Higher Education
https://doi.org/10.1007/s10734-022-00921-w

Too stupid for PhD? Doctoral impostor syndrome among Finnish PhD students

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Accepted: 29 August 2022

Abstract
Impostor syndrome (IS) refers to the inner speech of self-doubt and the belief that you are not as competent as others perceive you to be. The university can be considered a work environment prone to IS, especially because of the requirements of present higher education and science policy, which emphasizes continuous evaluation, a competitive spirit, and a focus on performance and excellence. It is therefore understandable that many doctoral students have begun to experience inadequacy and uncertainty during their postgraduate studies. This study focuses on the prevalence of IS among Finnish PhD students ($n = 1694$). In particular, attention is paid to the background factors in which experiences of uncertainty and attitudes related to IS are linked. Theoretically, we interpret IS as a phenomenon related to the habitus formed through an individual's life experiences and the inner speech associated with it. Based on the results of the linear regression analysis, the lack of encouragement in childhood and a low level of planning when applying for doctoral studies explain the emergence of IS in a statistically significant manner.

Keywords Doctoral students · Higher education · Habitus · Inner speech · Impostor syndrome

Introduction

> I am not satisfied that the thesis has progressed slowly as hell because of lack of funding, depression, unemployment and general hopelessness. I'm not happy with not being able to churn out publications in such a way that I would ever be able to compete for academic posts. I'm not happy that obviously I'm too lazy and stupid and too little ambitious and competitive to ever succeed in academia. (Doctoral student, female)

After passing through multiple educational transitions and meeting highly competitive access criteria (Cardoso et al., 2022), PhD students have already proven their sufficient ability to complete the highest university degree (Stubb et al., 2010). Nevertheless, many

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doctoral students doubt their abilities and, like the one cited above, experience severe performance pressure. Uncertainty and pressure are exacerbated by the increasing emphasis on competition, efficiency, effectiveness, excellence, and the importance of cutting-edge research in university and science policy rhetoric (Deem, 2020; Hannukainen & Brunila, 2017; Peura & Jauhiainen, 2018). As a result of continuous evaluation, monitoring of results, and glorification of excellence, some doctoral students might begin to demand too much from themselves and feel like an "impostor" who is not good enough for doctoral studies. Excessive self-criticism and the associated impostor syndrome (IS) can eventually become obstacles to the completion of a dissertation.

Previous IS research within academia has focused mainly on undergraduate students (September et al., 2001; Sonnak & Towell, 2001; Thompson et al., 1998), but the fraudulence experienced by doctoral students has recently attracted considerable interest (Cisco, 2020; Cohen & McConnell, 2019; Craddock et al., 2011; Cutri et al., 2021; Parkman, 2016; Sverdlik et al., 2018). PhD students are at especially high risk of developing IS, given the multidimensional evaluations they receive from peers, students, and professors (Gardner & Holley, 2011; Knights & Clarke, 2014).

Environmental conditions contribute to impostor fears (Kumar et al., 2021). The university can be considered a work environment prone to IS, especially because of its continuous evaluation, competitive spirit, and focus on performance (Hutchins, 2015). In the twenty-first century, competition has intensified further, as the number of jobs available to doctors has not grown at the same pace as the number of doctoral degrees (Haila et al., 2016). To succeed in this competition, higher quality research must be published at an increased pace. In addition to this seemingly contradictory requisite, researchers are required to have not only good research skills but also good language skills, self-confidence, and presentation skills, as well as the ability to network internationally and to market themselves (Cardoso et al., 2022; Kouhia & Tammi, 2014). These are qualities that have traditionally been required of those working in marketing positions in companies (Laalo et al., 2019). The new requirements are particularly challenging for individuals prone to IS, who are often introverted, experience severe performance pressure, and continuously compare themselves to others (e.g., Cisco, 2020; Sakulku & Alexander, 2011).

Here, we study the experiences of doctoral students and the challenges they face during their doctoral journey. In particular, attention is paid to the background factors in which experiences of uncertainty and attitudes related to IS are linked. Theoretically, we interpret IS as a phenomenon connected to the habitus (Bourdieu & Wacquant, 1995) formed through an individual's life experiences and the inner speech (Vygotsky, 1934/1986) associated with it. Based on Bourdieu's theory and previous research, working-class doctoral students may face more obstacles on their doctoral journeys. In contrast, doctoral students from highly educated families develop feelings of insecurity under severe success pressure from home.

Theoretical background

The impostor phenomenon: definition and previous research

More than four decades ago, American psychologists Clance and Imes (1978) found that many of the successful and talented women were plagued by an unwarranted, self-dismissive mindset. The women they interviewed did not feel intelligent and progressive, despite

all their accomplishments and the accolades of colleagues. Good performance in studies and work was considered to be mainly a coincidence or a kind of "scam" that would soon be revealed to others as well. This phenomenon later came to be known as IS,[1] which refers to a mindset in which a person considers themselves less proficient than they actually are. While the people around them might find the person skilled and competent, they themselves think that they only managed to give an impression of their prowess. A person with IS never feels good enough about themselves. Despite their abilities, they do not appreciate themselves or their accomplishments. They attribute their success to luck and their own shortcomings of failure; it is also difficult for the impostor to receive compliments and positive feedback. Their minds are gnawed by the incessant fear of mistakes and concern about their inadequate talent (Clance & Imes, 1978; Clance & O'Toole, 1987; Ekman, 2017; Royse Roskowski, 2010).

The roots of IS have been sought in a childhood family, and the problem has been thought to worsen at the school level, where the pupil is subjected to ongoing evaluation. The women interviewed by Clance and Imes (1978) were split into two groups based on their family history. In the first group, someone in the family was considered intelligent, whose achievements were often compared to those of the women. Because of this, the women felt that their abilities were always doubted, no matter how well they performed their duties. The school offered them the opportunity to demonstrate their ability, and that is why they did well there. Nevertheless, they were always over-shadowed by a smarter family member. In the second group, the women had grown up in a family in which they were considered a kind of "superhuman" easily capable of doing anything. Faced with difficult tasks, they experienced heavy performance pressures in an effort to meet their parents' outsized expectations. This, in turn, led to the fact that despite excellent school success, they began to consider themselves stupid because good grades did not come easy, but a lot of work had to be done for them (Clance & Imes, 1978; Clance & O'Toole, 1987).

An explanation for IS has also been sought from individual character traits and responsiveness. Since the 1990s, researchers have looked at the connection of IS, among other things, to individual self-confidence and the ability to tolerate comparison, competition, and evaluation. The phenomena closely associated with IS also include introversion, perfectionism, fear of failure, and self-harming patterns of action (Pannhausen et al., 2020; Royse Roskowski, 2010; Sakulku & Alexander, 2011). Despite this, empirical studies have considered IS to be its own independent phenomenon, which is different from other close concepts of the same type (Leonhardt et al., 2017). Even if the "impostors" know that everyone fails occasionally, they do not tolerate it on their own but seek to avoid mistakes and failure by all means. The fear of failure is great because it implies shame and humiliation. In contrast, there is also fear of success because it creates pressure to succeed next time, too (Ekman, 2017).

Clance and Imes (1978) originally interpreted IS as a problem for educated, talented women in demanding jobs. However, later studies also showed that men experience IS (Clance & O'Toole, 1987; Sakulku & Alexander, 2011). There is no clear evidence of the

[1] Clance herself preferred to use the term impostor phenomenon because she wanted to avoid the hallmark of pathology associated with the term impostor syndrome. According to her, the impostor phenomenon was not a matter of illness but of a certain kind of self-image or self-misinterpretation (Simmons, 2016). Nevertheless, the term impostor (or imposter) syndrome is also widely used. In this article, we use both the terms impostor phenomenon and impostor syndrome, as they describe the same kind of tendency: constantly doubt one's own abilities. For variety, we also use "impostor feelings" and "impostor experiences" throughout the article.

prevalence of IS among different genders, but some studies have suggested that IS experiences differ between men and women. For example, women might think that competence can only be demonstrated by being better than others. For men, in turn, the experience of IS is more related to the fear of failure (Royse Roskowski, 2010). Women also appear to suffer more than men from the life-limiting consequences of IS (Clance & O'Toole, 1987).

IS is not a recognized psychiatric disorder, but it can be classified as an anxiety symptom related to performance, competence, and self-image. Because a culture of critique is embedded in the academic community and doctoral programs, PhD students are at especially high risk of developing IS (Pervez et al., 2020) and other mental health problems (Deem, 2020; Kismihók et al., 2022; Levecque et al., 2017; Mackie & Bates, 2019; Schmidt & Hansson, 2018). In addition, problems with job continuity and research funding, deficiencies in dissertation supervision, the complexity of work combined with excessive workload, difficulties in reconciling work and family life, and a lack of community spirit increase the risk of mental health problems (Deem, 2020).

Even though IS has its roots in the early stages of life, experiences of fraudulence may not emerge until during doctoral education. According to Kumar et al. (2021), impostor fears are associated with a sense of misfit with an organization. Furthermore, early career status and low tenure may give rise to such fears, and PhD students often face problems with job continuity and research funding. In Finland, universities are the only institutions that supply doctoral degrees. At each university, there is a graduate school consisting of several doctoral programs organized by faculties or other units. Every doctoral student belongs to a doctoral program regardless of their status or funding. These doctoral programs carry out the selection of the applying graduates. However, funded full-time posts for a maximum of 4 years can only be provided to some students. Understandably, the competition for these posts is fierce. Among the key objectives of Finnish graduate schools are ensuring the quality of high-level education and shortening the time for the completion of graduate studies, thereby lowering the age of graduates.

Inner story and habitus

A person with IS adopts a distorted self-image and a self-critical inner story. The inner story is about a kind of silent monolog that we have inside our heads. In Vygotsky's (1934/1986) theory of cognitive development, inner speech is the outcome of a developmental process over a lifespan. Therefore, inner speech is not detached from the world outside the individual, as the building blocks of each individual's story are culturally shaped in the context of social interaction. In fact, our entire worldview, identity, and habitus can be interpreted as the result of numerous different stories and combinations thereof. According to Kenyon and Randall (1997), our feelings also have story roots. For example, what we call temperament or character is, in many ways, related to the stories we hear from others about ourselves and, above all, the stories we tell ourselves about ourselves.

Therefore, it does matter what kind of stories we hear, listen to, tell, and embrace. According to Howard (1991), we need to be especially careful about what kind of stories we tell about ourselves because we will inevitably live in accordance with them. If stories told about oneself are predominantly negative, they can perpetuate unfavorable behaviors and ways of thinking, such as IS.

IS can also be interpreted as a phenomenon linked to the class structure and social interaction of society. For example, those who have made a cultural transition from the working class to the upper classes of society through education

might be more exposed to IS. Expressed in Bourdieu's (1990) terms, IS can be about the incongruity of habitus and field. By habitus, Bourdieu meant a system of relatively permanent beliefs and tendencies that integrate the experiences of life history and influence an individual's actions and choices in different fields and situations of social life. The inner story of an individual, in turn, can be interpreted as an important component of habitus. Culturally constructed inner speech makes us feel and act in a certain way in a given situation. Inner speech is related to, among other things, our responses to the tasks and challenges ahead. Inner speech and the habitus associated with it have already originated in the primary socialization of the childhood family; therefore, parental lifestyles and parenting practices play a key role in their construction.

According to Bourdieu's theory, the values internalized by the offspring of highly educated parents, the meanings they attach to different things, the tendencies to act and choose, and the resources provided by the home environment provide them with a competitive advantage over the children of less-educated parents. In short, children in highly educated families can better adapt to the school culture and demands of their growing environment. If the children of less-educated parents succeed in school and continue their studies at university, it is possible that they feel they have found themselves in an uncomfortable and foreign environment. Such experiences of "strangeness" (Reay et al., 2009; Sonnak & Towell, 2001) have been observed, for example, in the life stories of school achievers (Vanttaja, 2002) and those of women with working-class backgrounds studying at university (Käyhkö, 2014).

In many ways, the descriptions of women involved in Käyhkö's (2014) study of their difficulties in adapting to the culture of the university world are similar to those of women suffering from IS. The women interviewed by Käyhkö said they had experienced uncertainty most strongly in seminar situations in which they should have dared to bring out their own ideas. They were timid in presenting their thoughts because they feared that they did not have enough important things to say, or that by saying something self-evident, they would reveal their own ignorance. Already taking the floor and making themselves visible had been difficult and uncomfortable for them. Covering up their supposed weaknesses, the women chose to remain silent. According to Käyhkö, the women seemed to lack the self-assurance and digestibility of the middle-class habitus ideal at university, as well as the desire to be at the forefront.

Similar experiences among PhD students were evident in Chakraverty's (2020) study: scientific writing and publishing one's own texts could also trigger IS feelings. Presenting one's own research to others, either in writing or orally, seemed to trigger self-critical, judgmental, and self-doubting inner speech. In performance situations, doctoral students were constantly afraid to say something silly and to be condemned by the audience. The articles offered for publication or those already published, in turn, were feared to be knocked out by reviewers and readers.

According to Clance and O'Toole (1987), when faced with a new task, impostors doubt their ability to cope with it. When trying to complete a task, an impostor might end up, for example, over-performing or procrastinating. Both patterns of action produce many troublesome symptoms, such as stress, anxiety, and insomnia. In general, although the impostor copes with challenging tasks, the mental pressure associated with performing can further reinforce the notion that the path to success at work goes through suffering. At worst, such a mindset can lead to burnout and depression (Sakulku & Alexander, 2011).

Methods

Research questions and data

This study focuses on the prevalence of IS among Finnish PhD students. In particular, we focus on the background factors in which experiences of uncertainty and attitudes related to IS are linked. Our research questions are as follows:

(1) How common is the IS phenomenon among Finnish doctoral students?
(2) What are the background factors related to IS?
(3) How should doctoral students' IS be accounted for in doctoral education, and how can it be alleviated?

We answer the research questions based on a survey of Finnish doctoral students conducted in 2015 ($n = 1694$). The survey was in Finnish, and 97% of respondents had Finnish as their mother tongue. The questionnaire comprised multiple-choice questions, Likert-scale statements, and open-ended questions. The topics of the questionnaire, which included 70 questions, were related to the childhood home and parents of doctoral students, pre-doctoral studies, applying for doctoral studies, life situation during studies, dissertation supervision and social networking, socialization in the academic community, internationalization and experiences of own prowess, and performance in doctoral studies. The aim was to target all doctoral students writing their dissertations at Finnish-speaking multidisciplinary universities. Research permits were obtained from eight universities: the universities of Helsinki, Eastern Finland, Jyväskylä, Lapland, Oulu, Tampere, and Turku and Aalto University. The coordinators of the graduate schools and doctoral programs at each university submitted the Webropol survey as a mass mailing to the target group. The exception was Aalto University, where the researchers were provided with the e-mail addresses of 374 postgraduate students, who gave permission to disclose their contact information.

After two reminder messages, 1694 doctoral students responded to the survey, which is approximately 12% of the doctoral students in the universities involved in the study. The response rates at the universities of Jyväskylä, Lapland, and Turku were higher than those at other universities. In Tampere, the response rate was the lowest. Compared to the population, there were also differences in the sample in terms of age and gender. The women clearly answered more often than men: women accounted for approximately 70% of the respondents, compared to approximately 54% of all doctoral students in 2015. The youngest age groups of doctoral students had also responded to the survey slightly more actively: 50% were under 35 years of age (45% of the whole population). However, the total number of respondents to the survey was so large that, despite the limitations mentioned above, the survey results could be generalized to the population. We will discuss the study limitations in detail at the end of the article.

Variables and analysis

Based on previous studies, we selected questions related to IS from the questionnaire and formed a doctoral impostor syndrome (DIS) scale. For the DIS scale, we selected 10 experiences or ideas often associated with the IS phenomenon, especially in doctoral education. Previous research has suggested that these include underestimating one's own gifts and

Table 1 Sum variables and statements/questions included

Sum variables	Statements/questions
DIS (Scale 1–4) (Cronbach's alpha = 0.83)	"I rely on my own abilities to complete my studies."* "I can market myself and my skills."* "I am social in nature, outgoing and it is natural for me to interact with people."* "I am a convincing speaker/performer."* "I am good at creating social networks that benefit my research."* "I can express myself by writing convincingly."* "I think I'm very social with the habits and rules of the academic life:"* "I often feel like I'm not talented enough to succeed in doctoral studies." "I feel like other doctoral students are much more skilled researchers than I am." "I am pleased with my performance in my doctoral studies."*
Home resources (Scale 1–3) (Cronbach's alpha = 0.77)	"What is your mother's vocational training?" "What is your father's vocational training?" "What was the financial situation of your childhood home?" "What social class or social stratum did your childhood family belong to?"
Encouraging parenting style (Scale 1–4) (Cronbach's alpha = 0.88)	"I was encouraged to develop myself." "I was encouraged to set myself high goals." "I was encouraged by curiosity." "I was encouraged to be self-sufficient." "I was encouraged to trust myself."
Demanding parenting style (Scale 1–5) (Cronbach's alpha = 0.80)	"It was important to my mother that I succeed in school." "It was important to my father that I succeed in school." "Acquiring children's college education was taken for granted in my childhood family." "My mother wanted me to get a college degree." "My father wanted me to get a college degree." "I applied for doctoral studies because I wanted to meet the wishes and expectations of my parents and/or relatives."

*These claims were reversed

abilities, considering others more self-skilled, dissatisfaction with one's own performance, distrust of one's own skills and persuasive self-expression, introversion, and feelings of outwardness (see, e.g., Clance & O'Toole, 1987; Chakraverty, 2020; Ekman, 2017; Royse Roskowski, 2010; Sakulku & Alexander, 2011). Likert-scale questions describing such experiences and thoughts were added, and the sum obtained was divided by 10 (Table 1). Thus, we obtained a sum variable describing DIS, which we used as an explanatory variable in the regression analysis. The statements chosen for the sum variable measured the phenomenon to be explained quite uniformly, as Cronbach's alpha received a value of 0.83.

For home resources and parenting styles, we created new sum variables. Table 1 describes the statements we included in these new sum variables. To describe the resources of the childhood home, we chose the vocational education of the mother and father, which were described by a

six-grade variable. We rescored the education level such that 1 = a vocational school or less, 2 = a college level or bachelor's degree or university studies, and 3 = a university degree or postgraduate education. The variable describing the social class of the family, which had four categories in the survey (working class, middle class, upper class, and some other class/stratum), was based on the respondents' own assessment. We excluded the last option from the new classification ("some other category/stratum") as it is more difficult to score like other categories. However, this was a relatively small group (6.4%). Thus, three categories remained: 1 = working class, 2 = middle class, and 3 = upper class. Similarly, the respondents assessed their childhood family's financial situation, which was divided into five categories: very poor to very wealthy. This variable was also changed to three categories, with the very poor and poor receiving a value of 1, a moderately subsistence value of 2, and a wealthy and very wealthy value of 3. Finally, we added up the scores of mother's and father's level of education, family's financial situation, and social class, and divided the result by 4. The sum of home resources was quite similar internally, as the Cronbach's alpha describing reliability was 0.77.

We studied childhood family's parenting style and atmosphere through two sum variables: an encouraging parenting style (EPS) and a demanding parenting style (DPS). There were five statements describing an EPS and six statements describing a DPS. We summed the statements from both descriptions of parenting styles and divided the sum by the number of statements. In this way, we obtained two sum variables: one describing the general support and encouragement received in the childhood family and the other describing the educational goals and expectations set by the parents regarding school success. The reliability coefficient of the sum variable describing the EPS (Cronbach's alpha) was 0.88, while that of the sum variable describing the DPS was 0.80.

Our aim was to determine which factors in the background and characteristics of doctoral students were related to DIS and to what extent. Regression analysis is a method that can be used to search for variables relevant to a phenomenon or to test a theory. When using regression analysis, the aim is to form the simplest possible, theoretically meaningful model that describes the co-variation of the data as well as possible. We used the so-called Enter method because, based on previous studies, we could pre-determine the variables associated with the IS of doctoral students (Nummenmaa, 2021). According to the literature (Craddock et al., 2011; Sonnak & Towell, 2001; Thompson et al., 1998; Yaffe, 2021), the following background variables of students have an impact on impostor feelings: gender, age, home resources, parenting styles, academic success, and level of planning (LoP) before applying for doctoral studies (Table 2).

In terms of age, the respondents were classified as under 35 years (young ones) and 35 years or older (adults). This classification divided the data such that approximately half the respondents were young and half were adults. We divided the sum variable describing home resources into three categories so that the lower quartile got a value of 1 and the upper quartile got a value of 3. Similarly, we classified the sum variables describing EPS and DPS. The master's thesis grade variable was classified into three categories by combining the lowest (1–2) and intermediate (3) grades, which received a value of 1, the grade of 4 got a value of 2, and the grade of 5 (Excellent) received a value of 3. The 10-point scale of planning before doctoral studies was rescaled to the following three categories: the lowest end of the scale (1–3) received a value of 1, the mid-point (4–7) received 2, and the far end (8–10) received 3.

The average score of the DIS in the data was 2.13, and slightly more than 7% of the respondents received a score of at least 3 (on a scale of 1 to 4). As shown in Table 2, the differences in the means were much lower in the different categories of explanatory variables. There was no difference between the women and men in experiencing DIS, $t(931) = 0.82$,

Table 2 Mean (*M*), standard deviation (SD), number (*N*), and percentage (%) of DIS scores in different categories of background variables

Variable		*M*	*SD*	*N*	%
Gender	Female	2.14	0.54	660	70.7
	Male	2.11	0.58	273	29.3
Age	Young ones (max 34 years)	2.12	0.55	487	52.0
	Adults (min 35 years)	2.14	0.55	449	48.0
Home resources***	Minor	2.23	0.56	209	25.2
	Intermediate	2.12	0.53	401	50.1
	Abundant	2.04	0.54	206	24.7
Encouraging parenting style***	Non-encouraging	2.40	0.54	214	23.1
	Intermediate	2.13	0.52	401	43.2
	Encouraging	1.95	0.52	313	33.7
Demanding parenting style***	Non-demanding	2.18	0.58	207	22.5
	Intermediate	2.17	0.53	427	46.3
	Demanding	2.03	0.55	288	31.2
Master thesis grade	1–3	2.16	0.53	161	18.9
	4	2.16	0.56	355	41.5
	5	2.09	0.56	339	39.6
Level of planning before applying for doctoral studies***	Coincidence/drift	2.26	0.55	316	33.8
	Intermediate	2.16	0.53	303	32.4
	Systematic	1.97	0.53	316	33.8

One-way ANOVA: ***$p < 0.001$

$p = 0.411$. Age was also not associated with DIS, $t(934) = -0.42$, $p = 0.672$. Those who had grown up in families with scarce resources had slightly more impostor feelings than others, $F(2, 828) = 6.55$, $p < 0.001$, $\text{eta}^2 = 0.02$, but the differences between the averages remained small. Childhood home parenting styles were associated with feelings related to DIS, $F(2, 925) = 45{,}86$, $p < 0.001$, $\text{eta}^2 = 0.09$: those who spent their childhoods in a non-encouraging environment had significantly higher DIS scores than others. Demanding parenting was associated with less-than-average DIS scores, $F(2, 919) = 7{,}00$, $p < 0.001$, $\text{eta}^2 = 0.02$. Those with the highest grades in their master's theses were better protected from impostor feelings than the others, but the differences were not statistically significant. Long-term planning to apply for doctoral studies clearly reduced the DIS scores, $F(2, 932) = 22{,}92$, $p < 0.001$, $\text{eta}^2 = 0.05$: those who had "drifted" to doctoral studies had the highest average of DIS scores.

Figure 1 illustrates the differences between categories of statistically significant variables associated with DIS scores by box plots. A box plot is a visual tool for displaying the minimum, maximum, sample median, first and third quartiles of the dataset, and outliers. As shown in the figure, the differences in the medians were the greatest in the box plots visualizing EPS and LoP before application.

Results

Table 3 shows the correlation coefficients, means, and SDs for the variables used in the multiple linear regression analysis: DIS, home resources (HR), EPS, DPS, and LoP. Since doctoral student's age, gender, and master's thesis grade were not statistically significantly associated with the DIS scores, we excluded these variables from the regression analysis.

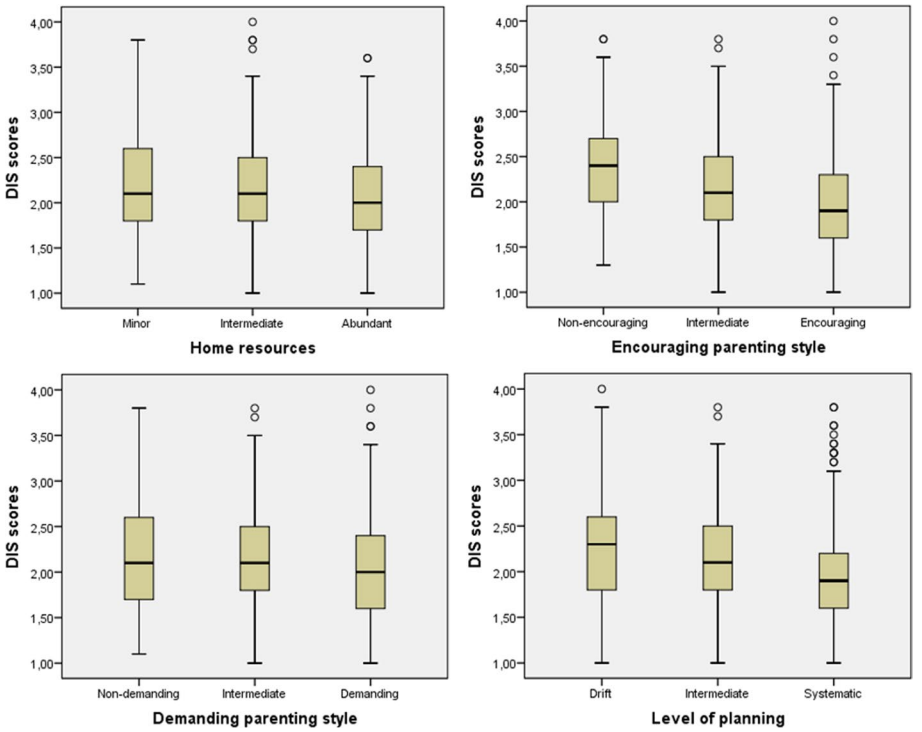

Fig. 1 DIS scores in different classes of background variables described by box plots

The DIS scores were negatively related to all four variables, suggesting that higher DIS scores were related to fewer HR ($r = -0.112$, $p < 0.01$), less EPS ($r = -0.299$, $p < 0.001$), less DPS ($r = -0.110$, $p < 0.01$), and lower LoP before applying for doctoral studies ($r = -0.227$, $p < 0.001$). Furthermore, a moderate positive correlation was found between HR and both parenting styles ($p < 0.001$), and a weak positive correlation was found between HR and LoP before applying ($p < 0.01$). There was also a moderate positive correlation between EPS and DPS ($p < 0.001$). Finally, a weak positive correlation was found between EPS and LoP before applying for doctoral studies, with subjects having more encouraging parents reporting more systematic planning ($p < 0.01$).

Table 3 Pearson correlation coefficient matrix for the variables used in the multiple regression analysis with means and standard deviations

Variable	*M*	SD	2	3	4	5
1 DIS scores	2.13	0.55	−0.112**	−0.299***	−0.110**	−0.227***
2 HR	1.90	0.56		0.321***	0.453***	0.091**
3 EPS	3.18	0.73			0.462***	0.104**
4 DPS	3.27	0.73				0.059*
5 LoP	5.43	2.91				

DIS doctoral impostor syndrome, *HR* home resources, *EPS* encouraging parenting style, *DPS* demanding parenting style, *LoP* level of planning

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

Table 4 Multiple regression results for doctoral students' IS

Variable	*B*	95% CI	*β*	*t*	*p*	Tolerance	VIF
(Constant)	2.961	[2.761, 3.161]		29.017	0.001		
HR	−0.021	[−0.092, 0.050]	−0.021	−0.576	0.565	0.776	1.289
EPS	−0.223	[−0.278, −0.167]	−0.294	−7.852	0.001	0.766	1.305
DPS	0.036	[−0.024, 0.096]	0.047	1.188	0.235	0.683	1.464
LoP	−0.036	[−0.048, −0.025]	−0.197	−5.977	0.001	0.985	1.015

$R^2 = 0.130$, adj. $R^2 = 0.126$, $p < 0.001$

HR home resources, *EPS* encouraging parenting style, *DPS* demanding parenting style, *LoP* level of planning

The results of the multiple regression analysis, as shown in Table 4, indicated that only EPS ($p < 0.001$) and LoP before applying for doctoral studies ($p < 0.001$) were significant predictors of DIS. Thus, the less a doctoral student has received encouragement from their parents during childhood and adolescence, the more likely they will experience impostor feelings. In addition, "drifting" into doctoral education can increase feelings of uncertainty, incompetence, and inferiority. In contrast, HR and DPS were not statistically significant predictors of impostor feelings.

The adjusted R^2 value was 0.126, meaning that approximately 13% of the variation in DIS scores can be explained by the model. The level of explanation typically remains quite low when trying to find predictors of a person's behavior or experiences. Nevertheless, the low R^2 value does not diminish the significance of the regression analysis results.

The Pearson correlation coefficient matrix (Table 3) showed that HR correlated moderately with EPS ($r = 0.32$) and DPS ($r = 0.45$). Although these parenting styles are more common in families with abundant resources and capital than in those with less diverse resources, home resources are not directly related to the emergence of a DIS. More important than parents' level of education, social class, or wealth is whether parents have been able to support and encourage their children to trust themselves.

In this study, DPS, which emphasizes school success, did not prove to be an independent predictor of DIS scores. However, Craddock et al. (2011) proposed a different conclusion. They found that the family's expectations of school success and academic performance are likely to increase doctoral students' performance pressure, fear of failure, and other feelings related to the impostor phenomenon. In contrast, it can be concluded from the averages in Table 2 that, during doctoral studies, one is more likely to have impostor experiences if the parents' wishes and expectations regarding school success have been at most moderate. The contradictory results are attributable to the fact that the doctoral students who responded to the survey in this study might have interpreted the statements describing DPS as demanding in a positive manner, with parents encouraging them to set high learning goals. Parents have thus shown that they trust and believe that their children will succeed in their studies—and in life in general.

Discussion and conclusion

In this study, we examined IS among Finnish doctoral students and the background factors associated with it. The premise is that an individual's perception of themselves and their possibilities gradually takes shape during the course of life as a result of different experiences. As the perception of self builds up and changes gradually throughout life, the

process is partially unconscious and difficult to observe. In different theory traditions, these processes are called, for example, the shaping of habitus (Bourdieu, 1990) or identity (Hall, 1996). According to our interpretation, the above concepts are united by the view that an individual's self-understanding and relationship with the world around us take on a verbal form in inner speech that we constantly engage in our minds. In turn, an individual's inner speech is connected to prevailing cultural practices and thinking patterns that determine what we should be like. People already embrace in childhood primary socialization when interacting with parents and other close people when acting on what kinds of knowledge, skills, choices, and behaviors are expected of them. For example, school success, educational goals, and applying for higher education are strongly associated with HR and parents' educational attainment (Boudon, 1974; Breen & Goldthorpe, 1997; Jackson, 2013).

According to our study, IS was not directly linked to home resources. Contrary to what we assumed, doctoral students from the working class had no more impostor experiences than those who came from the middle or upper class, when parenting styles were also accounted for. Based on the results, experiences of IS were evident, regardless of the home background, particularly among doctoral students who had a non-supportive and non-encouraging childhood family atmosphere.

Another factor that emerged in the statistical analysis in relation to the DIS was how systematic and planned the application for PhD studies was. Many studies have found that strong internal motivation to create a dissertation is central to the well-being, satisfaction, and success of doctoral students (Sverdlik et al., 2018). If the dissertation process has started, for example, to fulfill the wishes of other people, then feelings of inadequacy and uncertainty are quite understandable.

On the DIS scale of 1 to 4, more than 7% of the respondents had a score of at least 3. Proportioned to all doctoral students in Finland, this means more than 1200 doctoral students. The key question is how this can be accounted for in doctoral training. This is important because the constant suspicion of one's own abilities and feelings of inferiority can lead to burnout and, in the worst case, dropout from doctoral studies. Each missed dissertation, in turn, is a waste of resources for doctoral students themselves, as well as for universities and society as a whole.

Our research shows that the IS roots often extend to the early onset of the life course, when the inner story of an individual gradually begins to build. Supportive parents will undoubtedly help create a positive inner story. Although it is impossible to change the past, we can, to some extent, shape our inner story and attitude towards ourselves as well as our own life history. To be free from impostor feelings, one should be able to create new stories about oneself that can help interpret the events of the past differently. The mere knowledge that uncertainty feelings are also quite common among other PhD students can reduce excessive self-criticality. The support and encouragement of supervisors and mentors is also crucial (Craddock et al., 2011; Nori et al., 2020).

Based on this and previous studies, we argue that doctoral programs should take better account of PhD candidates' backgrounds, life situations, and aims. With proper supervision and support, a doctoral student can socialize better into the academic community (Holley & Caldwell, 2012). Alongside adequate support, the duration of funding should be lengthened and short funding periods avoided. Corcelles et al. (2019) stated that funding issues are among the main challenges faced by PhD researchers during their doctoral studies.

Although this study focused on Finland, we believe that the results also have wider relevance to other countries. The international environment of universities is increasingly typically described as a competitive field where the *tops* in science and expertise are sought. This course of development has been strengthened by significant transnational actors, such

as the OECD with its recommendations and the EU with its higher education policy (Kuusela et al., 2021). Thus, it is justified to claim that the working environment of doctoral students and the resulting pressures and experiences of inadequacy are quite similar in different parts of the world.

The inner story of the impostor also includes the story of a "real talent." Doctoral students with impostor feelings most obviously compare themselves to a kind of ideal graduate and a successful top researcher who meets all requirements and expectations. Therefore, attention must also be paid to where the ideal models and requirements of the achiever come from. As Deem (2020) indicated, it is interesting how few existing studies on the well-being of doctoral candidates have emphasized the organizational climate of higher education systems. The focus is on individual students, not on contemporary academic culture and the constant pressure to be efficient and productive. When anxiety-and stress-inducing IS is seen as an individual's problem alone, we easily end up providing attitude formation, individual therapy, and psychiatric drugs as a solution. If, on the other hand, IS is understood as a wider social and cultural phenomenon, then medicines are different. In that case, we also need to look critically at the requirements that are imposed on us as citizens in different roles. Cutting-edge talk, which has become common in education and science policy, can be seen as one way of governmentality by which doctoral students and other university staff have been perused to compete with each other and adopt a narrow understanding of science, the university world, and the work of a researcher (Hannukainen & Brunila, 2017; Filander et al., 2019). For one reason or another, top ideology, with its rankings and evaluation practices, has been fairly uncritically received in universities. It is therefore understandable that many doctoral candidates have begun to experience inadequacy and feel that they have been put in a playoff game where it is distressing to be involved.[2] The chosen line of education and science policy can eventually lead to a situation in which average performance has to be shamed and only the best is good enough.

Limitations

There are some limitations to this study. First, although there were more than 1600 respondents to the survey, the response rate (12%) remained very low. This should be accounted for when considering the generalizability of the results. For example, we cannot know whether graduate students who have difficulty progressing their studies have been more actively responding to the survey or whether highly advanced and satisfied PhD students have been more enthusiastic respondents. Second, the data contained skew in terms of gender, age, and university. The data included over-representation of women and PhD students under 35 years of age. In contrast, gender and age had no connection to DIS scores; thus, the minor over-representation of women and young PhD students does not affect the wider generalizability of the results. The universities of Lapland, Jyväskylä, and Turku were over-represented in the study, while those of Helsinki and Tampere were under-represented. However, in Finland, the differences between universities are relatively small compared to many other countries (Kohvakka et al., 2019), so there are presumably no major university-specific differences in the background and experience of doctoral students.

[2] Half of the respondents in our survey often felt overwhelmed by their doctoral studies. According to most respondents, success in research requires, among other things, extroversion (67%), the ability to market oneself (78%), persuasive speech and presentation skills (91%), and the ability to create social networks (91%).

We did not have, at our disposal, a questionnaire developed to measure the impostor phenomenon as such. In contrast, previous studies have enabled us to pinpoint situations in which impostor feelings occurred most commonly among PhD students. The selected claims to describe the DIS formed an internally congruent gauge; that is, they described the same phenomenon: uncertainty about one's own competence, underestimation of one's own abilities, and feelings of inferiority in relation to peers. Because doctoral students have gone through multiple educational selection processes, their genuine lack of ability or competence is quite different.

Author contribution Both authors contributed to the study conception and design. Material preparation and analysis were performed by Hanna Nori. Both authors contributed to the writing of the manuscript.

Funding Open Access funding provided by University of Turku (UTU) including Turku University Central Hospital.

Declarations

Conflict of interest The authors declare no competing interests.

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