates under my supervision typically work on their dissertations | | |
| On their own | 126 | 23 |
| In a research group | 167 | 30 |
| Both on their own and in a group | 262 | 47 |
| The typical source of funding of the doctoral candidates under my supervision | | |
| Employment at the university | 194 | 36 |
| A personal grant | 238 | 44 |
| No funding | 46 | 8 |
| Some other form of funding | 67 | 12 |

Appendix 2

Doctoral candidates' satisfaction with studies and supervision, and estimated graduation time by background variables

| | Satisfaction with doctoral studies <i>m (sd)</i> | Satisfaction with supervision <i>m (sd)</i> | Estimated graduation time <i>m (sd)</i> |
|--|--|---|---|
| Gender | | | |
| Female | 4.69 (1.28) | 5.36 (1.61) | 5.82 (3.93) |
| Male | 4.61 (1.47) | 5.33 (1.71) | 5.65 (4.18) |
| Nationality | | | |
| Finnish | 4.71 (1.37) | 5.29 (1.66) | 6.06 (4.24) |
| International | 4.40 (1.27) | 5.58 (1.60) | 4.66 (2.55) |
| Thesis format | | | |
| Monograph | 4.58 (1.46) | 5.31 (1.68) | 7.27 (4.95) |
| Summary of articles | 4.67 (1.32) | 5.35 (1.65) | 5.37 (3.61) |
| Study status | | | |
| Full-time | 4.68 (1.33) | 5.40 (1.61) | 5.19 (3.52) |
| Part-time | 4.58 (1.39) | 5.25 (1.72) | 6.77 (4.54) |
| Research group status | | | |
| Mainly alone | 4.55 (1.41) | 5.18 (1.72) | 6.20 (4.27) |
| In a group | 4.87 (1.20) | 5.71 (1.45) | 4.65 (1.84) |
| Funding | | | |
| Employment at the university | 4.79 (1.25) | 5.35 (1.62) | 4.57 (1.61) |
| A personal grant | 4.62 (1.28) | 5.39 (1.52) | 5.44 (2.66) |
| No funding | 4.36 (1.56) | 5.09 (1.90) | 7.75 (5.80) |
| Some other form of funding | 4.84 (1.33) | 5.68 (1.48) | 6.55 (5.68) |
| Doctoral school | | | |
| YEB | 4.36 (1.41) | 5.08 (1.70) | 5.85 (4.85) |
| DSHealth | 4.66 (1.31) | 5.31 (1.66) | 5.17 (4.16) |
| HYMY | 4.66 (1.37) | 5.33 (1.67) | 6.45 (3.83) |
| DONASCI | 4.83 (1.29) | 5.66 (1.47) | 4.38 (2.51) |
| Experience about cross-disciplinary collaboration | | | |
| Yes | 4.57 (1.39) | 5.24 (1.63) | 6.18 (4.46) |
| No | 4.70 (1.34) | 5.40 (1.67) | 5.54 (3.68) |
| Frequency of supervision | | | |
| At least once a month | 4.89 (1.24) | 5.80 (1.40) | 4.92 (2.65) |
| Less frequently than once a month | 4.23 (1.46) | 4.59 (1.79) | 7.22 (5.22) |
| Attrition intentions | | | |
| Yes | 3.91 (1.42) | 4.56 (1.90) | 5.97 (3.34) |
| No | 5.03 (1.16) | 5.74 (1.36) | 5.69 (4.28) |

Appendix 3

Correlations between doctoral candidates' interest, study well-being, and satisfaction

| | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. |
|----------------------------------|--------|-------|--------|--------|--------|--------|--------|-------|----|
| 1. Research interest | - | | | | | | | | |
| 2. Instrumental interest | .23** | - | | | | | | | |
| 3. Development interest | .58** | .31** | - | | | | | | |
| 4. Research engagement | .65** | .09* | .36** | - | | | | | |
| 5. Stress | -.17** | .07* | -.05 | -.31** | - | | | | |
| 6. Exhaustion | -.24** | .07 | -.08* | -.39** | .71** | - | | | |
| 7. Cynicism | -.51** | -.12* | -.25** | -.69** | .51** | .67** | - | | |
| 8. Satisfaction with studies | .36** | .14** | .17** | .45** | -.29** | -.36** | -.49** | - | |
| 9. Satisfaction with supervision | .29** | .14** | .17** | .36** | -.24** | -.29** | -.42** | .60** | - |

** $p < .001$,

* $p < .05$

Appendix 4

Interest, supervisory support and research community support by background variables

| | Research interest | Development interest | Instrumental interest | Supervisory support | Research community support |
|------------------------------|--------------------------|-----------------------------|------------------------------|----------------------------|-----------------------------------|
| | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> |
| Gender | | | | | |
| Female | 5.77 (.86) | 6.35 (.70) | 4.65 (1.48) | 5.44 (1.29) | 4.68 (1.31) |
| Male | 5.63 (.98) | 6.15 (.74) | 4.67 (1.51) | 5.37 (1.33) | 4.77 (1.21) |
| Nationality | | | | | |
| Finnish | 5.67 (.88) | 6.25 (.71) | 4.45 (1.48) | 5.35 (1.31) | 4.61 (1.25) |
| International | 5.89 (1.02) | 6.39 (.74) | 5.39 (1.28) | 5.65 (1.30) | 5.02 (1.35) |
| Thesis format | | | | | |
| Monograph | 5.79 (.95) | 6.28 (.81) | 4.29 (1.66) | 5.38 (1.34) | 4.28 (1.22) |
| Summary of articles | 5.71 (.89) | 6.28 (.70) | 4.74 (1.41) | 5.42 (1.30) | 4.80 (1.27) |
| Study status | | | | | |
| Full-time | 5.73 (.98) | 6.32 (.72) | 4.74 (1.48) | 5.44 (1.29) | 4.75 (1.29) |
| Part-time | 5.68 (.82) | 6.20 (.74) | 4.50 (1.48) | 5.36 (1.36) | 4.58 (1.27) |
| Research group status | | | | | |
| Mainly alone | 5.69 (.92) | 6.25 (.73) | 4.53 (1.52) | 5.30 (1.38) | 4.46 (1.28) |
| In a group | 5.77 (.88) | 6.31 (.74) | 4.91 (1.32) | 5.65 (1.14) | 5.24 (1.13) |
| Funding | | | | | |
| Employment at the university | 5.69 (.94) | 6.26 (.72) | 4.74 (1.38) | 5.41 (1.23) | 4.85 (1.20) |
| A personal grant | 5.72 (.93) | 6.33 (.61) | 4.73 (1.51) | 5.51 (1.23) | 4.70 (1.22) |
| No funding | 5.73 (.89) | 6.23 (.82) | 4.29 (1.61) | 5.15 (1.55) | 4.19 (1.36) |
| Some other form of funding | 5.76 (.87) | 6.32 (.73) | 4.80 (1.47) | 5.67 (1.19) | 5.09 (1.23) |
| Doctoral school | | | | | |
| YEB | 5.42 (.94) | 6.18 (.87) | 4.61 (1.35) | 5.14 (1.46) | 4.63 (1.27) |
| DSHealth | 5.75 (.89) | 6.34 (.62) | 5.04 (1.34) | 5.42 (1.25) | 5.02 (1.23) |
| HYMY | 5.79 (.90) | 6.29 (.74) | 4.36 (1.55) | 5.40 (1.34) | 4.43 (1.25) |
| DONASCI | 5.62 (.92) | 6.19 (.71) | 4.88 (1.44) | 5.65 (1.15) | 5.05 (1.24) |

| | Research interest | Development interest | Instrumental interest | Supervisory support | Research community support |
|--|--------------------------|-----------------------------|------------------------------|----------------------------|-----------------------------------|
| | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> |
| Experience about cross-disciplinary collaboration | | | | | |
| Yes | 5.82 (.89) | 6.28 (.77) | 4.62 (1.51) | 5.34 (1.33) | 4.70 (1.30) |
| No | 5.65 (.92) | 6.27 (.69) | 4.66 (1.47) | 5.45 (1.31) | 4.69 (1.28) |
| Phase of doctoral studies | | | | | |
| In the first third | 5.94 (.79) | 6.33 (.78) | 4.82 (1.44) | 5.88 (1.03) | 5.20 (1.13) |
| In the middle third | 5.77 (.93) | 6.29 (.69) | 4.72 (1.42) | 5.62 (1.17) | 4.85 (1.15) |
| In the final third | 5.66 (.91) | 6.28 (.69) | 4.57 (1.54) | 5.27 (1.35) | 4.53 (1.33) |
| Prolonged studies | | | | | |
| Yes | 5.77 (.75) | 6.37 (.65) | 4.58 (1.51) | 4.86 (1.53) | 4.11 (1.44) |
| No | 5.71 (.93) | 6.26 (.72) | 4.64 (1.49) | 5.54 (1.23) | 4.82 (1.22) |
| At least once a month | 5.73 (.93) | 6.30 (.71) | 4.87 (1.39) | 5.72 (1.14) | 5.05 (1.16) |
| Less frequently than once a month | 5.64 (.92) | 6.21 (.77) | 4.26 (1.53) | 4.90 (1.45) | 4.06 (1.27) |
| Attrition intentions | | | | | |
| Yes | 5.38 (1.03) | 6.19 (.72) | 4.45 (1.44) | 4.82 (1.50) | 4.11 (1.31) |
| No | 5.90 (.79) | 6.32 (.72) | 4.75 (1.50) | 5.70 (1.11) | 4.98 (1.17) |

Appendix 5

The positive key experiences and doctoral study related well-being

| | Research Engagement | Stress | Exhaustion | Cynicism | Satisfaction with studies | Satisfaction with supervision |
|---------------------------------------|----------------------------|---------------|-------------------|-----------------|----------------------------------|--------------------------------------|
| | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> |
| Positive experience related to | | | | | | |
| Structures and resources | 4.97 (1.33) | 4.62 (1.72) | 3.61 (1.41) | 3.62 (1.47) | 4.61 (1.20) | 5.39 (1.60) |
| Research communication | 4.80 (1.30) | 4.66 (1.77) | 3.80 (1.54) | 3.55 (1.32) | 4.89 (1.21) | 5.40 (1.60) |
| Research community interaction | 4.53 (1.45) | 4.72 (1.69) | 3.94 (1.50) | 3.93 (1.54) | 4.39 (1.48) | 5.09 (1.82) |
| Doctoral research | 5.15 (1.24) | 4.50 (1.78) | 3.59 (1.44) | 3.46 (1.45) | 4.69 (1.44) | 5.48 (1.51) |
| Supervision | 5.24 (1.18) | 4.37 (1.65) | 3.46 (1.44) | 3.10 (1.45) | 5.02 (1.33) | 5.82 (1.56) |
| Professional and career development | 4.62 (1.30) | 4.63 (1.84) | 3.58 (1.54) | 3.71 (1.56) | 4.71 (1.41) | 5.11 (1.73) |
| Personal | 4.02 (1.99) | 4.42 (2.02) | 3.53 (1.58) | 4.04 (1.79) | 3.75 (1.96) | 4.08 (2.23) |
| COVID-19 pandemic | 4.83 (1.18) | 3.00 (1.41) | 3.00 (1.70) | 3.17 (2.36) | 4.69 (1.44) | 6.00 (1.41) |

The negative key experiences and doctoral study related well-being

| | Research Engagement | Stress | Exhaustion | Cynicism | Satisfaction with studies | Satisfaction with supervision |
|---|--------------------------------|---------------|-------------------|-----------------|--------------------------------------|--|
| | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> |
| Negative experience related to | | | | | | |
| Structures and resources | 5.14 (1.32) | 4.11 (1.78) | 3.43 (1.52) | 3.30 (1.50) | 4.74 (1.36) | 5.74 (1.52) |
| Research communication | 4.99 (1.00) | 4.71 (1.65) | 3.65 (1.43) | 3.68 (1.28) | 4.87 (1.15) | 5.71 (1.30) |
| Research community interaction | 4.58 (1.51) | 4.93 (1.62) | 3.94 (1.32) | 3.82 (1.49) | 4.40 (1.60) | 4.96 (1.72) |
| Doctoral research | 4.83 (1.22) | 4.46 (1.72) | 3.61 (1.46) | 3.50 (1.36) | 4.81 (1.12) | 5.43 (1.43) |
| Supervision | 4.48 (1.36) | 5.20 (1.62) | 4.39 (1.44) | 4.30 (1.37) | 3.86 (1.44) | 3.75 (1.92) |
| Professional and career development | 5.09 (1.04) | 5.06 (1.57) | 3.54 (1.39) | 3.39 (1.21) | 4.90 (1.40) | 5.55 (1.52) |
| Personal | 4.52 (1.53) | 4.72 (1.81) | 3.91 (1.51) | 3.92 (1.54) | 4.58 (1.45) | 5.45 (1.35) |
| COVID-19 pandemic | 4.84 (1.48) | 4.97 (1.80) | 3.91 (1.37) | 3.57 (1.45) | 5.00 (1.17) | 5.93 (1.17) |

Appendix 6

Factors influencing the decision of committing in supervising a new candidate by background variables

| | Master's thesis grade | Quality of research proposal | References/ testimonials | Availability of financial support | Alignment with your own research interests | Prior research experience, outputs, and publications of the candidate | Candidate's motivation for wanting to do the doctorate |
|--|------------------------------|-------------------------------------|---------------------------------|--|---|--|---|
| | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> |
| Faculty | | | | | | | |
| Faculty of Agriculture and Forestry | 5.43 (1.14) | 5.87 (1.15) | 4.87 (1.54) | 6.08 (1.13) | 6.27 (1.07) | 4.47 (1.47) | 6.52 (.80) |
| Faculty of Arts | 4.75 (1.61) | 6.49 (.73) | 4.26 (1.37) | 3.97 (1.38) | 5.83 (1.21) | 4.11 (1.48) | 6.54 (.73) |
| Faculty of Educational Sciences | 4.21 (1.35) | 6.38 (.68) | 3.61 (1.62) | 4.00 (1.36) | 6.28 (.75) | 4.03 (1.52) | 6.52 (.69) |
| Faculty of Biological and Environmental Sciences | 4.16 (1.45) | 5.63 (1.02) | 5.23 (1.33) | 5.84 (1.43) | 6.23 (.97) | 4.85 (1.34) | 6.78 (.47) |
| Faculty of Law | 5.63 (.74) | 6.25 (.71) | 3.50 (1.77) | 3.13 (1.36) | 4.75 (1.49) | 4.50 (1.93) | 6.75 (.46) |
| Faculty of Pharmacy | 4.67 (1.29) | 5.13 (1.51) | 4.60 (1.30) | 6.27 (1.62) | 6.07 (1.03) | 4.20 (1.52) | 6.47 (.74) |
| Faculty of Medicine | 3.51 (1.68) | 5.13 (1.63) | 4.94 (1.63) | 5.28 (1.74) | 6.49 (.92) | 4.80 (1.56) | 6.75 (.58) |
| Faculty of Science | 4.72 (1.27) | 4.65 (1.71) | 5.20 (1.26) | 5.92 (1.37) | 6.25 (.90) | 4.35 (1.66) | 6.46 (.77) |
| Faculty of Social Sciences | 4.82 (1.12) | 6.47 (.79) | 4.00 (1.67) | 4.25 (1.59) | 5.95 (.87) | 4.44 (1.30) | 6.39 (.86) |
| Faculty of Theology | 5.00 (1.41) | 6.80 (.42) | 3.00 (1.49) | 3.50 (1.65) | 4.90 (1.52) | 3.60 (1.71) | 6.40 (.70) |
| Faculty of Veterinary Medicine | 3.33 (1.99) | 5.33 (1.50) | 4.47 (1.69) | 6.20 (1.08) | 6.60 (.63) | 3.40 (1.84) | 6.80 (.41) |
| Independent institute | 3.83 (1.76) | 5.67 (1.34) | 5.00 (1.69) | 5.40 (1.73) | 6.33 (.87) | 5.00 (1.44) | 6.44 (.77) |
| Position at the university | | | | | | | |
| Professor/ Research director | 4.65 (1.53) | 5.73 (1.47) | 4.42 (1.63) | 5.05 (1.76) | 6.00 (1.20) | 4.80 (1.43) | 6.62 (.62) |
| Tenure track professor | 4.80 (1.47) | 5.51 (1.63) | 5.31 (1.33) | 5.48 (1.68) | 6.29 (.70) | 4.65 (1.51) | 6.67 (.52) |
| University researcher/ university lecturer | 4.45 (1.44) | 5.80 (1.20) | 4.85 (1.50) | 5.36 (1.64) | 6.22 (.93) | 4.28 (1.58) | 6.49 (.82) |
| Postdoctoral researcher/ University instructor | 3.95 (1.68) | 5.59 (1.72) | 4.64 (1.48) | 4.67 (1.81) | 6.18 (.97) | 3.86 (1.75) | 6.48 (.90) |

| | Master's thesis grade | Quality of research proposal | References/testimonials | Availability of financial support | Alignment with your own research interests | Prior research experience, outputs, and publications of the candidate | Candidate's motivation for wanting to do the doctorate |
|--|------------------------------|-------------------------------------|--------------------------------|--|---|--|---|
| | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> |
| Gender | | | | | | | |
| Women | 4.45 (1.60) | 5.73 (1.42) | 4.70 (1.64) | 5.27 (1.70) | 6.31 (.95) | 4.40 (1.58) | 6.65 (.66) |
| Men | 4.43 (1.54) | 5.59 (1.46) | 4.59 (1.51) | 5.00 (1.77) | 6.02 (1.10) | 4.53 (1.51) | 6.49 (.74) |
| Co-supervision | | | | | | | |
| Never/rarely | 4.38 (1.56) | 5.61 (1.55) | 4.61 (1.68) | 5.09 (1.78) | 6.16 (1.15) | 4.36 (1.58) | 4.36 (.72) |
| Occasionally | 4.46 (1.58) | 5.74 (1.25) | 4.68 (1.56) | 5.07 (1.68) | 6.01 (1.09) | 4.39 (1.52) | 4.39 (.73) |
| Frequently/Always | 4.47 (1.56) | 5.64 (1.47) | 5.64 (1.47) | | | | |
| Candidate's research group status | | | | | | | |
| On their own | 4.76 (1.54) | 6.28 (.98) | 4.12 (1.54) | 4.06 (1.67) | 5.79 (1.22) | 4.18 (1.34) | 6.41 (.75) |
| In a research group | 4.34 (1.56) | 5.47 (1.50) | 4.78 (1.57) | 5.47 (1.61) | 6.28 (.94) | 4.55 (1.58) | 6.61 (.70) |
| Candidate's thesis format | | | | | | | |
| Monograph | 5.02 (1.40) | 6.50 (.69) | 3.96 (1.44) | 3.95 (1.42) | 5.66 (1.17) | 4.23 (1.45) | 6.45 (.76) |
| Summary of articles | 4.32 (1.56) | 5.48 (1.49) | 4.79 (1.58) | 5.41 (1.67) | 6.29 (.96) | 4.52 (1.54) | 6.60 (.69) |
| Candidate's typical study status | | | | | | | |
| Full-time | 4.60 (1.38) | 5.54 (1.47) | 4.83 (1.50) | 5.50 (1.67) | 6.22 (.96) | 4.57 (1.56) | 6.56 (.73) |
| Part-time | 4.10 (1.82) | 5.92 (1.32) | 4.26 (1.68) | 4.45 (1.59) | 6.08 (1.16) | 4.24 (1.44) | 6.61 (.63) |
| Candidate's Doctoral school | | | | | | | |
| YEB | 4.67 (1.50) | 5.87 (1.08) | 4.85 (1.53) | 5.97 (1.17) | 6.29 (1.00) | 4.57 (1.50) | 6.57 (.74) |
| DSHealth | 3.58 (1.67) | 4.99 (1.64) | 4.78 (1.63) | 5.55 (1.76) | 6.41 (1.00) | 4.71 (1.68) | 6.72 (.60) |
| HMYM | 4.80 (1.45) | 6.49 (.72) | 3.95 (1.59) | 4.07 (1.48) | 5.84 (1.10) | 4.21 (1.46) | 6.44 (.79) |
| DONASCI | 4.75 (1.16) | 4.69 (1.70) | 5.27 (1.22) | 5.93 (1.33) | 6.31 (.86) | 4.51 (1.47) | 6.56 (.65) |

Appendix 7

Candidates' perceptions of frequency of supervision by doctoral schools

| Doctoral school | <i>n</i> | Daily | Weekly | Once a month | Once every two months | Once every six months | Less frequently |
|--|-----------------|--------------|---------------|---------------------|------------------------------|------------------------------|------------------------|
| Doctoral School in Environmental, Food and Biological Sciences | 63 | 3% | 43% | 30% | 8% | 8% | 8% |
| Doctoral School in Health Sciences | 202 | 5% | 36% | 37% | 13% | 5% | 3% |
| Doctoral School in Humanities and Social Sciences | 357 | 1% | 9% | 34% | 27% | 19% | 10% |
| Doctoral School in Natural Sciences | 103 | 3% | 58% | 26% | 4% | 3% | 6% |
| All doctoral schools | 725 | 3% | 26% | 34% | 18% | 12% | 7% |

Appendix 8

Changing supervisor and considering changing supervisor

| Doctoral school | <i>n</i> | Changed supervisor | | Considered changing supervisor | |
|--|------------|---------------------|--------------------|--------------------------------|--------------------|
| | | Yes <i>n</i> (%) | No <i>n</i> (%) | Yes <i>n</i> (%) | No <i>n</i> (%) |
| Doctoral School in Environmental, Food and Biological Sciences | 63 | 6 (9%) | 58 (91%) | 9 (14%) | 55 (86%) |
| Doctoral School in Health Sciences | 205 | 23 (11%) | 183 (89%) | 30 (15%) | 171 (85%) |
| Doctoral School in Humanities and Social Sciences | 366 | 52 (14%) | 315 (86%) | 72 (20%) | 286 (80%) |
| Doctoral School in Natural Sciences | 104 | 8 (8%) | 96 (92%) | 15 (15%) | 87 (85%) |
| Total | 738 | 89 (12%) | 652 (88%) | 126 (17%) | 599 (83%) |

Appendix 9

Supervisory interaction, supervisory competences, and professional support by background variables

| | Supervisory interaction | Supervisory competencies | Professional support from the research community |
|--|--------------------------------|---------------------------------|---|
| | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> |
| Faculty | | | |
| Faculty of Agriculture and Forestry | 6.08 (.54) | 5.52 (.71) | 5.35 (1.06) |
| Faculty of Arts | 6.06 (.70) | 5.37 (.73) | 4.94 (1.17) |
| Faculty of Educational Sciences | 6.26 (.74) | 5.60 (.66) | 5.26 (1.01) |
| Faculty of Biological and Environmental Sciences | 6.20 (.59) | 5.36 (.73) | 4.77 (1.39) |
| Faculty of Law | 6.05 (.62) | 5.60 (.43) | 5.55 (1.08) |
| Faculty of Pharmacy | 6.37 (.62) | 5.79 (.70) | 5.43 (.80) |
| Faculty of Medicine | 6.16 (.60) | 5.35 (.87) | 5.29 (1.05) |
| Faculty of Science | 5.87 (.75) | 5.31 (.70) | 5.39 (.99) |
| Faculty of Social Sciences | 5.99 (.59) | 5.35 (.64) | 5.06 (1.22) |
| Faculty of Theology | 5.77 (.77) | 5.02 (1.58) | 5.82 (1.05) |
| Faculty of Veterinary Medicine | 6.00 (.61) | 5.08 (1.15) | 5.33 (.85) |
| Independent institute | 5.92 (.80) | 5.15 (.81) | 4.89 (1.57) |
| Position at the university | | | |
| Professor/Research director | 6.06 (.65) | 5.56 (.68) | 5.36 (1.08) |
| Tenure track professor | 6.05 (.53) | 5.23 (.71) | 5.21 (.91) |
| University researcher/university lecturer | 6.02 (.71) | 5.32 (.76) | 4.93 (1.27) |
| Postdoctoral researcher/University instructor | 6.11 (.66) | 5.06 (.90) | 4.98 (1.10) |
| Gender | | | |
| Women | 6.18 (.60) | 5.35 (.85) | 5.12 (1.16) |
| Men | 5.94 (.72) | 5.36 (.72) | 5.29 (1.11) |
| Co-supervision | | | |
| Never/rarely | 6.01 (.75) | 5.21 (.84) | 5.24 (1.13) |
| Occasionally | 6.09 (.69) | 5.44 (.72) | 5.26 (1.09) |
| Frequently/Always | 6.07 (.60) | 5.41 (.77) | 5.11 (1.20) |
| Perceived number of supervisees | | | |
| Suitable | 6.09 (.66) | 5.38 (.76) | 5.27 (1.11) |
| Too high | 5.91 (.67) | 5.12 (.99) | 5.00 (1.13) |
| Too small | 5.85 (.75) | 5.29 (.76) | 4.71 (1.35) |

| | Supervisory interaction | Supervisory competencies | Professional support from the research community |
|---|--------------------------------|---------------------------------|---|
| | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> |
| Candidates' research group status | | | |
| On their own | 5.95 (.69) | 5.21 (.83) | 4.96 (1.23) |
| In a research group | 6.08 (.67) | 5.38 (.78) | 5.24 (1.13) |
| Candidates' thesis format | | | |
| Monograph | 5.98 (.74) | 5.35 (.74) | 5.02 (1.24) |
| Summary of articles | 6.07 (.66) | 5.35 (.80) | 5.23 (1.13) |
| Candidates' study status | | | |
| Full-time | 6.06 (.67) | 5.39 (.73) | 5.17 (1.18) |
| Part-time | 6.05 (.67) | 5.27 (.90) | 5.20 (1.10) |
| Doctoral school of the candidates' | | | |
| YEB | 6.02 (.67) | 5.34 (.72) | 5.06 (1.18) |
| DSHealth | 6.18 (.62) | 5.35 (.85) | 5.33 (1.10) |
| HMYM | 6.04 (.65) | 5.33 (.79) | 5.02 (1.22) |
| DONASCI | 5.86 (.78) | 5.28 (.74) | 5.38 (.99) |

Appendix 10

Correlations between research community support, supervisory support, research engagement, exhaustion, cynicism, and satisfaction with studies and supervision

| | 1. | 2. |
|----------------------------------|--------|--------|
| 1. Research community support | - | |
| 2. Supervisory support | .68** | - |
| 3. Research engagement | .34** | .39** |
| 4. Exhaustion | -.30** | -.31** |
| 5. Cynicism | -.42** | -.45** |
| 6. Satisfaction with studies | .57** | .57** |
| 7. Satisfaction with supervision | .61** | .87** |

** $p < .001$

Appendix 11

Doctoral candidates' satisfaction with courses and practices by doctoral schools

| | Doctoral School in Environmental, Food and Biological Sciences <i>m (sd)</i> | Doctoral School in Health Sciences <i>m (sd)</i> | Doctoral School in Humanities and Social Sciences <i>m (sd)</i> | Doctoral School in Natural Sciences <i>m (sd)</i> |
|--|--|--|---|---|
| The courses provided by the doctoral school are in line with my needs. | 4.23 _a (1.45) | 4.70 _b (1.52) | 4.26 _{b,c} (1.59) | 4.93 _{a,c} (1.60) |
| The courses provided by the doctoral program are in line with my needs. | 4.14 _a (1.44) | 4.62 _b (1.60) | 4.22 _{b,c} (1.59) | 4.83 _{a,c} (1.76) |
| The instructions and forms related to doctoral studies are easily available. | 4.09 (1.65) | 3.55 _{a,b} (1.64) | 3.96 _a (1.64) | 4.37 _b (1.68) |
| The instructions and forms related to doctoral studies are clear. | 4.00 (1.67) | 3.47 _{a,b} (1.70) | 4.01 _a (1.66) | 4.22 _b (1.62) |
| Guidance and help related to doctoral studies is available, if needed. | 4.94 (1.59) | 4.57 _a (1.59) | 4.89 (1.58) | 5.19 _a (1.31) |
| I know, what to do (e.g., from whom to ask advice), if I face problems in my doctoral studies. | 4.63 _a (1.63) | 3.89 _{a,b} (1.83) | 4.22 _c (1.82) | 4.88 _{b,c} (1.60) |

Note. The means within a row sharing the same subscript differ statistically significantly from each other.

- The DONASCI doctoral candidates reported more frequently that the courses provided by their doctoral school/program responded to their needs compared to candidates of the YEB and HYMY.
- The DSHealth candidates reported more often that the courses were in line with their needs compared to candidates of the HYMY doctoral school.
- The DSHealth candidates were less satisfied with the clarity and availability of the instructions and forms related to doctoral studies compared to candidates at the HYMY and DONASCI.
- The DSHealth candidates perceived less frequently that the guidance and help related to doctoral studies were available if needed compared to candidates at the DONASCI.
- The DSHealth candidates reported knowing what to do if they faced problems in their studies less frequently than the candidates at the YEB and DONASCI.
- The HYMY doctoral school candidates reported less frequently that they knew what to do when facing problems compared to candidates at the DONASCI.

Appendix 12

Doctoral candidates' estimations of the impact of the COVID-19 pandemic on their doctoral studies and well-being

| | The COVID-19 pandemic has hindered the progress of my doctoral studies <i>m (sd)</i> | COVID-19 pandemic has promoted the progress of my doctoral studies. <i>m (sd)</i> | The COVID-19 pandemic has decreased my doctoral study-related well-being <i>m (sd)</i> |
|--|--|---|--|
| Gender | | | |
| Female | 4.11 (2.15) | 2.94 (1.85) | 4.35 (2.01) |
| Male | 4.11 (2.14) | 3.10 (1.86) | 4.46 (2.04) |
| Nationality | | | |
| Finnish | 4.00 (2.15) | 3.02 (1.85) | 4.31 (1.99) |
| International | 4.55 (2.06) | 2.99 (1.81) | 4.66 (2.08) |
| Thesis format | | | |
| Monograph | 4.18 (2.18) | 3.28 (1.94) | 4.21 (2.00) |
| Summary of articles | 4.08 (2.13) | 2.96 (1.82) | 4.41 (2.02) |
| Study status | | | |
| Full-time | 4.48 (2.01) | 2.89 (1.76) | 4.88 (1.89) |
| Part-time | 3.58 (2.24) | 3.22 (1.96) | 3.63 (1.97) |
| Research group status | | | |
| Mainly alone | 4.08 (2.18) | 3.07 (1.87) | 4.27 (2.03) |
| In a group | 4.18 (2.04) | 2.80 (1.71) | 4.66 (1.93) |
| Funding | | | |
| Employment at the university | 4.48 (1.92) | 2.79 (1.73) | 5.05 (1.84) |
| A personal grant | 4.20 (2.10) | 3.14 (1.85) | 4.36 (1.91) |
| No funding | 3.73 (2.36) | 3.14 (1.96) | 3.60 (2.04) |
| Some other form of funding | 3.70 (2.24) | 3.15 (1.90) | 4.10 (2.06) |
| Doctoral school | | | |
| YEB | 4.34 (2.28) | 2.92 (1.63) | 4.53 (2.16) |
| DSHealth | 3.76 (2.07) | 2.99 (1.89) | 4.04 (2.00) |
| HYMY | 4.24 (2.14) | 3.09 (1.87) | 4.40 (2.00) |
| DONASCI | 4.35 (2.16) | 2.83 (1.84) | 4.94 (1.86) |
| Experience about cross-disciplinary collaboration | | | |
| Yes | 4.37 (2.11) | 3.01 (1.89) | 4.66 (2.01) |
| No | 3.98 (2.15) | 3.02 (1.82) | 4.23 (1.99) |
| Frequency of supervision | | | |
| At least once a month | 4.05 (2.12) | 3.08 (1.85) | 4.46 (2.01) |
| Less frequently than once a month | 4.20 (2.20) | 2.93 (1.85) | 4.29 (2.02) |
| Attrition intentions | | | |
| Yes | 4.45 (2.21) | 2.84 (1.83) | 4.70 (2.00) |
| No | 3.93 (2.09) | 3.11 (1.85) | 4.21 (1.99) |

Appendix 13

Supervisors' estimations of the impact of the COVID-19 pandemic on supervision and supervisees by background variables

| | The Covid-19 pandemic has negative impact on my work as supervisor <i>m (sd)</i> | The Covid-19 pandemic has hindered the progress of my doctoral candidates <i>m (sd)</i> | The Covid-19 pandemic has impacted negatively on the well-being of my doctoral candidates <i>m (sd)</i> |
|---|--|---|---|
| Faculty | | | |
| Faculty of Agriculture and Forestry | 3.96 (1.74) | 4.38 (1.76) | 4.81 (1.80) |
| Faculty of Arts | 3.65 (1.85) | 4.61 (1.96) | 5.09 (1.55) |
| Faculty of Educational Sciences | 2.59 (1.62) | 3.93 (1.62) | 4.00 (1.61) |
| Faculty of Biological and Environmental Sciences | 4.19 (1.51) | 4.94 (1.60) | 5.13 (1.36) |
| Faculty of Law | 3.00 (1.77) | 3.88 (1.89) | 4.00 (1.93) |
| Faculty of Pharmacy | 3.33 (1.54) | 4.40 (2.10) | 4.80 (1.21) |
| Faculty of Medicine | 3.85 (1.95) | 4.80 (1.95) | 4.72 (1.65) |
| Faculty of Science | 4.12 (1.82) | 4.43 (1.79) | 5.04 (1.50) |
| Faculty of Social Sciences | 3.44 (1.71) | 4.55 (1.61) | 4.89 (1.37) |
| Faculty of Theology | 3.70 (2.21) | 4.00 (2.06) | 5.00 (1.33) |
| Faculty of Veterinary Medicine | 3.27 (1.75) | 4.87 (2.00) | 4.67 (1.50) |
| Independent institute | 4.24 (1.96) | 5.04 (1.57) | 4.68 (1.70) |
| Position at the university | | | |
| Professor/Research director | 3.81 (1.89) | 4.52 (1.82) | 4.83 (1.56) |
| Tenure track professor | 4.41 (1.72) | 5.26 (1.51) | 5.73 (1.23) |
| University researcher/ university lecturer | 3.81 (1.70) | 4.78 (1.68) | 4.97 (1.45) |
| Postdoctoral researcher/ University instructor | 3.30 (1.83) | 4.05 (2.19) | 4.45 (1.72) |
| Gender | | | |
| Women | 3.71 (1.92) | 4.59 (1.95) | 4.93 (1.68) |
| Men | 3.80 (1.75) | 4.56 (1.70) | 4.77 (1.47) |
| Co-supervision | | | |
| Never/rarely | 3.85 (1.87) | 4.68 (1.83) | 4.92 (1.55) |
| Occasionally | 3.55 (1.85) | 4.48 (1.77) | 4.62 (1.56) |
| Frequently/Always | 3.84 (1.80) | 4.61 (1.86) | 4.95 (1.59) |

| | The Covid-19 pandemic has negative impact on my work as supervisor <i>m (sd)</i> | The Covid-19 pandemic has hindered the progress of my doctoral candidates <i>m (sd)</i> | The Covid-19 pandemic has impacted negatively on the well-being of my doctoral candidates <i>m (sd)</i> |
|---|--|---|---|
| Perceived number of supervisees | | | |
| Suitable | 3.68 (1.83) | 4.57 (1.81) | 4.82 (1.60) |
| Too high | 4.15 (1.88) | 5.15 (1.69) | 5.32 (1.35) |
| Too small | 4.15 (1.88) | 4.52 (1.91) | 4.98 (1.55) |
| Candidates' research group status | | | |
| On their own | 3.48 (1.87) | 4.41 (1.95) | 4.92 (1.64) |
| In a research group | 3.86 (1.83) | 4.65 (1.79) | 4.85 (1.56) |
| Candidates' thesis format | | | |
| Monograph | 3.41 (1.84) | 4.35 (1.86) | 4.74 (1.62) |
| Summary of articles | 3.86 (1.84) | 4.64 (1.81) | 4.89 (1.56) |
| Candidates' study status | | | |
| Full-time | 4.06 (1.80) | 4.74 (1.78) | 5.10 (1.47) |
| Part-time | 3.21 (1.79) | 4.32 (1.88) | 4.38 (1.68) |
| Doctoral school of the candidates' | | | |
| YEB | 4.17 (1.67) | 4.66 (1.83) | 4.87 (1.66) |
| DSHealth | 3.85 (1.96) | 4.96 (1.85) | 4.85 (1.65) |
| HMY | 3.39 (1.81) | 4.41 (1.84) | 4.86 (1.55) |
| DONASCI | 4.05 (1.82) | 4.37 (1.79) | 4.99 (1.43) |

Appendix 14

Supervisors' perceptions of challenges by background variables

| | Supervising online/ remotely | Preparing and conducting online vivas | Helping doctoral candidates to change projects/ focus | Recognising when someone I supervise needs help | Supporting my doctoral candidate(s) including managing their well-being | Helping doctoral candidates with data collection/ analysis |
|--|---|--|--|--|--|---|
| | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> |
| Faculty | | | | | | |
| Faculty of Agriculture and Forestry | 3.75 (1.78) | 3.40 (1.58) | 3.79 (1.69) | 4.63 (1.63) | 4.77 (1.74) | 3.69 (1.50) |
| Faculty of Arts | 3.43 (1.70) | 3.80 (1.62) | 3.58 (1.73) | 4.56 (1.73) | 4.68 (1.68) | 3.32 (1.72) |
| Faculty of Educational Sciences | 2.21 (1.54) | 3.08 (1.50) | 2.93 (1.53) | 3.90 (1.45) | 4.11 (1.34) | 3.36 (1.50) |
| Faculty of Biological and Environmental Sciences | 3.83 (1.69) | 3.29 (1.38) | 3.90 (1.64) | 4.69 (1.63) | 4.67 (1.53) | 3.52 (1.52) |
| Faculty of Law | 3.13 (1.96) | 3.38 (1.77) | 2.88 (1.81) | 4.38 (1.85) | 4.25 (1.49) | 4.00 (1.85) |
| Faculty of Pharmacy | 3.80 (1.57) | 3.08 (1.44) | 2.79 (1.53) | 4.60 (1.40) | 4.80 (1.61) | 3.00 (1.71) |
| Faculty of Medicine | 3.81 (1.74) | 3.86 (1.61) | 3.60 (1.57) | 4.67 (1.67) | 4.64 (1.64) | 3.72 (1.66) |
| Faculty of Science | 4.06 (1.73) | 3.50 (1.48) | 3.80 (1.76) | 5.04 (1.44) | 4.84 (1.40) | 3.24 (1.79) |
| Faculty of Social Sciences | 2.82 (1.64) | 4.08 (1.47) | 3.37 (1.70) | 4.52 (1.80) | 4.61 (1.71) | 3.61 (1.69) |
| Faculty of Theology | 3.40 (1.96) | 3.20 (1.87) | 3.10 (1.29) | 4.80 (1.23) | 4.60 (1.17) | 3.50 (1.27) |
| Faculty of Veterinary Medicine | 3.13 (1.77) | 3.27 (1.56) | 3.53 (1.46) | 5.00 (1.46) | 4.33 (1.50) | 3.50 (1.65) |
| Independent institute | 3.52 (1.92) | 3.10 (1.09) | 3.72 (1.79) | 5.00 (1.68) | 4.88 (1.42) | 3.44 (1.85) |
| Position at the university | | | | | | |
| Professor/Research director | 3.67 (1.78) | 3.62 (1.64) | 3.58 (1.72) | 4.64 (1.61) | 4.72 (1.53) | 3.59 (1.65) |
| Tenure track professor | 3.80 (1.77) | 3.63 (1.48) | 3.78 (1.54) | 5.30 (1.23) | 5.25 (1.10) | 3.41 (1.66) |
| University researcher/university lecturer | 3.58 (1.76) | 3.66 (1.50) | 3.76 (1.66) | 4.83 (1.64) | 4.80 (1.51) | 3.61 (1.72) |
| Postdoctoral researcher/University instructor | 2.70 (1.47) | 3.00 (1.31) | 3.02 (1.61) | 4.09 (1.71) | 3.91 (1.83) | 3.45 (1.73) |
| Gender | | | | | | |
| Women | 3.42 (1.79) | 3.54 (1.54) | 3.56 (1.70) | 4.72 (1.68) | 4.67 (1.66) | 3.61 (1.68) |
| Men | 3.61 (1.74) | 3.58 (1.55) | 3.56 (1.66) | 4.61 (1.59) | 4.60 (1.53) | 3.47 (1.63) |

| | Supervising online/ remotely | Preparing and conducting online vivas | Helping doctoral candidates to change projects/ focus | Recognising when someone I supervise needs help | Supporting my doctoral candidate(s) including managing their well-being | Helping doctoral candidates with data collection/ analysis |
|------------------------------|---|--|--|--|--|---|
| | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> | <i>m (sd)</i> |
| Co-supervision | | | | | | |
| Never/rarely | 3.51 (1.90) | 3.68 (1.56) | 3.52 (1.74) | 4.63 (1.68) | 4.54 (1.58) | 3.67 (1.75) |
| Occasionally | 3.61 (1.63) | 3.51 (1.44) | 3.66 (1.64) | 4.47 (1.72) | 4.55 (1.69) | 3.57 (1.54) |
| Frequently/Always | 3.46 (1.77) | 3.50 (1.60) | 3.55 (1.68) | 4.81 (1.54) | 4.75 (1.53) | 3.44 (1.67) |
| Research group status | | | | | | |
| On their own | 3.20 (1.80) | 3.66 (1.62) | 3.45 (1.77) | 4.34 (1.76) | 4.51 (1.70) | 3.44 (1.75) |
| In a research group | 3.60 (1.77) | 3.52 (1.53) | 3.59 (1.66) | 4.77 (1.59) | 4.67 (1.56) | 3.58 (1.64) |
| Thesis format | | | | | | |
| Monograph | 3.49 (1.80) | 3.70 (1.78) | 3.56 (1.68) | 4.29 (1.69) | 4.39 (1.59) | 3.43 (1.62) |
| Summary of articles | 3.53 (1.78) | 3.53 (1.50) | 3.57 (1.69) | 4.75 (1.61) | 4.68 (1.58) | 3.56 (1.67) |
| Study status | | | | | | |
| Full-time | 3.73 (1.77) | 3.52 (1.51) | 3.69 (1.70) | 4.89 (1.56) | 4.84 (1.51) | 3.55 (1.68) |
| Part-time | 3.07 (1.71) | 3.63 (1.63) | 3.27 (1.61) | 4.22 (1.70) | 4.22 (1.68) | 3.52 (1.66) |
| Doctoral school | | | | | | |
| YEB | 3.75 (1.80) | 3.40 (1.40) | 3.74 (1.70) | 4.81 (1.69) | 4.76 (1.77) | 3.79 (1.60) |
| DSHealth | 3.68 (1.77) | 3.58 (1.58) | 3.52 (1.63) | 4.77 (1.63) | 4.59 (1.55) | 3.48 (1.72) |
| HMYM | 2.99 (1.69) | 3.66 (1.68) | 3.33 (1.68) | 4.41 (1.71) | 4.51 (1.63) | 3.48 (1.69) |
| DONASCI | 4.05 (1.68) | 3.43 (1.54) | 3.88 (1.76) | 4.96 (1.37) | 4.86 (1.35) | 3.30 (1.69) |

Appendix 15

Doctoral candidates' well-being by background variables

| | Research engagement <i>m (sd)</i> | Stress <i>m (sd)</i> | Exhaustion <i>m (sd)</i> | Cynicism <i>m (sd)</i> | Work-life balance <i>m (sd)</i> |
|--|---|--------------------------------|------------------------------------|----------------------------------|---|
| Gender | | | | | |
| Female | 4.85 (1.34) | 4.62 (1.72) | 3.71 (1.48) | 3.62 (1.48) | 4.52 (1.15) |
| Male | 4.83 (1.34) | 4.53 (1.82) | 3.61 (1.49) | 3.51 (1.42) | 4.52 (1.19) |
| Nationality | | | | | |
| Finnish | 4.80 (1.32) | 4.53 (1.75) | 3.61 (1.47) | 3.62 (1.46) | 4.60 (1.15) |
| International | 5.06 (1.40) | 4.89 (1.74) | 3.92 (1.48) | 3.45 (1.53) | 4.16 (1.17) |
| Thesis format | | | | | |
| Monograph | 5.16 (1.31) | 4.28 (1.79) | 3.62 (1.53) | 3.45 (1.49) | 4.32 (1.16) |
| Summary of articles | 4.76 (1.34) | 4.68 (1.73) | 3.69 (1.46) | 3.62 (1.46) | 4.58 (1.15) |
| Study status | | | | | |
| Full-time | 4.87 (1.39) | 4.79 (1.78) | 3.85 (1.49) | 3.64 (1.50) | 4.35 (1.15) |
| Part-time | 4.80 (1.29) | 4.34 (1.67) | 3.40 (1.42) | 3.53 (1.45) | 4.76 (1.16) |
| Research group status | | | | | |
| Mainly alone | 4.83 (1.37) | 4.56 (1.76) | 3.66 (1.48) | 3.63 (1.46) | 4.49 (1.19) |
| In a group | 4.85 (1.27) | 4.74 (1.72) | 3.70 (1.47) | 3.50 (1.50) | 4.55 (1.11) |
| Funding | | | | | |
| Employment at the university | 4.66 (1.34) | 4.89 (1.76) | 3.89 (1.44) | 3.70 (1.43) | 4.42 (1.09) |
| A personal grant | 4.84 (1.38) | 4.59 (1.77) | 3.72 (1.58) | 3.68 (1.52) | 4.36 (1.16) |
| No funding | 5.01 (1.32) | 4.29 (1.68) | 3.42 (1.40) | 3.51 (1.45) | 4.51 (1.22) |
| Some other form of funding | 5.05 (1.26) | 4.52 (1.71) | 3.49 (1.41) | 3.29 (1.45) | 5.01 (1.11) |
| Doctoral school | | | | | |
| YEB | 4.39 (1.37) | 4.83 (1.91) | 3.73 (1.42) | 3.84 (1.55) | 4.35 (1.35) |
| DSHealth | 4.82 (1.31) | 4.66 (1.77) | 3.72 (1.49) | 3.57 (1.46) | 4.68 (1.17) |
| HYMY | 5.02 (1.29) | 4.50 (1.73) | 3.58 (1.48) | 3.52 (1.44) | 4.42 (1.15) |
| DONASCI | 4.67 (1.36) | 4.73 (1.71) | 3.84 (1.46) | 3.67 (1.53) | 4.55 (1.03) |
| Experience about cross-disciplinary collaboration | | | | | |
| Yes | 4.92 (1.26) | 4.79 (1.63) | 3.73 (1.47) | 3.54 (1.44) | 4.44 (1.14) |
| No | 4.81 (1.39) | 4.49 (1.81) | 3.65 (1.49) | 3.63 (1.50) | 4.56 (1.18) |

| | Research engagement <i>m (sd)</i> | Stress <i>m (sd)</i> | Exhaustion <i>m (sd)</i> | Cynicism <i>m (sd)</i> | Work-life balance <i>m (sd)</i> |
|-----------------------------------|---|--------------------------------|------------------------------------|----------------------------------|---|
| Phase of doctoral studies | | | | | |
| In the first third | 5.29 (1.08) | 4.11 (1.70) | 3.06 (1.27) | 2.90 (1.88) | 4.69 (1.07) |
| In the middle third | 4.91 (1.33) | 4.68 (1.73) | 3.57 (1.41) | 3.48 (1.44) | 4.58 (1.20) |
| In the final third | 4.74 (1.35) | 4.66 (1.78) | 3.87 (1.51) | 3.79 (1.47) | 4.45 (1.16) |
| Prolonged studies | | | | | |
| Yes | 4.81 (1.32) | 4.64 (1.61) | 4.05 (1.49) | 3.94 (1.46) | 4.26 (1.20) |
| No | 4.86 (1.33) | 4.59 (1.78) | 3.60 (1.47) | 3.53 (1.46) | 4.56 (1.16) |
| Frequency of supervision | | | | | |
| At least once a month | 4.83 (1.36) | 4.63 (1.78) | 3.71 (1.45) | 3.50 (1.45) | 4.56 (1.14) |
| Less frequently than once a month | 4.83 (1.35) | 4.64 (1.68) | 3.68 (1.51) | 3.82 (1.50) | 4.40 (1.22) |

Appendix 16

Doctoral supervisors' experiences of work engagement, stress, and burnout by background variables

| | Work engagement <i>m (sd)</i> | Stress <i>m (sd)</i> | Exhaustion <i>m (sd)</i> | Cynicism <i>m (sd)</i> | Inadequacy <i>m (sd)</i> |
|---|---|--------------------------------|------------------------------------|----------------------------------|------------------------------------|
| Faculty | | | | | |
| Faculty of Agriculture and Forestry | 5.66 (.79) | 3.71 (1.69) | 3.06 (1.24) | 2.49 (1.22) | 2.97 (1.15) |
| Faculty of Arts | 5.48 (.92) | 4.32 (1.96) | 3.54 (1.33) | 2.63 (1.29) | 3.30 (1.46) |
| Faculty of Educational Sciences | 5.87 (.81) | 3.21 (1.52) | 2.96 (1.30) | 2.20 (1.06) | 3.14 (1.38) |
| Faculty of Biological and Environmental Sciences | 5.72 (.82) | 4.69 (1.74) | 4.03 (1.49) | 2.80 (1.48) | 3.62 (1.29) |
| Faculty of Law | 5.88 (.53) | 2.38 (1.51) | 2.55 (.91) | 1.96 (.95) | 2.83 (1.38) |
| Faculty of Pharmacy | 5.53 (.78) | 4.00 (2.00) | 3.21 (1.20) | 2.69 (1.19) | 3.27 (1.25) |
| Faculty of Medicine | 5.86 (.88) | 3.94 (1.85) | 3.12 (1.31) | 2.21 (1.23) | 3.12 (1.44) |
| Faculty of Science | 5.60 (.81) | 3.78 (1.64) | 3.26 (1.22) | 2.54 (1.35) | 3.14 (1.38) |
| Faculty of Social Sciences | 5.41 (.93) | 3.95 (1.61) | 3.53 (1.36) | 2.77 (1.37) | 3.59 (1.34) |
| Faculty of Theology | 5.14 (1.46) | 3.70 (1.34) | 2.58 (1.13) | 2.43 (2.26) | 2.50 (1.68) |
| Faculty of Veterinary Medicine | 5.63 (.83) | 3.67 (1.72) | 3.37 (1.46) | 2.69 (1.51) | 3.41 (1.73) |
| Independent institute | 5.61 (.91) | 4.16 (1.63) | 3.79 (1.17) | 2.39 (1.25) | 3.24 (1.53) |
| Position at the university | | | | | |
| Professor/Research director | 5.82 (.83) | 3.65 (1.70) | 3.18 (1.25) | 2.23 (1.18) | 3.00 (1.37) |
| Tenure track professor | 5.61 (.74) | 4.76 (1.58) | 3.92 (1.29) | 2.70 (1.35) | 3.34 (1.41) |
| University researcher/ university lecturer | 5.45 (.96) | 4.13 (1.79) | 3.41 (1.36) | 2.74 (1.42) | 3.48 (1.34) |
| Postdoctoral researcher/ University instructor | 5.44 (.90) | 4.25 (1.81) | 3.66 (1.40) | 2.84 (1.52) | 3.72 (1.51) |
| Gender | | | | | |
| Women | 5.65 (.92) | 4.25 (1.74) | 3.49 (1.37) | 2.56 (1.38) | 3.41 (1.48) |
| Men | 5.62 (.82) | 3.66 (1.74) | 3.19 (1.26) | 2.44 (1.24) | 3.06 (1.31) |
| Co-supervision | | | | | |
| Never/rarely | 5.57 (.87) | 3.89 (1.75) | 3.28 (1.31) | 2.52 (1.34) | 3.23 (1.45) |
| Occasionally | 5.72 (.87) | 3.91 (1.69) | 3.35 (1.16) | 2.47 (1.25) | 3.19 (1.35) |
| Frequently/Always | 5.62 (.88) | 4.05 (1.80) | 3.41 (1.41) | 2.53 (1.33) | 3.27 (1.37) |
| Perceived number of supervisees | | | | | |
| Suitable | 5.67 (.84) | 3.90 (1.77) | 3.29 (1.32) | 2.43 (1.31) | 3.12 (1.36) |
| Too high | 5.51 (.96) | 4.55 (1.67) | 3.83 (1.33) | 2.67 (1.24) | 3.88 (1.46) |
| Too small | 5.38 (.98) | 4.14 (1.74) | 3.51 (1.30) | 2.95 (1.37) | 3.72 (1.46) |

| | Work engagement <i>m (sd)</i> | Stress <i>m (sd)</i> | Exhaustion <i>m (sd)</i> | Cynicism <i>m (sd)</i> | Inadequacy <i>m (sd)</i> |
|---|---|--------------------------------|------------------------------------|----------------------------------|------------------------------------|
| Candidates' research group status | | | | | |
| On their own | 5.42 (1.04) | 4.13 (1.83) | 3.55 (1.31) | 2.76 (1.48) | 3.41 (1.48) |
| In a research group | 5.69 (.81) | 3.93 (1.75) | 3.31 (1.33) | 2.45 (1.27) | 3.21 (1.38) |
| Candidates' thesis format | | | | | |
| Monograph | 5.52 (.99) | 3.98 (1.86) | 3.24 (1.26) | 2.60 (1.38) | 3.17 (1.40) |
| Summary of articles | 5.65 (.85) | 3.96 (1.74) | 3.37 (1.33) | 2.50 (1.31) | 3.26 (1.39) |
| Candidates' study status | | | | | |
| Full-time | 5.61 (.86) | 4.11 (1.73) | 3.43 (1.31) | 2.58 (1.34) | 3.31 (1.39) |
| Part-time | 5.67 (.91) | 3.71 (1.81) | 3.21 (1.34) | 2.41 (1.28) | 3.14 (1.41) |
| Doctoral school of the candidates' | | | | | |
| YEB | 5.58 (.85) | 4.18 (1.70) | 3.48 (1.41) | 2.83 (1.40) | 3.39 (1.31) |
| DSHealth | 5.79 (.81) | 3.97 (1.78) | 3.18 (1.26) | 2.19 (1.11) | 3.23 (1.38) |
| HYMY | 5.47 (.99) | 3.98 (1.81) | 3.40 (1.33) | 2.64 (1.41) | 3.34 (1.45) |
| DONASCI | 5.63 (.80) | 3.81 (1.62) | 3.32 (1.20) | 2.49 (1.27) | 3.12 (1.33) |

Appendix 17

Correlations between supervisors' perceptions of supervisory interaction, professional support, and well-being.

| | 1. | 2. | 3. | 4. | 5. | 6. | 7. |
|---|--------|--------|--------|-------|-------|-------|----|
| 1. Supervisory interaction | - | | | | | | |
| 2. Professional support from the research community | .31** | - | | | | | |
| 3. Work engagement | .37** | .40** | - | | | | |
| 4. Stress | -.09* | -.24** | -.26** | - | | | |
| 5. Exhaustion | -.15* | -.30** | -.28** | .79** | - | | |
| 6. Cynicism | -.25** | -.41** | -.63** | .35** | .44** | - | |
| 7. Inadequacy | -.17** | -.32** | -.49** | .54** | .58** | .68** | - |

* $p < .05$, ** $p < .001$