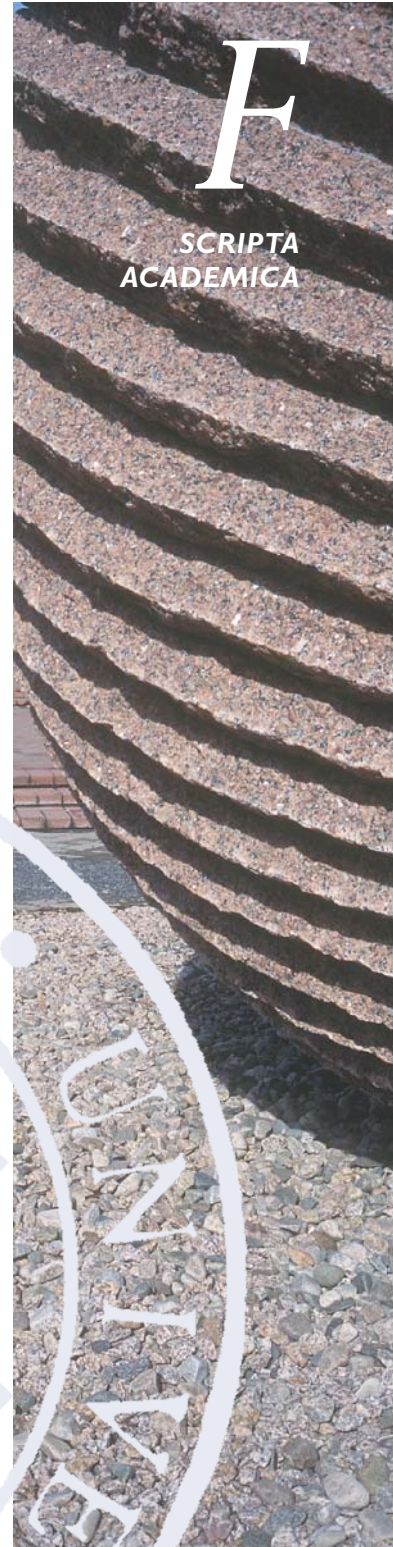


*Jaana Isohätälä & Jean-Nicolas Louis &
Kristina Mikkonen & Kirsi Pyhältö*

TOWARDS A DOCTORAL
DEGREE AND FUTURE
CAREER – PERCEPTIONS OF
DOCTORAL STUDENTS AT
THE UNIVERSITY OF OULU

UNIVERSITY OF OULU;
UNIVERSITY OF OULU GRADUATE SCHOOL;
THE STUDENT UNION OF THE UNIVERSITY OF OULU



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*JAANA ISOHÄTÄLÄ & JEAN-NICOLAS LOUIS &
KRISTINA MIKKONEN & KIRSI PYHÄLTÖ*

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AND FUTURE CAREER –
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STUDENTS AT THE UNIVERSITY
OF OULU**

UNIVERSITY OF OULU, OULU 2017

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Towards a doctoral degree and future career – perceptions of doctoral students at
the University of Oulu.**

University of Oulu; University of Oulu Graduate School; The Student Union of the University of Oulu

Acta Univ. Oul. F 12, 2017

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Abstract

Doctoral students comprise a large group of researchers at the University of Oulu. However, the backgrounds and needs of the doctoral students in the University of Oulu Graduate School (UniOGS) are highly heterogeneous, which makes it challenging to evaluate the quality of their doctoral training. This report sheds light on these doctoral students and their perceptions of doctoral training at UniOGS. The report is based on the Postgraduate Studies in Finland survey that was conducted in Oulu in fall 2015 by the Doctoral Students' Section of the Student Union at the University of Oulu. The report provides a summary of the results, focusing on three aspects: the conditions for pursuing a doctoral degree, the factors in influencing the progress of doctoral studies, and doctoral students' perceptions of their future career.

Keywords: career orientation, doctoral student, doctoral training, study conditions, study progress

**Isohätälä, Jaana & Louis, Jean-Nicolas & Mikkonen, Kristina & Pyhältö, Kirsi,
Kohti tohtorintutkimtoa ja tulevaa uraa – Oulun yliopiston tohtoriopiskelijoiden
näkökulmia.**

Oulun yliopisto; Oulun yliopiston tutkijakoulu; Oulun yliopiston ylioppilaskunta

Acta Univ. Oul. F 12, 2017

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Tiivistelmä

Oulun yliopiston tutkijakoulun jatko-opiskelijat muodostavat huomattavan osan Oulun yliopiston tiedeyhteisöstä. Tohtorikoulutuksen laatua ja kehitystarpeita on kuitenkin haastavaa arvioida, sillä jatko-opiskelijoiden taustat ja tarpeet vaihtelevat. Tämä raportti vetää yhteen tuloksia kyselystä, jossa selvitettiin jatko-opiskelijoiden taustoja ja heidän näkemyksiään tohtoriopinnoista Oulun yliopiston tutkijakoulussa. Raportti perustuu Postgraduate studies in Finland -kyselyyn, jonka Oulun yliopiston ylioppilaskunnan jatko-opiskelijajaosto toteutti Oulun yliopistolla syksyllä 2015. Raportti käsittelee tohtoriopintojen olosuhteita, tohtoriopintojen etenemiseen vaikuttavia tekijöitä ja jatko-opiskelijoiden näkemyksiä tulevasta urastaan.

Asiasanat: jatko-opiskelija, tohtorikoulutus, tohtoriopinnot, tutkijakoulu

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Oulu, October 2017

Jaana Isohätälä

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1 Introduction

Doctoral students constitute a sizeable group of young researchers at the University of Oulu. Their doctoral training is organized by the University of Oulu Graduate School (UniOGS), which monitors doctoral students' progress, provides doctoral study courses and programs, and handles administrative duties relating to doctoral training. UniOGS's aim is to ensure equal opportunities for all doctoral students to complete a doctoral degree in the ten faculties of the University of Oulu, representing the three doctoral fields of human sciences, technology and natural sciences, and health and biosciences.

However, the backgrounds and needs of doctoral students are highly heterogeneous, which makes it challenging to evaluate the quality of their doctoral training. This is a major concern for the Doctoral Students' Section of the University of Oulu's Student Union, which represents all doctoral students at the university and advocates high-quality doctoral studies and the well-being of doctoral students across fields.

The present survey report addresses the shortage of information concerning doctoral students and their perceptions of doctoral training at the University of Oulu. The aim is to examine the conditions for pursuing a doctoral degree, the factors that influence the progress of doctoral studies, and doctoral students' perceptions of their future careers. The report is based on the results of the *Postgraduate Studies in Finland survey*, which was conducted by the Doctoral Students' Section at the University of Oulu in the fall of 2015. The survey was developed by Aalto University Doctoral Students' Association. This report focuses only on the responses of doctoral students at UniOGS.

2 Data collection and analysis

The *Postgraduate Studies in Finland* survey was conducted online in the fall of 2015. It was sent to all registered doctoral students (N = 1,645) at UniOGS. The survey was available only in English and included 63 Likert-scaled questions about respondents' background, funding, collaborations, well-being, experience of discrimination, supervision, and career plans. Open-ended questions were utilized to explore positive and negative factors influencing doctoral studies.

The data reported here were analyzed using qualitative content analysis and statistical measures including Kruskal-Wallis H test, Mann-Whitney U test, Spearman r correlation test, one-way ANOVA tests, and two-proportion t-test. Non-parametric tests were used for data that were not normally distributed. All tests were evaluated with a statistical significance of $p < 0.05$. The factors contributing to selective outcome variables were tested using binary logistic regression and reported in odds ratios and confidence intervals of 95%.

2.1 Participants

Altogether, 375 doctoral students (53% female; 45% male) from UniOGS, representing all 10 faculties of the university, completed the survey. Thus, the response rate was 23%. The sample size was sufficient at the 95% confidence level. The majority of the respondents (63%) were under 35 years of age (Min = 26, Max = 55). In addition, 41% of the respondents reported being in a relationship and not having children, and 40% being in a relationship and having children.

In terms of gender distribution, the sample represented the population well. However, students from the Faculties of Medicine and Information Technology and Electrical Engineering were slightly under-represented, as were students from the smallest faculties—namely, the School of Architecture and Oulu Mining School. However, the disciplinary proportions of the sample and the population were not significantly different at the 0.05 level (Appendix 1 Table 7). The represented faculties indicate that the doctoral students were divided into three doctoral training fields at UniOGS: human sciences, technology and natural sciences, and health and biosciences.

3 Doctoral study conditions

3.1 Full-time and part-time doctoral students

The majority of the doctoral students reported pursuing their doctoral studies full-time (61%), whereas 29% reported studying part-time, and 10% did not indicate whether they were undertaking their doctoral degree full-time or part-time. Some differences among the doctoral training fields were detected. Doctoral students in the field of technology and natural sciences (76%) reported studying full-time more often compared to their counterparts in the fields of human sciences (60%) and health and biosciences (60%) ($\chi^2(2, N = 338) = 10.52, p = 0.005$) (Appendix 2. Table 8). Furthermore, international doctoral students (89%) more frequently reported studying full-time compared to Finnish doctoral students (60%) ($\chi^2(1, N = 338) = 23.75, p < 0.001$). Moreover, men (73%) reported studying full-time more often than women did (63%) ($\chi^2(1, N = 332) = 4.21, p = 0.04$).

3.2 Funding

A small majority of the respondents (53%) had salaried positions at the university, including working on a research project, having a doctoral student position funded by the university, or having another research or teaching position at the University of Oulu. Moreover, 26% reported being employed outside the university and 11% reported having a personal grant, while 10% reported that they were neither employed nor had a personal grant at the time of the survey. Those students with no salary or personal grant reported receiving unemployment or student benefits or being supported by family or using personal savings or other means to fund their doctoral studies.

Differences among the doctoral training fields in terms of funding were detected (see Table 1). Doctoral students in technology and natural sciences (61%) were more commonly salaried by the university compared to their counterparts in health and biosciences (53%) and human sciences (37%) ($\chi^2(2, N = 375) = 14.67, p = 0.001$). Lack of funding (i.e., no grant or employment) was more common among doctoral students in human sciences (18%) than among those in technology and natural sciences (6%) and health and biosciences (9%) ($\chi^2(2, N = 375) = 12.05, p = 0.002$).

Table 1. Employment status of respondents by Faculty.

Committee	Faculty	University	Other em-	Personal	No grant or	
		employ- ment	ployment	grant	employ- ment	
		N	%	%	%	
Technology and natural sciences						
	Architecture	7	42.9	42.9	0	14.3
	Mining	4	75	0	25	0
	School					
	Science	55	54.5	10.9	30.9	3.6
	Technology	59	55.9	28.8	8.5	6.8
	Information	52	75	19.2	0	5.8
	Tech. and Elect. Eng.					
Human sciences						
	Humanities	51	31.4	35.3	19.6	13.7
	Education	27	44.4	18.5	11.1	25.9
	Business	24	45.8	25	8.3	20.8
	School					
Health and biosciences						
	Medicine	76	47.4	40.8	5.3	6.6
	Biochemistry	20	75	0	0	25
	and Molecular Med.					

Men (61%) were more commonly employed by the university than women were (46%) ($\chi^2(1, N = 367) = 8.79, p = 0.003$). Women (15%), in turn, reported having personal grants more often than men did (6%) ($\chi^2(1, N = 367) = 8.21, p = 0.004$). The differences may reflect field-specific funding conditions, since gender distributions vary in different fields. For instance, there are proportionally more males (67.8%) than females in the Faculty of Technology where University employment is common but more females (69.5%) than males in the Faculty of Humanities where relatively many students receive personal grants.

Moreover, more international doctoral students (62%) had a salaried position at the university than Finnish doctoral students did (50%) ($\chi^2(1, N = 375) = 4.23, p = 0.04$), whereas more Finnish doctoral students had personal grants (14%) than did their international counterparts (5%) ($\chi^2(1, N = 375) = 4.67, p = 0.031$). In addition, more full-time doctoral students (69%) held a salaried position at the university than part-time

doctoral students did (28%) ($\chi^2(1, N = 338) = 48.15, p < 0.001$). Full-time doctoral students (16%) also reported having a grant more commonly than part-time students did (3%) ($\chi^2(1, N = 338) = 12.17, p < 0.001$). Part-time doctoral students (59%), in turn, were clearly more often employed outside the university compared to full-time doctoral students (5%) ($\chi^2(1, N = 338) = 124.31, p < 0.001$).

3.3 Research group status

Doctoral students' experiences of collaboration in a research group varied from frequent to infrequent ($M = 3.61, SD = 1.85$) (Appendix 3. Table 9). Twenty-nine percent of the respondents reported that they had not worked in a research group, and about one-third (34.7%) reported being frequently engaged in research collaboration.

Significant differences in doctoral students' involvement in research collaboration were detected among faculties ($H = 54.409, p < 0.001$). Doctoral students from the Faculty of Biochemistry and Molecular Medicine reported engaging in research collaboration more frequently (mean rank 118.45) than doctoral students in the Faculty of Humanities (mean rank 262.97, $p < 0.001$) and Oulu Business School (mean rank 247.19, $p = 0.003$) did. Doctoral students from the Faculty of Medicine (mean rank 160.17) also reported being involved in a research collaboration more frequently than doctoral students in the Faculty of Humanities ($p < 0.001$) and Oulu Business School ($p = 0.02$) did. Doctoral students in the Faculty of Humanities also collaborated with a research group significantly less frequently ($p \leq 0.001$) than respondents in the Faculties of Information Technology and Electrical Engineering (mean rank 166.37), Technology (mean rank 176.76), and Science (mean rank 171.02) did.

Full-time doctoral students participated in a research group more frequently (mean rank 151.55) than part-time doctoral students did (mean rank 207.20) ($U = 16\,590, p < 0.001$). Moreover, doctoral students employed by the university reported collaborating with a research group more frequently (mean rank 158.40) compared to students without a paid position (mean rank 220.76) ($U = 23\,364, p < 0.001$).

Those doctoral students who had worked in a research group ($N = 265$) were satisfied in general with this collaboration ($M = 4.54, SD = 1.04$).

3.4 Research collaboration

Most of the doctoral students (73%) reported that they had engaged in research collaboration with other researchers. However, about one-fourth of them (27%) had no experience of such collaboration. Differences between the disciplines in terms of experienced research collaboration were identified. Doctoral students in human sciences (49%) ($\chi^2(2, N = 375) = 43.59, p < 0.001$) had considerably less experience of research collaboration compared to their counterparts in technology and natural sciences (80%) and health and biosciences (87%). Moreover, doctoral students employed by the university (84%) had more experience of research collaboration than did those without a paid position (62%) ($\chi^2(1, N = 375) = 23.06, p < 0.001$). In addition, full-time doctoral students (78%) had more experience of research collaboration compared to part-time doctoral students (64%) ($\chi^2(1, N = 338) = 6.89, p = 0.009$). In addition, men (79%) had more research collaboration experience compared to women (68%) ($\chi^2(1, N = 367) = 5.89, p = 0.15$), which may reflect the different gender distributions in different fields.

The doctoral students who had experience of research collaboration ($N = 275$) had most typically collaborated with a senior researcher (47%) or with another junior researcher (43%) from the same faculty. Some doctoral students had also collaborated with a senior (35%) or junior researcher (22%) from another university. The doctoral students had less experience of collaborating with senior (20%) and junior researchers (14%) from another faculty at the University of Oulu. Those doctoral students who had collaborated with other researchers typically perceived the collaboration to have been successful ($M = 2.97, SD = 0.57$).

3.5 Academic support

Overall, the doctoral students reported receiving sufficient academic support from the university ($M = 2.5; SD = 0.06$) (Appendix 4. Table 10). However, women reported being less satisfied (mean rank 194.44) with the academic support compared to men (mean rank 170.75) ($U = 14\,491, p = 0.026$). There were no differences in the experience of receiving academic support between Finnish and international doctoral students or between disciplines or funding statuses.

3.6 Workload and stress

In general, the doctoral students did not suffer from intense stress and workload in their doctoral studies ($M = 3.18$; $SD = 0.90$) (Table 2). However, women reported experiencing heavier workloads and greater stress than men did ($t(352) = -2.303$, $p = 0.022$). There were no differences between Finnish and international respondents. The experience of workload and stress was neither associated with disciplinary background nor funding status.

3.7 Health, living and social life satisfaction

The doctoral students evaluated their health, living, and social life from nine perspectives (Table 3). The doctoral students were typically happy about all aspects of their health, living, and social life. They were the happiest about their living conditions and apartment ($M = 3.67$) and their relationship with family ($M = 3.67$). They were the least satisfied with their financial situation ($M = 3.03$)

Table 2. Doctoral students' workload and stress.

	No. of items	Alpha	Mean	SD	Min	Max
Workload and stress	4	0.87	3.18	.90	1	6

Cronbach's alpha indicating sufficient scale reliability

Table 3. Happiness with health, living, and social life (with scale 1= very unhappy to 4= happy).

Items	N	M	SD
Living conditions and apartment	372	3.67	0.67
Physical health	372	3.45	0.74
Mental health	369	3.40	0.78
Financial situation	371	3.03	0.83
Relationship with friends	369	3.49	0.73
Relationship with family	370	3.67	0.64
Romantic relationships	358	3.45	0.83
Social life in general	367	3.28	0.82
Hobbies and free time	371	3.25	0.84

Differences were detected between doctoral students with different disciplinary backgrounds in terms of happiness with physical health ($H = 18.199$, $p = 0.033$), financial situation ($H = 18.624$, $p = 0.029$), social life in general ($H = 20.259$) ($p = 0.016$), and hobbies and free time ($H = 17.825$, $p = 0.037$). Doctoral students in the Faculty of Medicine (mean rank 211.37) were significantly happier with their physical health (mean rank 211.37) and social life (mean rank 211.57) than those in the Faculty of Information Technology and Electrical Engineering were (mean rank 150.77, $p = 0.016$; mean rank 152.80, $p = 0.04$). Further investigation revealed that doctoral students in the Faculties of Medicine (mean rank 208.69) and Information Technology and Electrical Engineering (mean rank 206.5) were happier with their financial situation compared to those in the Faculty of Humanities (mean rank 139.86) ($p = 0.007$ and $p = 0.035$). Finally, doctoral students in the Faculty of Humanities (mean rank 226.71) were significantly happier with their hobbies and free time than those in the Faculty of Education were (mean rank 134.65) ($p = 0.004$).

Differences between Finnish and international doctoral students' health, living, and life satisfaction were also identified. Finnish doctoral students were significantly happier with their living conditions and apartment (mean rank 195.09) than international students were (mean rank 160.72) ($U = 10\ 576$, $p < 0.001$). Finnish doctoral students were also happier with their mental health (mean rank 191.07) than their international counterparts were (mean rank 166.98) ($U = 11\ 158.5$, $p = 0.035$). In addition, Finnish students were happier with their social life in general (mean rank 192.36) than international students were (mean rank 158.26) ($U = 10\ 148.5$, $p = 0.004$), and Finnish students (mean rank 191.85) were happier with their hobbies and free time than international students were (mean rank 168.26) ($U = 11\ 201.5$, $p = 0.047$).

Further differences were identified between full-time and part-time doctoral students in terms of health, living, and life satisfaction. Part-time doctoral students were happier about their living conditions and apartment (mean rank 187.56) than full-time doctoral students were (mean rank 158.69) ($U = 14\ 370.5$, $p = 0.001$). Part-time students were also happier about their financial situation (mean rank 192.21) than full-time students were (mean rank 155.69) ($U = 14\ 873$, $p = 0.001$). Moreover, part-time doctoral students were happier about their mental health (mean rank 194.47) than their peers working full-time were (mean rank 153.20) ($U = 15\ 030$, $p < 0.001$).

The results also showed that doctoral students who were salaried by the university evaluated their happiness differently compared those without a salaried position. Doctoral students without a paid position (mean rank 197.82) were happier about their

physical health than were those with a paid position (mean rank 176.34) ($U = 19\,240$, $p = 0.029$). Students without a paid position (mean rank 200.89) were also happier about their mental health than were those with a paid position (mean rank 170.82) ($U = 19\,730.5$, $p = 0.002$). Moreover, doctoral students without a paid position (mean rank 195.81) were happier about the relationship with their friends than were those with a paid position (mean rank 175.25) ($U = 18\,866.5$, $p = 0.033$).

There were no differences between males and females regarding health and living satisfaction. Only a small difference ($U = 14\,214$, $p = 0.048$) was detected in satisfaction with social life, as women (mean rank 189.11) reported being happier in their general social life than men did (mean rank 169.17).

3.8 Experiencing and witnessing discrimination and harassment

Although the majority of the respondents (87%) reported not having experienced harassment or discrimination, 13% ($N = 47$) reported that they had been either the object of or witness to harassment. Women reported more often having witnessed or experiencing discrimination or harassment (16%) than men did (8%) ($\chi^2(1, N = 367) = 6.27$, $p = 0.012$). Furthermore, doctoral students employed by the university had experienced or witnessed discrimination or harassment (16%) more commonly than did those without a paid position (8%) ($\chi^2(1, N = 375) = 5.21$, $p = 0.022$).

The doctoral students who had either experienced or witnessed harassment or discrimination most typically reported institutional discrimination (26%), such as unfair treatment or bullying within the research group, power misuse, senior colleagues openly discriminating against each other, unfair recruitment procedures, problematic funding policies, or gender discrimination (15%) including structural discrimination against women. Sexual harassment (6%), cultural discrimination (4%), and religious discrimination (2%) were rarely reported. Yet nearly half of the respondents who had experienced discrimination or harassment did not explicate the type of harassment or discrimination they had experienced or witnessed.

In 74% of cases where discrimination or harassment had occurred, the initiator was the victim's employer, supervisor, or colleague¹. The doctoral students experiencing or witnessing harassment or discrimination reported that they were rarely able to react to it,

¹In the remaining cases (26%), the relationship between the victim and initiator was something else or the initiator was not specified.

as the intimidating atmosphere prevented them or junior colleagues from criticizing or initiating discussion about such issues.

4 Factors contributing to the progress of doctoral studies

On average, the doctoral students expected to complete their doctoral degree in 5.9 years (SD = 4.2 years, variation 2-32 years). Full-time doctoral students expected to graduate in 4.7 years (SD = 2.2 years), whereas part-time doctoral students estimated graduating in 7.5 years (SD = 5.6 years).

There were significant differences between faculties in the estimated time of completion of the doctoral degree ($H = 30.118$, $p < 0.001$) (Table 4). The estimated completion time was significantly shorter in the Faculties of Science (M = 4.5 years, mean rank 155.62) and Medicine (M = 4.9 years, mean rank = 168.44) compared to the Faculty of Humanities (M = 7.69 years, mean rank 244.67) ($p = 0.001$ and $p = 0.002$). Moreover, in the Faculties of Humanities and Education, the number of doctoral students whose studies were delayed (when using criteria of over 4 years for full-time students and over 7 years for part-time students) was significantly higher than in other faculties ($\chi^2 = 24.828$, $p = 0.003$).

Table 4. Progress of doctoral research among faculties.

Faculty	Timely progress N (%)	Delayed progress N (%)	Estimated completion M (SD)
Architecture	5 (71.4)	2 (28.6)	6.14 (1.42)
Biochemistry and Molecular Med.	15 (75.0)	5 (25.0)	5.05 (0.56)
Humanities	24 (47.1)	27 (52.9)	7.69 (0.64)
Mining School	3 (75.0)	1 (25.0)	5.00 (1.35)
Education	13 (48.1)	14 (51.9)	7.37 (0.95)
Science	42 (77.8)	12 (22.2)	4.51 (0.19)
Medicine	61 (80.3)	15 (19.7)	4.96 (0.26)
Business School	18 (75.0)	6 (25.0)	4.70 (0.28)
Technology	37 (63.8)	21 (36.2)	6.46 (0.75)
Information Tech. and Elect. Eng.	32 (61.5)	20 (38.5)	6.31 (0.81)

The progress of the doctoral research was evaluated according to the starting year of the respondents' doctoral studies, their estimated year, of graduation, and their status as doing either part-time or full-time, research.

Further investigation showed (Appendix 5. Table 11; Appendix 6. Table 12) that the doctoral students' progress in their studies was affected by four factors: age, employment position, frequency of interactions with the supervisor and the supervisor's commitment to the supervisee's education. The progress of those doctoral students who were between 20 and 30 years old was faster (90.3% showing timely progress) compared to older doctoral students (51.9%) ($p < 0.0001$). Moreover, doctoral students who were salaried employees of the university progressed 0.56 times faster in their studies than those not employed by the university (OR = 0.56, 95% CI = 0.33-0.95, $p = 0.032$).

The frequency of supervision was evaluated on an eight-point scale (1 = on a daily basis, 8 = never). About half (49%) of the doctoral students reported interacting with their supervisor at least on a weekly basis, 21% at least every few weeks, and 28% once a month or less. Those doctoral students who received supervision only a few times a year or less (10%) progressed 0.25 times slower (OR = 0.25, 95% CI = 0.07-0.85, $p = 0.026$) than those students who received more frequent supervision (Appendix 5. Table 11).

Differences among faculties in terms of the frequency of supervision were detected ($H = 38.291$, $p < 0.001$). The frequency of supervision was significantly higher in the Faculty of Biochemistry and Molecular Medicine (mean rank 118.68) compared to the Faculties of Humanities (mean rank 215.73, $p = 0.023$), Technology (mean rank 215.83, $p = 0.016$), and Education (mean rank 237.85, $p = 0.005$). The frequency of supervision was also significantly higher in the Faculty of Science (mean rank 150.03) compared to the Faculties of Technology ($p = 0.042$) and Education ($p = 0.017$). Moreover, a significant difference was found between the Faculty of Medicine (mean rank 152.36) and the Faculties of Humanities ($p = 0.05$), Technology ($p = 0.024$), and Education ($p = 0.012$).

The doctoral students' progress was also affected by the perceived commitment of an supervisor (Appendix 6. Table 12). Most of the doctoral students (62%) estimated that their supervisor's commitment to their education was very high and good. Those doctoral students who estimated supervisory commitment to be average and below average progressed 0.28 to 0.37 times slower compared to those satisfied with their supervisor's commitment (OR = 0.28, 95% CI = 0.11-0.71, $p = 0.007$) (OR = 0.37, 95% CI = 0.18-0.79, $p = 0.008$). The supervisor's commitment was also associated with doctoral students' engagement in research group collaboration ($r = 0.389$, $p < 0.01$). Furthermore, 71% of respondents who estimated that supervisory commitment was high engaged more frequently in research group collaboration compared to those

students (54%) with a less-committed supervisor ($\chi^2 = 11.735$, $p < 0.001$). Supervisor's commitment correlated strongly with respondents' satisfaction with academic support ($r = 0.525$, $p < 0.01$).

4.1 Perceptions of factors contributing to doctoral research progress

Doctoral students (N = 300) reported several contributing factors that were either promoting or hindering their study progress. They perceived that (1) *researcher community interaction*, (2) *supervision*, (3) *structures and resources*, (4) *doctoral research*, (5) *personal factors*, and (6) *coursework* were either promoting or hindering their study progress (Table 5).² *Researcher community interaction*, *Supervision*, *Structures and resources*, and *Doctoral research* were the most frequently perceived factors promoting doctoral studies. *Structures and resources* was by far the most reported factor hindering study progress.

4.1.1 Researcher community interaction

The doctoral students (54%) often perceived interaction in the researcher community, including peers, research group members, senior researchers, and other faculty members, as a positive resource for their study progress. For example, some students reported

² The reliability of the analysis was checked by calculating Cohen's kappa value of the categorizations by two independent researchers. The kappa value was high ($\kappa > 0.70$) for all categories.

Table 5. Factors promoting and hindering doctoral research and doctoral training.

Factors	Promoting		Hindering	
	N	%	N	%
Researcher community interaction	161	54	56	19
Supervision	119	40	49	16
Structures and resources	103	34	135	45
Doctoral research	98	33	88	29
Personal factors	46	15	89	30
Coursework	36	12	28	9

Note. The number of students who reported the given factor in their response (N_{Total} = 300).

benefiting from collaborative writing, feedback, networking opportunities, a positive and inspiring atmosphere, and the overall support given in the researcher community. Some students also valued international collaboration and perceived that international research visits had contributed to their progress.

“Friendly atmosphere in my department (once I finally got to know people), contact with other PhD students (once I finally got to meet people).”

“Great research team with lots of collaboration. Successful, encouraging and ambitious main supervisor. Also some methodological courses have helped.”

In turn, some doctoral students (19%) reported problems in researcher community interaction, such as poor atmosphere or a sense of isolation, which hindered the study progress. For example, they reported that perceiving oneself as an outsider, not having colleagues to talk to, lacking opportunities to meet peers, or simply feeling alone with their work impeded their progress. Other reported hindrances were unfriendly, busy, dismissive, or discriminative colleagues and a competitive or uninspiring atmosphere in the research group or faculty. A few respondents reported that senior scholars harassed junior staff or took advantage of the work of doctoral students.

“My research projects are too separated from other people’s projects in my group. I feel that I’m working alone too much, although I may have partly driven myself to this situation.”

“The attitude of my peer doctoral students towards me and my research has been extremely dismissive, perhaps due to the academic competition. My efforts to create contact with others have been met mostly with indifference.”

4.1.2 Supervision

A common factor reported as promoting the progress of students’ doctoral research was supervision (40%). Doctoral students particularly appreciated friendly, easy-going, and open-minded supervisors. They also valued the encouragement and trust they received from supervisors. Moreover, supervisors’ expertise and the interest they showed in the doctoral students were perceived as promoting the students’ study progress. Some students reported benefitting from clear deadlines and help with their research, whereas others valued freedom given by their supervisor.

“Good supervisor; always helping if I have a question and genuinely interested about my research.”

“The trust from my supervisors. The open-door policy that I can talk with them whenever needed, provided they are available.”

However, doctoral students (16%) sometimes perceived problems in supervisory relationships and lack of supervision as hindrances to their progress. For example, some doctoral students reported that inadequate supervision, such as a lack of interest or a supervisor’s negative attitude or lack of knowledge of the thesis topic, affected their studies negatively. Some felt that their supervisor gave them too much independence, while others felt that the supervisor put too much pressure on them.

“My supervisors never show any interest in the work, unless it is the number of publications.”

“My supervisor left Oulu during my doctoral studies and there’s no one left at the university who would be able to give me any advice on my research topic.”

4.1.3 Structures and resources

Many doctoral students (34%) reported that structures and resources, such as funding and university infrastructure, promoted their progress. Students especially valued full-time funding and travel grants from the university or external funders as well as the facilities, equipment, and support services provided by the university. Several also reported benefitting from the practices and procedures related to doctoral training, such as help from UniOGS coordinators or follow-up group.

“I was lucky to get the four-year doctoral position, so I don’t need to care about funding and waste my time filling out grant applications.”

“A place to work, equipment, and software.”

On the negative side, doctoral students (45%) commonly reported that structures and resources hindered their progress. Students particularly considered the lack, inadequacy, or temporary nature of funding as a hindrance. They also reported that applying for funding was too time-consuming. Further, they felt that bureaucracy and unclear,

inflexible, or changing regulations and practices concerning doctoral training slowed them down. Some mentioned a lack of information flow at the university and problems in the status of non-salaried students. Only a few mentioned limitations in equipment or facilities hindering progress.

“Funding stopped at a crucial end-point of my research so finishing thesis while unemployed has been absolutely soul crushing. Can’t really take a job when you are trying furiously to graduate.”

“Unnecessary bureaucracy that I need to spend time and mental capital to deal with.”

4.1.4 Doctoral research

A third of the doctoral students (33%) reported research-related attributes, such as contemporary research topic, high-quality data, and obtaining interesting results, as promoting their progress and enabling them to reach important milestones, such as getting published. Students reported enjoying the flexibility, freedom, and independence of being an early career researcher. Some described appreciating the opportunities to travel and participate in research seminars and conferences. Some perceived the opportunity to teach as enhancing their progress.

“Successful writing, submissions, and approvals of the articles.”

“I am allowed to choose the area of focus that I like.”

“I have attended some international and national research meetings and preparing for those is also motivating.”

On the downside, nearly one-third (29%) of the doctoral students considered doctoral research-related attributes, such as poor-quality data, problems with data collection, lack of theoretical knowledge, and methodological choices, as hindrances to their study progress. Moreover, some doctoral students reported that a poor balance between their other duties in the research project or their teaching load affected their progress negatively. Some also reported that their progress was hindered by poor or uncertain future career prospects.

“The methods used in my project aren’t successful as of yet, so the data collected is unreliable thus far.”

“The extra work given by the department. The task are always given at the last minute so I cannot plan my own work. Also I don’t feel that teaching task should be given to me because the university does not pay me anything [salary]. My responsibilities are to my financiers and they pay for research not teaching.”

“Desperate atmosphere regarding future opportunities of research.”

4.1.5 Personal factors

Personal factors, including doctoral students’ motivation and effort, family, and friends, living conditions, and current life situation, were rarely identified (15%) as assets for study progress. Some students perceived that their motivation and resilience, persistence, and commitment promoted their progress. Some also mentioned that they had skills or previous knowledge that was useful in their research. A few reported benefiting from the support of family and friends.

“My girlfriend being in Finland with me.”

“Perseverance, high beliefs about myself, good skills in English.”

Personal factors were more often reported by doctoral students (30%) as hindering their study progress than enabling it. Some reported, for instance, difficulties in maintaining reasonable work-life balance due to lack of time because of other work or other studies or because of family responsibilities, such as raising children. They also frequently reported that their work was impeded by a lack of motivation and effort, lack of skills or knowledge, and problems relating to their mental or physical health. In addition, some respondents mentioned that they lived too far from the university.

“Feeling that I am alone and my work is meaningless.”

“Adaptation to a new environment and culture was challenging.”

“I have another full-time job and I have two children; thus, I don’t have a lot of excess time. I live far away from the university, which causes a problem in accessing courses at the university. It is also hard to get motivated to do the research work among everything else.”

4.1.6 Coursework

Rather few doctoral students (12%) reported that coursework had benefited their study progress. These students perceived that field-specific studies offered by their department or doctoral program or by international summer schools and UniOGS had contributed to their progress. The flexibility of studies and the possibilities of taking courses online and at foreign universities were perceived positively.

“There are some interesting courses which are related to my research field. There are guest lectures and seminars given by visiting researchers. These lectures give me more knowledge about the current research and new methods, technologies, and tools.”

“The extra courses in teaching and entrepreneurship.”

“The flexibility given to my choice of courses/seminars/summer schools and the support provided to attend said courses.”

Though rather few doctoral students reported coursework to be particularly useful, only a small number of doctoral students (9%) considered coursework to have a negative influence on their study progress. They reported, for example, that courses were not relevant to them or that the mandatory courses were not useful. They also perceived the lack of field-specific courses as a problem.

“There are only a few courses at the university that I can benefit from, concerning my own research.”

“Courses at the University of Oulu are targeted at young PhD students, which is very understandable. But with my work experience, I get very little from obligatory courses.”

5 Perceptions of future career

5.1 Career orientation

Doctoral students perceived the position of researcher at an institute and postdoctoral researcher as the most attractive career choices after obtaining their doctoral degree (Table 6). A career as a politician was perceived as the least attractive career choice. Doctoral students were also less attracted to public or third sector positions, entrepreneurship, and lower-level private sector positions than by positions in academia and in the private sector in their field. They evaluated that they had the highest chances of becoming employed as postdoctoral researchers. In contrast, they estimated their likelihood of being employed as a politician as the lowest among career options. Respondents were also rather doubtful of becoming employed as a professor or working in foundations or associations.

Table 6. Estimated attractiveness and likelihood of employment after graduation.

Employment options	Attractiveness of employment after graduation			Likelihood of employment after graduation		
	N	M	SD	N	M	SD
Professor	358	3.82	1.59	363	2.67	1.05
University Lecturer	360	4.20	1.22	363	3.53	1.23
Post Doc	360	4.54	1.17	368	4.20	1.28
Other University Position	359	4.04	1.34	362	3.54	1.39
Researcher for an Institute	360	4.59	1.14	367	3.79	1.33
Government Officer	357	3.62	1.32	362	3.07	1.27
Private Sector Researcher	358	4.25	1.40	368	3.55	1.38
Private Sector Position (other than research, equivalent to education)	355	4.08	1.38	362	3.63	1.39
Other Private Sector Employee (lower level)	352	3.36	1.13	362	3.16	1.25
Politician	353	2.70	1.03	360	2.39	0.90
Foundation or Association Work	352	3.39	1.32	360	2.88	1.18
School Teacher	355	3.35	1.19	361	3.00	1.30
Entrepreneur	361	3.54	1.42	364	3.19	1.34

Some gender differences were detected with respect to the doctoral students' career orientations. Men, for instance, were more attracted than women were to working as a professor ($t(349) = -2.932, p = 0.004$). They also estimated a higher likelihood of being employed as a professor than women did ($t(353) = -3.085, p = 0.002$). In addition, compared to women, men considered having better chances of employment as a researcher in the private sector ($t(358) = -3.086, p = 0.002$) and as an entrepreneur ($t(354) = -2.454, p = 0.015$). The differences may partly reflect gender distributions in different fields; for example, most of the respondents in human sciences were women.

Differences were also detected between Finnish and international doctoral students regarding career orientation. Finnish respondents generally considered positions outside academia as more attractive or likelier to be within their reach than their international counterparts did. Finnish doctoral students also considered employment as a government officer to be more attractive than international students did ($t(129) = 2.270, p = 0.025$). In addition, foundation work was considered more attractive by Finnish respondents than international ones ($t(126) = 2.107, p = 0.037$). Finnish doctoral students also estimated higher chances of becoming employed as a government officer ($t(140) = 4.089, p < 0.001$), politician ($t(153) = 3.466, p = 0.001$), schoolteacher ($t(359) = 3.360, p = 0.001$), and foundation employee ($t(128) = 2.811, p = 0.006$) than international doctoral students did.

Further investigation showed that full-time doctoral students generally found different careers, mostly in academia, likelier and more attractive than part-time students did. Full-time students considered the position of postdoctoral researcher to be more likely within their reach than part-time students did ($t(329) = 6.148, p < 0.001$). They also considered their chances of gaining employment as a researcher in an institute to be better than part-time respondents did ($t(185) = 2.549, p = 0.012$). Moreover, full-time doctoral students perceived postdoctoral position ($t(153) = 4.383, p < 0.001$), researcher for an institute ($t(164) = 3.651, p < 0.001$), private sector researcher ($t(183) = 3.925, p < 0.001$), foundation employee ($t(315) = 2.715, p = 0.007$), professor ($t(320) = 2.038, p = 0.042$), and private sector employee ($t(169) = 2.047, p = 0.042$) as more attractive than part-time students did.

Some differences in career orientation were identified between those doctoral students who were salaried by the university and non-salaried students. Doctoral students with a paid position considered employment as a postdoctoral researcher to be more likely than those without a paid position ($t(366) = 5.262, p < 0.001$). They also considered their chances of being employed in the private sector as better ($t(345)$

= 2.305, $p = 0.022$) than non-salaried students did. Salaried students also perceived postdoctoral researcher ($t(283) = 3.244$, $p = 0.001$) and private sector researcher ($t(356) = 2.571$, $p = 0.011$) positions as more attractive than non-salaried students did. Moreover, salaried students estimated a higher likelihood of gaining employment as a researcher for an institute than those without a paid position ($t(348) = 2.785$, $p = 0.006$).

Significant differences were found between faculties in doctoral students' estimations of the likelihood that they would obtain a postdoctoral researcher position ($F(9,358) = 2.419$, $p = 0.011$), a private sector position ($F(9,352) = 3.782$, $p < 0.001$), or becoming an entrepreneur ($F(9,354) = 4.392$, $p < 0.001$). Doctoral students from the Faculty of Education considered employment as a postdoctoral researcher less likely than their counterparts from the Faculties of Science ($p = 0.25$) and Biochemistry and Molecular Medicine ($p = 0.49$). Students from the Faculty of Education also considered finding work as a private sector employee as less likely than students from the Faculties of Technology ($p = 0.024$) and Information Technology and Electrical Engineering ($p = 0.02$). Doctoral students from the Faculty of Humanities also estimated a lower likelihood of private sector employment compared to those in the Faculties of Technology ($p = 0.019$) and Information Technology and Electrical Engineering ($p = 0.016$). Entrepreneurship was considered a less likely option by the doctoral students of the Faculty of Medicine compared to the School of Architecture ($p = 0.013$) and Faculty of Information Technology and Electrical Engineering ($p < 0.001$). Moreover, doctoral students from the Faculty of Information Technology and Electrical Engineering considered entrepreneurship to be more likely than those in the Faculties of Science ($p = 0.026$) and Humanities ($p = 0.47$).

Further investigation uncovered that there were significant differences between the doctoral students from different faculties with regard to estimations of the attractiveness of a private sector position ($F(9,345) = 4.323$, $p < 0.001$, equal variances not assumed) and entrepreneurship ($F(9,351) = 3.021$, $p = 0.002$). Private sector employment was considered significantly less attractive by doctoral students in the Faculty of Education compared to the Faculty of Technology ($p = 0.009$), Oulu Business School ($p = 0.021$), and Faculty of Biochemistry and Molecular Medicine ($p = 0.27$). Doctoral students in the Faculty of Technology also perceived private sector employment as more attractive than did those from the Faculty of Medicine ($p = 0.003$). Entrepreneurship was considered significantly more attractive by doctoral students of the Oulu Business School compared to those in the Faculties of Medicine ($p = 0.006$) and Science ($p = 0.25$). Doctoral students from the Faculty of Information Technology and Electrical Engineering were

also more intrigued by entrepreneurship than those in the Faculty of Medicine ($p = 0.017$).

5.2 Usefulness of doctoral training

Doctoral students typically considered knowledge and skills developed during doctoral studies as useful for their desired career ($M = 2.06$; $SD = 0.70$) (Appendix 7. Table 13). A significant difference was found between the faculties ($H = 18.140$, $p < 0.034$): doctoral students in the Faculty of Medicine (mean rank 163.31) regarded their studies as more useful for their career than doctoral students in the Faculty of Information Technology and Electrical Engineering did (mean rank 221.56, $p = 0.031$).

5.3 Career support

Most of the doctoral students (67%) reported that they had not received enough support from the university for their career planning. Women were more dissatisfied with the support they received with career planning (72%) than men were (60%) ($\chi^2(1, N = 360) = 5.72$, $p = 0.017$). Furthermore, full-time doctoral students were more dissatisfied with the support they received with career planning (72%) than part-time doctoral students were (60%) ($\chi^2(1, N = 333) = 5.07$, $p = 0.024$).

6 Summary of the results

This report focused on exploring the conditions of doctoral studies, the factors contributing to doctoral students' progress in their studies, and career orientation among doctoral students at UniOGS, based on survey data collected in 2015.

Study conditions: The majority of the surveyed doctoral students were pursuing their doctoral studies full-time. International doctoral students, men, and doctoral students in the field of technology and natural sciences were more likely to be undertaking their doctoral studies full-time than others. A small majority of the doctoral students were salaried by the university. International doctoral students, men, and those in the fields of technology and natural sciences were also most typically the respondents with salaried positions.

About one-third of the doctoral students reported being frequently engaged in collaboration with a research group. Full-time doctoral students and those salaried by the university reported more frequent involvement in research group collaboration compared to others. In general, doctoral students reported receiving sufficient academic support; however, women were less satisfied than men were with the support they received.

On average, doctoral students did not suffer from high levels of stress and heavy workloads; however, women reported experiencing higher levels of stress and heavier workloads than men did. The majority of the respondents reported not having experienced harassment or discrimination; however, women reported having witnessed or experienced discrimination or harassment more often than men did.

The doctoral students were typically happy about all aspects of their health, living, and social life. Yet differences among the students were detected. Finnish doctoral students were more satisfied with their living conditions and apartments and with their mental health than their international counterparts were. Part-time doctoral students were happier about their living conditions and apartments, financial situation, and mental health than full-time students were. Further, non-salaried students were happier with their physical and mental health and their relationships with friends than salaried students were.

Factors contributing to study progress: Full-time doctoral students expected to graduate in less than 5 years, whereas part-time students estimated completing their

degree in 7.5 years. The estimated completion times were longer and the number of delayed students was higher in the Faculty of Humanities than in other faculties.

Doctoral students' study progress was affected by age, employment, frequency of interacting with one's supervisor, and the supervisor's commitment to the supervisee's education. Younger students and salaried students made faster progress compared to older students and those without a salaried position. Progress was slower among students who rarely interacted with their supervisor or who felt a lack of commitment on the part of their supervisor. Perceptions of supervisors' commitment correlated with students' satisfaction with academic support.

Doctoral students perceived that they benefited from active and supportive interaction with the researcher community as well as friendly, encouraging, and knowledgeable supervisors. Students considered that their progress was also promoted by the interesting and flexible work of a researcher and by structures and resources such as funding and infrastructure. However, structures and resources were also a common hindrance. Students particularly felt slowed down by the lack and inadequacy of funding as well as bureaucracy and unclear doctoral training practices. Further, students reported difficulties in doctoral research and work-life balance.

Perceptions of future career: The majority of the doctoral researchers were oriented toward a career in academia. The position of postdoctoral researcher was considered the most attractive and likeliest career choice after graduation, especially by international doctoral students and full-time doctoral students. Compared to non-salaried students, students with a paid position at the university were more attracted to, and perceived a better chance of, gaining employment in research positions in or outside of academia.

Employment as a postdoctoral researcher was considered more likely by students in the Faculties of Science and Biochemistry and Molecular Medicine than by those in the Faculty of Education. Employment in the private sector, in turn, was considered either more likely or more attractive by students in the Faculties of Technology, Information Technology and Electrical Engineering, and Biochemistry and Molecular Medicine and Oulu Business School compared to those in the Faculties of Education, Humanities, and Medicine. Entrepreneurship was considered either more likely or more attractive by students in the Faculties of Information Technology and Electrical Engineering, and Architecture and Oulu Business School than those in the Faculties of Medicine, Science, and Humanities.

Doctoral students mostly considered that the knowledge and skills developed in the course of doctoral studies would be useful in their desired career. However, most

of the doctoral students reported that the university had not provided enough support for their career planning, with women and full-time doctoral students showing greater dissatisfaction than men and part-time doctoral students.

Appendix 1

Table 7. Number and proportion of doctoral students in each faculty.

Faculty	Total		Respondents		Difference	
	N	%	N	%	Z	p
Architecture	24	1 %	7	2 %	-0.58	0.56
Biochemistry and Molecular Med.	64	4 %	20	5 %	-1.26	0.21
Humanities	223	14 %	51	14 %	-0.02	0.98
Mining School	16	1 %	4	1 %	-0.17	0.87
Education	123	7 %	27	7 %	0.18	0.85
Science	197	12 %	55	15 %	-1.42	0.15
Medicine	403	24 %	76	20 %	1.74	0.08
Business School	96	6 %	24	6 %	-0.42	0.68
Technology	205	12 %	59	16 %	-1.70	0.09
Information Tech. and Elect. Eng.	294	18 %	52	14 %	1.86	0.06
Total	1645	100	375	100		

Appendix 2

Table 8. Respondents by full-time and part-time status.

Faculty	N	Full-time	Part-time
		%	%
Architecture	5	80.0	20.0
Biochemistry and Molecular Med.	20	75.0	25.0
Humanities	43	58.1	41.9
Mining School	4	75.0	25.0
Education	25	60.0	40.0
Science	49	87.8	12.2
Medicine	65	55.4	44.6
Business School	24	62.5	37.5
Technology	54	64.8	35.2
Information Tech. and Elect. Eng.	49	77.6	22.4

Appendix 3

Table 9. Frequency of collaboration with a research group.

Scale	%
1 = Yes, a lot	14.4
2 = Yes, most of the time	20.3
3 = Sometimes	20.8
4 = Not that often	8.0
5 = Rarely	7.5
6 = No	29.1

Appendix 4

Table 10. Satisfaction with academic support.

Scale	%
1 = Yes, I feel that I get enough support	17.4
2 = Yes, most of the time	36.4
3 = Sometimes yes, sometimes not	29.7
4 = I feel that I don't get enough support	11.5
5 = No, I don't really get any support	5.1

Appendix 5

Table 11. Factors contributing to the progress of doctoral studies: binary logistic regression model 1

Contributing factors	Progress of doctoral studies	
	OR (CI 95%)	p
Age		
20-30 (ref.)		
31-35	0.13 (0.06, 0.27)	0.0001
36-40	0.13 (0.06, 0.28)	0.0001
above 40	0.17 (0.08, 0.39)	0.0001
Employment position		
University position	0.56 (0.33, 0.95)	0.032
No University position (ref.)		
Supervisor's interaction with the student		
On daily basis (ref)		
Several times a week	0.78 (0.27, 2.22)	0.635
Once a week	2.29 (0.69, 7.64)	0.179
Once every few weeks	0.78 (0.27, 2.27)	0.649
Once a month	1.10 (0.30, 3.95)	0.892
Once every few months	0.57 (0.18, 1.84)	0.35
Few times a year or less	0.25 (0.07, 0.85)	0.026
Omnibus		0.0001
Hosmer and Lemeshow		0.21
Cox&Snell, Nagelkerke R ²	21.5% to 30.0%	
Classification	75.1	

OR: odd ratios

CI: confidence intervals

P <0.05 (statistical significance marked in bold)

Appendix 6

Table 12. Factors contributing to the progress of doctoral studies: binary logistic regression model 2

Contributing factors	Progress of doctoral studies	
	OR (CI 95%)	p
Age		
20-30 (ref.)		
31-35	0.13 (0.06, 0.27)	0.0001
36-40	0.11 (0.05, 0.24)	0.0001
above 40	0.12 (0.05, 0.26)	0.0001
Employment position		
University position	0.58 (0.35, 0.96)	0.035
No position (ref.)		
Supervisor's commitment to education		
Very high (ref.)		
Good	0.66 (0.32, 1.34)	0.213
Average	0.37 (0.18, 0.79)	0.008
Below average	0.28 (0.11, 0.71)	0.007
Omnibus		0.0001
Hosmer and Lemeshow		0.88
Cox&Snell, Nagelkerke R ²	19.3% to 27.1%	
Classification	72.1	

OR: odd ratios

CI: confidence intervals

p < 0.05 (statistical significance marked in bold)

Appendix 7

Table 13. Usefulness of the knowledge and skills learned during doctoral training

Scale	%
1 = Nearly everything I learned supports me in my chosen career	19.3
2 = Most of what I learned is useful in my career	58.2
3 = My research topic itself is not that useful but transferable skills are important	20.1
4 = Basically nothing I have learned supports me in my career	2.45

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