Personal interest, supervisory and research community support and dropout intentions among Finnish PhD candidates

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Abstract

Purpose – This study aims to advance the understanding on individual variations in PhD candidates' personal interest in their doctorate and supervisory and research community support, and several individual and structural attributes potentially having an impact on the profiles.

Design/methodology/approach – The authors explored the interrelationship between personal interest – social support profiles, and nationality, gender, research group and study status and the risk of dropping out. A total of 768 PhD candidates from a research-intensive university in Finland responded to a modified version of the cross-cultural doctoral experience survey. Latent profile analysis was used to explore the individual variations in PhD candidates' interest and support from the supervisor and research community.

Findings – Three distinctive PhD interest-social support profiles were detected; the high interest–high support profile (74.4%, $n = 570$), the high interest–moderate support profile (18.2%, $n = 140$) and the moderate interest–moderate support profile (7.4%, $n = 56$). The profiles exhibited high to moderate levels of research, development and instrumental interest. Individuals in the high interest–moderate support and in the moderate interest–moderate support profiles were more prone to consider dropping out from their PhD than in the high interest–high support profile.

Originality/value – The results indicate that by cultivating PhD candidates' interest and providing sufficient supervisory and the research community offers a means for preventing candidates from discontinuing their doctorate. Hence, building a supportive learning environment that cultivates a PhD candidate's personal interest is likely to reduce high dropout rates among the candidates.

Keywords PhD candidate, Personal interest, Social support, Dropout intentions, Doctoral education

Paper type Research paper

Introduction

Personal interest plays a central role in the quality of the PhD experience, study completion (Grover, 2007; Pyhältö *et al.*, 2019) and PhD careers within (De Clercq *et al.*, 2021) and beyond the academy after graduation. High levels of interest have been shown to be related to timely study progress (Devos *et al.*, 2017; Marais *et al.*, 2018), reduced risk of dropping out (Cornér *et al.*, 2021, Pyhältö *et al.*, 2019), shorter study completion time (Lahenius, 2013; Zhao *et al.*, 2007), research career intentions (Curtin *et al.*, 2016; Forbrig, 2020) and career advancement (Grabowski and Miller, 2015). In general, PhD candidates have been shown to be highly committed to their studying (Cornér *et al.*, 2021, Vekkaila, 2013). At the same time, the number of candidates who never complete their PhD is high (Gardner and Gopaul, 2012; Wollast *et al.*, 2018). Depending on the discipline, country and the study dropout rates ranging from 33% up to 70% have been reported (Gardner and Gopaul, 2012; Jiranek, 2010; Wollast *et al.*, 2018). This implies that not all the candidates are sufficiently supported to sustain their interest until completion. To prevent study dropout, and effectively preparing PhD candidates for future careers both inside and outside academia, we need to be able to identify the candidates at risk. Based on prior studies, early risk indicators are likely to involve reduced interest in studying and insufficient supervisory and research community support (Wisker, 2012). However, thus far, empirical evidence on individual variations in PhD candidates' interest and the support received from their supervisors and the research community has been limited. In fact, we have not found any research applying the person-centred approach on personal interest–social support profiles and the interrelation between the profiles and the risk of dropping out of a doctoral programme. Furthermore, large-scale survey studies on the topic are still rare (Pyhältö *et al.*, 2019, Cornér *et al.*, 2021). Our study contributes to the body of knowledge on PhD candidates' personal interest and social support experience and turnover intentions by exploring the PhD candidates' personal interest and support profiles and the odds of harbouring dropout intentions in a research-intensive context in Finland. In addition, we explore how the profiles are related to PhD candidates' demographics such as gender, study status, research group status and nationality.

PhD candidates' personal interest

PhD candidates' personal interest is constructed in the interplay between the individual and their social environments (Pyhältö *et al.*, 2019, Cornér *et al.*, 2021). While the interest is individually experienced, it is constructed in a certain socio-cultural context and is socially embedded (Cai *et al.*, 2019). This implies that PhD candidates' personal interest is likely to be highly affected by the support received from the supervisory and research community (Curtin *et al.*, 2016; De Clercq *et al.*, 2019; Litalien and Guay, 2015; Woolderink *et al.*, 2015). Personal interest in one's doctorate entails two distinct but complementary components: feeling-related and value-related valences (Anttila *et al.*, 2015; Sverdlik *et al.*, 2018; Pyhältö *et al.*, 2019; see also seminal work by Hidi and Renniger, 2006; Krapp, 2002, 2005). While feeling-related valence refers to emotions that are associated with undertaking a doctorate, such as involvement or stimulation, the value-related valence entails the attribution of personal significance or importance of the studies (Pyhältö *et al.*, 2019). The interest can be driven primarily by the feeling or the personal significance or both (Eccles *et al.*, 1984). It can also vary over time (Pyhältö *et al.*, 2012a). Prior studies have shown that PhD candidates are typically driven by curiosity to explore, recognise and create new knowledge, i.e. interest in research itself (Guerin *et al.*, 2015; Neves, 2018; Pyhältö *et al.*, 2019; Skakni, 2018b). For

instance, a significant proportion of British PhD candidates (41%) reported that their main motive for pursuing a doctoral degree was interest in their research topic (Neves, 2018). In addition, a wish to develop new competencies i.e. personal and professional transformation have been shown to be an important motive for commencing a doctorate (Guerin *et al.*, 2015; Skakni, 2018b). Instrumental motives such as better employment opportunities, gaining a better salary or promotion when the degree is completed have been also identified as motives for undertaking a PhD (Guerin *et al.*, 2015; Sakurai *et al.*, 2017, Stubb *et al.*, 2012). In fact, about one-third of the PhD candidates in the UK emphasised improving career prospects as an important motive for pursuing their doctoral degree (Neves, 2018). Results of inter-country comparisons on the contextual differences are partly contradictory. A recent comparison between Finland, the UK and Spain reported some differences, including Spanish PhD candidates showing higher levels of both instrumental and research interest compared to Finnish and UK PhD candidates, and the Finnish candidates showing lower levels of instrumental interest than UK candidates (Pyhältö *et al.*, 2019). However, no variation was detected in another recent study on PhD candidates' personal interest among Danish and Finnish candidates (Cornér *et al.*, 2021). This suggests that individual variation within a socio-cultural context or/and variation between the local scholarly communities providing the primary learning environment for a PhD candidate might be greater than inter-country variation. Moreover, a PhD candidate may also simultaneously have several complementary or event partly contradictory motives for undertaking a PhD. Based on this, we presume that individual variations in PhD candidates' interest can be detected, and that the variation is at least to some extent affected by the interactions within the learning environment provided by the local scholarly community. This means that PhD candidates' interest in pursuing a PhD is likely to be influenced by the socio-cultural structures with its norms in the learning environment (Lovitts, 2005), disciplinary practices (Stubb *et al.*, 2012b), research writing practices (Lonka *et al.*, 2019), the organisation of the faculty and how the supervisory support is arranged (Lee, 2018; McAlpine, 2017). Yet, we still know little about individual variations in PhD candidates' personal interest and its interrelationship with their supervisory and research community support experience.

Social support from supervisor and research community

Social support refers to the social resources perceived to be available and provided to PhD candidates by their learning environment (Cobb, 1976; House, 1981; Pyhältö, 2018; Cornér *et al.*, 2018). The primary sources of support for the PhD candidates typically are the support from the doctoral supervisor(s) (Kobayashi, 2014; Olmos-López and Sunderland, 2015; Agné and Mörkenstam, 2018) and support from the research community, including both formal and informal relationships within academia (Pyhältö, 2018; Cornér *et al.*, 2018; Wisker, 2012). Supervisory support is a central determinant of doctoral experience (De Clerqe *et al.*, 2021; Devine and Hunter, 2016), including feedback strategies (Chugh *et al.*, 2022), building and sustaining a PhD candidate's personal interest in studying (Martinsuo and Turkulainen, 2011) and in an increased interest in pursuing an academic career (Curtin *et al.*, 2016). However, the effective supervisory support can take a range of forms.

Informational support can be a more practical and an intellectual form of support (Hopwood, 2010). It may also be in the form of emotional support (Hopwood, 2010) such as encouragement or acknowledgement. PhD candidates value highly both informational and emotional support, such as to receive relevant feedback, advice and to have a trustful

relationship (Devos *et al.*, 2017; Pyhältö *et al.*, 2015; Rogers-Shaw and Carr-Chellman, 2018). They highlight the importance of a flexible, responsive and negotiable approach as support strategies of the supervisor, especially when facing stressful transactions (Deuchar, 2008; Rogers-Shaw and Carr-Chellman, 2018). Prior studies have confirmed a connection between constructive and encouraging support and PhD candidates' determination and study progress (Ives and Rowley, 2005; Vekkaila *et al.*, 2018; Wao and Onwuegbuzie, 2011).

The research community provides the primary learning environment for a PhD candidate (Cai *et al.*, 2019). The research community comprises social networks, research teams and collaborators beyond the institution, constituting the disciplinary community of practice (Nummenmaa *et al.*, 2008; Stubb *et al.*, 2012; White and Nonnamaker, 2008; Dysthe *et al.*, 2006). At its best, fellow PhD candidates, post-PhD researchers, senior scholars and other staff members and international research networks, special interest groups and external stakeholders (such as funding agencies and cultural foundations) form a functional support system, providing support sources for a range of purposes (Hakkarainen *et al.*, 2016; Pyhältö, 2018; Stubb *et al.*, 2012). Multiple sources of social support in the research community such as group supervision, research seminars and other collective forms of social support are of benefit to PhD candidates in their development to becoming independent researchers (Agné and Mörkenstam, 2018; Peltonen *et al.*, 2017; Skakni, 2018b). Furthermore, the overall research community contribute to the sense of belonging and overall satisfaction in the doctoral project (Hutchings, 2017; Dysthe *et al.*, 2006). The collective forms of social support in the research community have been shown to be crucial in the transition from being a PhD candidate to being a post-PhD researcher (Jones, 2013; McAlpine and Amundsen, 2012; Olmos-López and Sunderland, 2015). To sum up, supervisory and research community support plays a distinctive but complementary role in the doctoral experience. Accordingly, the quantity and quality of interactions within the nested research communities and with supervisor(s) is a key resource for building and sustaining PhD candidates' interest and commitment to doctoral studies (Jones, 2013; McAlpine and Amundsen, 2012).

Dropout intentions
Studying for a doctorate is intellectually and emotionally challenging (Barry *et al.*, 2018; Cotterall, 2013; Mantai and Dowling, 2015; Skakni, 2018a). The PhD candidates' persistence, and hence their interest in their doctorate, is tested by many hardships faced during the programme, including (but not limited to) high levels of stress, lack of funding and insufficient support (Devine and Hunter, 2016; Castelló *et al.*, 2017; Jones, 2013; Pyhältö *et al.*, 2012). Due to the hardships, many PhD candidates never complete their doctorate (Jones, 2013; Gardner, 2010). The attrition rate varies between 33 and 70% depending on the discipline, country and the doctoral education system (Gardner and Gopaul, 2012; Jiranek, 2010; Wollast *et al.*, 2018). Actual discontinuation is typically preceded by reduced study motivation and considering dropping out. It has been suggested that the proportion of PhD candidates considering dropping out in Finland ranges from 38%–45% (Cornér *et al.*, 2017, Peltonen *et al.*, 2017), implying that Finland is in line with global attrition trends.

Recent studies have identified several antecedents of study completion/non-completion. Antecedents of non-completion include studying part time (Castelló *et al.*, 2017), prolonging the study progress (van de Schoot *et al.*, 2013), the PhD candidate's dissatisfaction with their progress (Marais *et al.*, 2018), a *"crisis"* in competence (Litalien and Guay, 2015, p. 229), the workload (van Rooij *et al.*, 2021), social isolation (Ali and Kohun, 2007; Vekkaila *et al.*, 2018), work–life imbalance (Schmidt and Hansson, 2018), psychological costs such as experiencing exhaustion and cynicism (Devine and Hunter, 2016; Levecque *et al.*, 2017) and insufficient support from the supervisory and research community (Cornér *et al.*, 2017, Peltonen *et al.*,

2017, Pyhältö *et al.* 2015). To sum up, the results indicate that a lack of or insufficient supervisory support and integration into the research community and research networks are among the more powerful determinants of non-completion, and potentially reduced interest preceding a decision to discontinue and actual attrition (Castelló *et al.*, 2017; Graham and Massyn, 2019). To add the body of knowledge, we applied a person-centred approach to PhD candidates' personal interest, experiences of social support in their learning environment and dropout intentions among Finnish PhD candidates.

Doctoral education in Finland

In the European context, Finland has the highest rate of doctoral degree completion per capita (OECD, 2014). The doctoral education system in Finland is nationwide, meaning that all doctoral candidates are part of a doctoral programme at their home university. The structure of the doctoral education system is under constant development, but it stands on a solid research-intensive base and includes only marginal amounts of course work (usually 40 credits in the European Credit Transfer System, ECTS) (Pyhältö *et al.*, 2019).

Most doctoral candidates produce a thesis, which comprises of three or four peer-reviewed published international articles, and a written summary of these articles. Monographs are also produced (mainly in the Humanities, Arts and Social Sciences). The dissertation is pre-examined by two external examiners appointed by the faculty and the doctoral candidates defend their dissertations in public. Hereafter, the faculty awards the PhD candidates their PhD degree. In Finland, there are no tuition fees, but the doctoral candidate has to seek funding from the university or various foundations. PhD completion is targeted to take four years, but the typical time of candidacy is five or six years.

Aims of the study

The aim of this study was to understand individual variations in PhD candidates' interest and social support from their supervisor and research community, and if such variation is associated with dropout intentions. In addition, the interrelationships between the profiles and nationality, gender, research group status or study status were explored. The following research questions were addressed:

RQ1. What individual variations can be detected in PhD candidates' interest and social support?

RQ2. Are the interest–support profiles related to a PhD candidate's nationality, gender, research group status, study status or dropout intentions?

Methods

Participants

A total of 768 PhD candidates (67% women, 31% men) from four doctoral schools at the case university, including Environmental, Food and Biological Sciences (YEB), Health Sciences (DSHealth), Humanities and Social Sciences (HYMY) and Natural Sciences (DONASCI), responded to a cross-cultural doctoral experience survey. The response rate was 17%. The candidates were typically aged between 30 and 34 years, varying from under 25 to over 50. In terms of age distribution, the doctoral schools and disciplinary distribution, the sample was a good representation of the whole PhD candidate population in the case university where the study was conducted. Women were slightly overrepresented in the data. On average, doctoral candidates expected to graduate within 5.8 years, and 43% of the doctoral candidates expected to finish their doctoral degree within four years. Most of

the candidates were in final third of their doctoral studying (52%), while 33% were in the middle and 15% at the beginning. Most participants were Finnish, and most reported working full-time on their thesis and were writing their thesis in the form of a compilation of articles. About 21% of candidates were preparing a monograph, while 2% reported that they did not know in which form their thesis would take. A minority reported being engaged in the research team (see Table 1).

Data
The data were collected in April and May 2021 by using a modified version of the cross-cultural doctoral experience survey (C-DES) validated in previous studies (Pyhältö *et al.*, 2018; see also Pyhältö *et al.*, 2016). The data were collected with an online survey. The link to the C-DES survey was sent via e-mail to the participants by using the doctoral schools' PhD candidate mailing lists. All the participants were informed about the study prior to the data collection. No identifying information was collected nor were any incentives offered. Participation in the study was voluntary. For this study, we used the following scales:

- research interest (five items);
- development interest (four items);
- instrumental interest (four items);
- supervisory support (ten items); and
- research community support (seven items).

In addition, the following background variables were used: nationality (Finnish/other), study status (full-time/part-time), gender (women/men), research group status (alone/in a group). Furthermore, the reported dropout intentions (yes/no) were used.

Ethics
In Finland, ethics review is required when:

- research involves intervention in the physical integrity of research participants;
- deviates from the principle of informed consent;

Background variables	*n* (%)
Nationality	
Finnish	604 (80)
Other	152 (20)
*Gender**	
Women	502 (67)
Men	234 (31)
Study status	
Full-time	467 (62)
Part-time	286 (38)
Research group status	
Alone	521 (70)
In a group	224 (30)
Note: *2% of the participants disclosed "other" as their gender **Source:** Created by author	

Table 1.
Distribution of the participants by the background variables

- involves participants under the age of 15 being studied without parental consent;
- exposes participants to exceptionally strong stimuli;
- risks causing long-term mental harm beyond that encountered in normal life; and
- signifies a security risk to subjects (Finnish National Board on Research Integrity, 2019, p. 19).

None of these conditions was encountered in this study.

Analysis
A latent profile analysis (LPA) was used to explore the individual variation in PhD candidates' interest and social support from supervisor and research community. Compared to other clustering approaches, LPA provides statistical criteria for model comparisons in selecting the best-fitting number of latent classes and opportunity to include predictors and outcomes (Morin *et al.*, 2018; Vermunt and Magidson, 2002). The analyses were carried out using MPlus version 8.6. An MLR estimator was used, because it produces maximum likelihood estimates with standard errors and chi-squared test statistics that are robust to non-normality (Muthén and Muthén, 1998/2017). Within-class variances were held constant across classes. Lastly, to analyse whether nationality, gender, study status or research group status predicted belonging to a certain profile, we used auxiliary MPlus command (Muthén and Muthén, 1998/2017). The background variables were included as antecedents of the latent class variable while accounting for the measurement error in classification (Asparouhov and Muthén, 2014). This analysis was carried out with the R3STEP procedure of MPlus that performs a multinomial logistic regression and provides the odds ratios describing the effect of background variables on the likelihood of membership in each of the latent profiles compared to other profiles (McLarnon and O'Neill, 2018). The DCAT procedure for MPlus was used for examining whether candidates from different profiles differed from each other in terms of their likelihood of quitting their doctorate.

Results
On average, the PhD candidates reported high levels of research and development interest, and moderate levels of instrumental interest (see Table 2). Significant variation between the candidates in their research, development and instrumental interest was detected. The

Study variables	1	2	3	4	5
1. Research interest					
2. Development interest	0.570**				
3. Instrumental interest	0.179**	0.190**			
4. Supervisory support	0.367**	0.214**	0.133**		
5. Research community support	0.328**	0.207**	0.236**	0.636**	
No. items	5	4	4	10	7
Cronbach's α	0.79	0.71	0.80	0.95	0.90
Mean	5.86	6.36	4.64	5.38	4.78
SD	0.91	0.73	1.49	1.34	1.38
Min/max	1.80/7.00	1.50/7.00	1.00/7.00	1.00/7.00	1.00/7.00

Note: **$p < 0.001$
Source: Created by author

Table 2.
Descriptive statistics
of the study variables

personal interest dimensions were interrelated. The associations between research and development interest were stronger than the interrelationships between instrumental interest and other interest dimensions. This means that the candidates who reported high levels of research interest typically reported high levels of development interest as well, while the relationship was weaker with instrumental interest. The candidates also reported receiving sufficient social support from the supervisor and the research community. The PhD candidates who reported receiving sufficient support from their supervisor were also more satisfied with the social support available in the research community.

The interest-support profiles

Firstly, LPAs were run with one to seven classes. Several statistical criteria were used in selecting the best-fitting model: the Bayesian criteria (BIC and adjusted BIC) and Vuong–Lo–Mendell–Rubin (VLMR) and Lo–Mendell–Rubin (aLRT) and bootstrapped (BLRT) likelihood ratio tests (Nylund *et al.*, 2007; Berlin *et al.*, 2014). Theoretical meaningfulness of the profile solution was emphasised when selecting the number of classes. The information criteria (AIC, BIC, aBIC) showed that adding a new latent profile enhanced the model fit all the way to seven profiles (see Table 3). The elbow plot (Figure 1) showed that BIC and aBIC values clearly decreased from one to two profiles, but after that, the decline levelled off. According to VLMR and aLRT likelihood ratio tests, adding a new class increased the model fit to three classes. Hence, the three-profile solution was selected. It was also considered to be the most parsimonious model and included profiles with sufficiently large memberships (i.e. > 5% of the classes), and had a clear theoretical interpretation. The entropy value (0.89) and latent class probabilities (>0.80) showed sufficient separation between the profiles in the three-profile solution.

Three interest-social support profiles were identified (Figure 2). The first profile was the most common among the participants, making up 74.4% of the total ($n = 570$). The PhD candidates with this profile reported the highest levels of research, development and instrumental interest. In addition, they reported receiving higher levels of supervisory and research community support than PhD candidates with other profiles. This profile was described as the *high interest–high support* profile. The second profile, the *high interest-moderate support* profile, constituted 18.2% ($n = 140$). The PhD candidates in this profile reported lower levels of interest than PhD candidates in the high interest–high support profile, although they still reported quite high levels of research and development interest, and moderate levels of instrumental interest. In addition, the PhD candidates in this profile reported receiving less supervisory and research community support compared to candidates in other two profiles. The third profile, *moderate interest–moderate support* profile was smallest of the profiles with a 7.4% share ($n = 56$). The candidates in this profile reported lower levels of research and development interest compared to other profiles, and lower levels of instrumental interest than PhD candidates in high interest–high support profile. In addition, they reported receiving less support both from supervisor and research community than PhD candidates in *high interest–high support* profile. In general, the candidates in all profiles reported lower levels of instrumental interest than research or development interest. However, this difference seemed to be the smallest in the moderate interest–moderate support profile.

Secondly, we explored whether the PhD candidates' nationality, gender, study status or research group status were related to the profile membership. Nationality, gender and study status were not statistically significantly related to the profile membership. Yet, some differences between the profiles were detected regarding their research group

| No. of classes	LogL(df)	AIC	BIC	aBIC	Entropy	Latent class probabilities	VLMR	aLRT	BLRT	Class counts (posterior/most likely)
1	−5,888.54 (10)	11,797.08	11,843.49	11,811.74						766/766
2	−5,597.76 (16)	11,227.51	11,301.77	11,250.96	0.857	0.929, 0.969	0.000	0.000	0.000	175, 590/169, 597
3	−5,467.07 (22)	10,978.14	11,080.25	11,010.39	0.887	0.908, 0.966, 0.899	0.045	0.048	0.000	139, 570, 56/133, 577, 56
4	−5,383.50 (28)	10,823.01	10,952.96	10,864.05	0.788	0.924, 0.914, 0.808, 0.901	0.335	0.342	0.000	31, 117, 231, 387/30, 113, 231, 392
5	−5,309.07 (34)	10,686.14	10,843.84	10,735.97	0.806	0.900, 0.960, 0.814, 0.905, 0.894	0.164	0.170	0.000	33, 19, 268, 110, 336/33, 18, 273, 108, 334
6	−5,267.27 (40)	10,614.54	10,800.18	10,673.16	0.816	0.994, 0.911, 0.804, 0.868, 0.831, 0.904	0.166	0.171	0.000	13, 32, 34, 297, 281, 110/12, 31, 33, 304, 276, 110

Source: Created by author

Table 3.
Information criteria
values for different
profile solutions in
LPAs
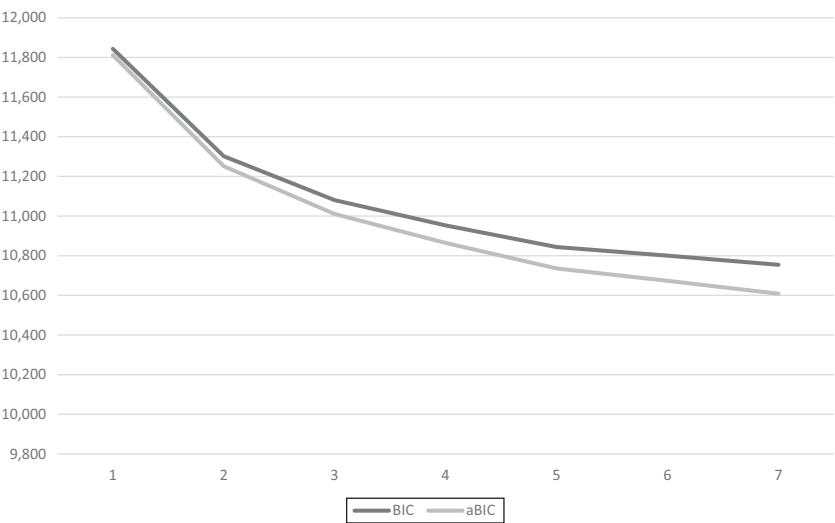
Source: Created by author
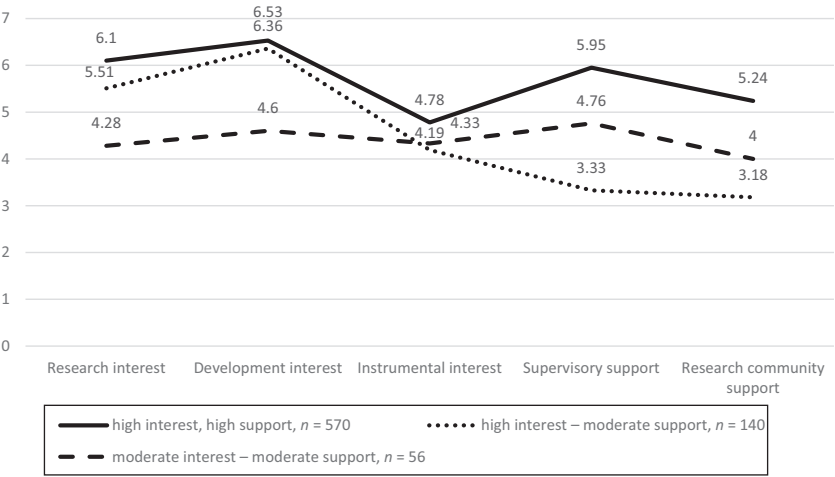
Source: Created by author

status, i.e. whether the candidate was engaged in a research team or not. The PhD candidates who reported undertaking their doctoral research alone were more likely to belong to the *high interest–moderate support* profile than to the *high interest–high support* profile ($b = 1.18$, SE = 0.33, $p < 0.001$, OR = 3.25, 95%CI[1.70–6.20]) and to *moderate interest–moderate support* profile ($b = 0.86$, SE = 0.44, $p < 0.05$, OR = 2.36, 95% CI[1.01–5.55]).

Differences between the profiles in considering study dropout
Lastly, we explored if there were differences in the tendency to dropout across the profiles. The PhD candidates in the *high interest–moderate support* profile (χ^2 (1) = 60.68, $p < 0.001$) and the *moderate interest–moderate support* profile (χ^2 (1) = 5.25, $p < 0.05$) reported significantly more dropout intentions than candidates with the *high interest–high support* profile. About 60% of the candidates in the *high interest–moderate support* profile and 49% of the candidates in the *moderate interest–moderate support* reported that they had considered dropping out from their programme, while 25% of the candidates in the *high interest–high support* profile had entertained such thoughts.

Discussion
Three distinct profiles for personal interest and social support were identified within our sample of Finnish PhD candidates. Two profile groups exhibited high research and developmental interest, while PhD candidates in all profiles reported only moderate instrumental interest. It is noteworthy that the two profiles with high research and developmental interest represented over 90% of the PhD candidates. Our findings on research and developmental interest corroborate with previous evidence demonstrating that PhD candidates are driven by being inspired to conduct research and a desire to develop new competencies and to grow as professionals (Guerin *et al.*, 2015; Pyhältö *et al.*, 2019; Skakni, 2018b). In parallel, the social support from various sources in their learning environment was associated with the experienced interest in doctoral studies. The PhD candidates in this study stated that a strong motive for undertaking a doctorate seems to be their curiosity and enthusiasm to create new knowledge, and that personal development, and the motive to enhance intellectual competence are highly significant reasons for pursuing a doctoral degree. This result is in line with previous research (Cornér *et al.*, 2021; Guerin *et al.*, 2015; Neves, 2018; Pyhältö *et al.*, 2019; Skakni, 2018b). However, the results shows that the PhD candidates in all three profiles exhibited only moderate levels of instrumental interest, indicating that better employment opportunities or a better salary seemed to have a lower priority than research and developmental motives for the participating candidates. Our findings indicate a hierarchy in the PhD candidates' motives. It appears that the participants in this study reported their enthusiasm with creating new knowledge, e.g. the commitment to conducting research and self-development as primary motive in comparison to instrumental motives. The result differs from that in previous research in which international comparisons indicated variety in PhD candidates' interest profiles, particularly when it comes to the importance they gave to instrumental interest (Pyhältö *et al.*, 2019).

In addition to relatively consistent two profiles for interest, variation in the three profiles was identified for the emphasis of social support. In the only "below average social support reported profile", namely the *high interest–moderate support profile*, the candidates reported significantly lower levels of both supervisory support and research community support than the individuals in the *high interest–high support profile* and in the *moderate interest–moderate support profile*. The result implies that though most of the candidates are strongly engaged in their PhD projects and show a strong interest in their doctoral trajectory, not all of them are adequately supported when they are studying. Lack of social support during the doctorate has been confirmed as a challenge in earlier research (Devine and Hunter, 2016; Castelló *et al.*, 2017; Jones, 2013; Pyhältö *et al.*, 2012). In line with the results of previous studies, our results showed that doctoral supervisors and the research community are key resources for PhD candidates' enculturation process, and that supervisory and research community support sustains their motivation and commitment to the doctoral project (Cornér *et al.*, 2017; Jones, 2013; McAlpine and Amundsen, 2012). Further, as

practical recommendations, PhD candidates who work alone benefit from emotional support, such as encouragement and receiving relevant feedback on their work (Devos *et al.*, 2017; Deuchar, 2008; Rogers-Shaw and Carr-Chellman, 2018) and from informational support, such as enhancing research writing practices (Lonka *et al.*, 2019, Pyhältö *et al.*, 2019). For PhD candidates who work mainly without having a research group to lean on, the importance of international research networks in their own field should be supported both by their supervisor and at the faculty or university level (Cornér *et al.*, 2018, Vekkaila *et al.*, 2018, Pyhältö *et al.*, 2018; Lee, 2018; McAlpine, 2017). Research has indicated that both the quantity and quality of exchanges within the academic community are key for constructing and sustaining PhD candidates in their doctoral project (Jones, 2013; McAlpine and Amundsen, 2012).

Background variables such as nationality, gender and study status did not explain the profile membership. This is a positive result when referring to equality in doctoral programmes in Finland (Nori *et al.*, 2020). However, candidates who worked alone more typically belonged to the *high interest–moderate support* profile compared to the PhD candidates who were undertaking their doctoral research in a research group. Further, considering dropping out of the doctoral degree was significantly more common for individuals in the *high interest–moderate support* and in the *moderate interest–moderate support* than in the *high interest–high support* profile. Two-thirds (66%) of the candidates in the *high interest-moderate support* profile and half (49%) of the candidates in the *moderate interest–moderate support* were prone to thoughts about dropping out. By comparison, a quarter (25%) of the individuals reporting high levels of interest and high levels of social support said they had considered quitting their doctoral studying. Two groups of PhD candidates reported high levels of interest: one group experienced high levels of support and the other group moderate levels of support. However, the PhD candidates receiving moderate levels of support were at greater risk of dropping out of their doctoral project. Consequently, our results indicate that high levels of research and development interest and high levels of perceived social support by both doctoral supervisors and the research community might distinguish completers from non-completers. Our results confirm earlier research stating that lack of social support and insufficient involvement in the research community determinate considerations of dropout (Castelló *et al.*, 2017; Graham and Massyn, 2019). PhD candidates' interest and experiences of social supervisory and research community support plays a significant role in shaping their doctoral trajectory (see also Martinsuo and Turkulainen, 2011).

Methodological reflections

Some methodological limitations need to be considered when interpreting the results. The criteria for selecting the number of profiles are ambiguous (Nylund *et al.*, 2007). In addition, the study was conducted in a specific socio-cultural context, i.e. in an institution. Therefore, we need further studies to examine whether similar interest-support profiles can be found among PhD candidates in other contexts. For example, we did not find a profile with low interest and low support within our data, although this kind of profile probably could be found elsewhere. It is important to note that due to the cross-sectional data set, causal conclusions regarding interest and support and dropping out cannot be drawn. The response rate was 17% and can be regarded as being rather low. Information on the participants' ethnicity beyond "Finnish"/"Non Finnish" or socio-economic status was not available, so we are unable to report on how representative the sample was in this regard. Women were slightly overrepresented in the sample, but in terms of age and disciplinary distribution, the sample represented the PhD candidates in the case university well. Future research could also be conducted over a longer period and follow PhD candidates from the

start of their PhD to their graduation. Moreover, interviews could preferably be combined with the quantitative data set.

Conclusions

Previous research relating to PhD candidates' individual variations in interest and support received from their learning environment in doctoral education is limited. We have not found any other studies applying a person-centred approach on exploring PhD candidates' personal interest and social support experiences, and the relationship between the profiles and the risk of harbouring dropout intentions. Accordingly, this study provides insight on how individual variation in doctoral students' social support experiences in relation to three personal interest profiles. The study also provides a deeper understanding of the interrelationship between personal interest in research and the risk of entertain the idea of dropping out in one large top research institution.

In terms of developing doctoral education our study has two main implications. Firstly, by cultivating doctoral candidates' personal interest, including a balanced combination of research, development and instrumental interest with sufficient social support offers a potential tool for buffering study drop out. Secondly, it seems that investing in research team integration enhances high interest and positive support experience among PhD. candidates. This may further have positive influences on PhD candidates' study well-being.

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