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RUSSIAN DOCTORAL EDUCATION IN CONDITIONS OF HIGH HETEROGENEITY
OF DOCTORAL STUDENT BODY: INSTITUTIONAL PRACTICES AND STUDENT
EXPERIENCE

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Introduction

In recent decades, doctoral education has become an increasingly important topic for governments and international organizations¹ around the world (Kehm, 2020; Nerad, 2011). The emphasis on the development of doctoral education at both the national and international levels is linked to its role in generating knowledge in the context of the knowledge-based economy (Cardoso et al., 2022; Kehm, 2020; Shin et al., 2018). Relevant theories suggest that new ideas and knowledge are the main resources for the economic development of countries (Powell, Snellman, 2004), and doctoral programs are considered a key source of highly skilled researchers who are capable of producing, implementing, and disseminating new knowledge (Auriol, 2010; Gokhberg et al., 2016). The allocation of resources towards improving doctoral education in various countries has led to its massification and internationalization (Auriol, 2010; Shin et al., 2018). One of the changes that accompany these trends is the increasing heterogeneity of the doctoral student body (Cardoso et al., 2022; Enders, 2004; Naidoo, 2015; Nerad, 2011; Offerman, 2011; Skakni, 2018). Studies in different national contexts have recorded an increase in the number of doctoral students from previously underrepresented groups, i.e., women, students over 30, first-generation students, and students with delayed enrolment (Auriol, 2010; Offerman, 2011), changes of motives to embark on a doctoral degree (Skakni, 2018), as well as the differentiation of doctoral students' career paths, in particular, the expansion of academic degree holders' presence in non-academic job markets (Auriol, 2010).

Although foreign research does not provide any formal definition or thresholds of what levels of heterogeneity to consider high, we can rely on statistical understanding of heterogeneity to avoid possible methodological constraints. In statistics, a distribution is considered highly heterogeneous if it is shaped closely to the even distribution. For example, if equal proportions of male and female doctoral students study at a university, we can conclude that the doctoral student body at this university is highly heterogeneous in regard to students' gender. Various statistical and survey data suggest that high heterogeneity of the doctoral student body is also relevant for Russia, either in static or dynamic sense, i.e., the distribution of Russian doctoral students in regard to specific characteristics is either already similar to the even distribution or becoming more similar to it in recent years. According to official statistics², Russian doctoral student body is characterized by high heterogeneity in regard to students'

¹ For example, OECD, World Bank.

² Federal State Statistics Service. URL: <https://rosstat.gov.ru/statistics/education> (accessed: 10.03.2024).

gender: the proportion of female students comprises 44-47% for the period of 2011-2021. Similarly, the share of doctoral students aged 29 and over in the total number of doctoral students more than doubled³ over the past ten years (2012-2022). The share of international doctoral students also more than doubled, from 5% in 2014 to 12% in 2021 (Vlasova et al., 2023). One third (33%) of students are those who had a gap in education before admission, i.e., those who come from the labor market with specific professional experience (Shugal et al., 2022). According to recent surveys, 41% of Russian doctoral students combine their training with employment on the non-academic market, and this share reaches 50% and even 60% in some fields of study (Slepyh, Rudakov, 2023). In the Russian context, the trends described are also associated with the massification of doctoral education in the 2000s, which was the result of both a growing demand for academic degrees (mainly due to the expansion of the market for highly skilled professionals) and an increased supply (due to the increase in the number of institutions offering doctoral programs) (Strongin et al., 2009).

The high heterogeneity of the doctoral student body, including the diversity of those who try to enroll into doctoral programs, imply several institutional changes to the system of doctoral training (Naidoo, 2015). Firstly, the different levels of training among applicants necessitate a shift from the apprenticeship model, where the preparation of doctoral students is reduced to individual work with a supervisor, to more structured educational programs that can provide a comparable level of training and quality of dissertation research (Enders, 2004). Secondly, the shift from the apprenticeship model involves involving a department in supporting doctoral students, i.e., introducing systems of collective support for them (Watts, 2010). In leading foreign universities, there are different forms of organizing such support – dual supervision, team supervision, research or doctoral schools, etc. (Hasgall et al., 2019; Lachmann et al., 2020) – which are aimed at reducing dependence on the supervisor through the distribution of functions between different actors (Ambrasat, Tesch, 2017; Robertson, 2017). Thirdly, there are new requirements for the selection of doctoral students. These include the use of transparent criteria and procedures that take into account different academic, professional, and social backgrounds of applicants (Cardoso et al., 2022; Kent, McCarthy, 2016). Holistic admission assumes that during the admission process, a wide range of factors should be taken into account when evaluating an applicant, i.e., no single factor should determine the final decision (Francis et al., 2021).

³ Ibid.

These principles are becoming the subject of discussion among foreign associations⁴ of doctoral education researchers and being put into practice at universities in Europe, the USA, Australia, and China (Hasgall et al., 2019; Nerad, 2011; Kumar, Wald, 2024). In Russia, only the first of the changes in the doctoral training system has been explicitly presented: the transition to structured educational programs in Russia took place with its inclusion in the higher education system in 2012-2013 and has been discussed many times in the academic and expert communities (see: Bednyi, 2017; Vershinin, 2015; Karavaeva et al., 2018; Nefedova, Dyachenko, 2019). The implementation of the other principles, i.e., distributed support and holistic admission, is not regulated by the federal legal framework. Instead, these practices can be implemented at the level of specific organizations. However, it has not been previously studied to what extent these practices are actually used in Russian doctoral education. This dissertation research is based on the assumption that the low efficiency of doctoral education in Russia, i.e., a high dropout rate⁵ and a low defence rate⁶ – may also be a consequence of the lack of adaptation of the doctoral training system to the conditions of a highly heterogeneous doctoral student body. At the same time, such adaptation would require answering the basic question about the specific features of the student experience of different groups of students and relying on the results of relevant empirical research. This study aims to fill these two gaps by identifying manifestations and consequences of doctoral student body heterogeneity in Russia at the individual and institutional levels. The aim is reached by identifying differences in the experience and performance of various groups of doctoral students, as well as determining the landscape of practices used for selecting and supporting doctoral students in Russia in conditions of the high heterogeneity of the doctoral student body.

Research problem and objectives

In the academic discussion, there are a number of open questions that could provide a basis for reforming doctoral student selection and training systems in the conditions of high heterogeneity of doctoral student body. How does the student experience differ among various groups of students, based on their academic, professional, and social backgrounds? What are

⁴ See, for example, the relevant reports of the Council for Doctoral Education at European University Association, the League of European Research Universities, or Council of Graduate Schools (Hasgall et al., 2019; Hillebrand, Leysinger, 2023; Kent, McCarthy, 2016).

⁵ According to available statistics, in 2021 in Russia, almost half (48%) of doctoral students did not complete their studies and did not defend their dissertation (Shugal et al. 2022).

⁶ 13%, as for 2022. See Federal State Statistics Service. URL: <https://rosstat.gov.ru/statistics/education> (accessed: 10.03.2024).

the most effective selection and support strategies when working with diverse groups? Are there universal strategies that can be applied to the entire heterogeneous student population? Empirical research on these topics is still limited and has primarily been conducted in Western contexts. It seems inappropriate to directly apply the results of existing research in the Russian context, as Russian doctoral education is still more focused on academic training. Thus, unlike many other countries, Russia does not offer a wide range of doctoral training models, e.g., professional or industrial doctorates (for more on different models, see: Bao et al., 2018). Under these circumstances, examining the experience of various groups of doctoral students becomes even more significant, as the lack of diversity in training models may introduce additional obstacles for students that are not present in foreign studies.

This thesis aims to contribute to the open questions by conducting a comprehensive study on the manifestations and consequences of heterogeneity of doctoral student body. The study focuses on two levels of analysis: the level of individual experience and the level of institutional practices implemented by Russian universities. At the individual level, the research explores the experience of different groups of doctoral students. At the institutional level, we focus on the tools and practices used by universities to select and support doctoral students. The research sets four main objectives, each corresponding to one of the two levels of analysis. The current state of research in each area is briefly presented below.

The first objective is to identify differences in the portrait and doctoral experience⁷ of students with the gaps of different length before admission. In foreign studies, the issue of high heterogeneity of the doctoral student body is approached through the examination of the experience of non-traditional doctoral students. Although there is no precise definition of such category in the literature, empirical research identifies this category based on one or more of the following characteristics: they study part-time, have a full-time job, are financially independent, are married, have children or other dependents, enroll in doctoral program after a gap etc. (Graham, Massyn, 2019; Langrehr et al., 2015). In our study, we use the presence of a gap as an indicator of belonging to the group of non-traditional doctoral students. This characteristic is the most comprehensive of those presented in the literature, as during the break a future doctoral student can gain a wide range of experiences, both social and professional, which can influence their subsequent student experience. Foreign studies also highlight some features of the motivation and experience of non-traditional students. They are less likely to

⁷ Here we refer to the broader term “student experience”, which covers “all aspects of the engagement of students with higher education” (Arambewela, Maringe, 2012: 65).

enter graduate school in order to proceed with an academic career and are more likely to pursue different career paths and apply their knowledge in their professional activities (Jablonski, 2001; Offerman, 2011; Skakni, 2018), they are more engaged in classes (Wyatt, 2011), at the same time they are more autonomous (Babb et al., 2022), including student-supervisor interaction (Offerman, 2011), as well as face more barriers during their doctoral journeys as they have to combine studying, work, family responsibilities, etc. (Cornwall et al., 2019; MacDonald, 2018). However, current research is limited to specific fields of study, mostly engineering (Mosyjowski et al., 2017; Mosyjowski & Daly, 2020; Murray et al., 2017; Peters et al., 2017; Peters & Daly, 2013), and qualitative research design (Bendix Petersen, 2014; Naidoo, 2015), which does not allow us to generalize the results to all non-traditional doctoral students, given their high heterogeneity. For Russian research, it is more common to consider the graduate student population as a whole, rather than identifying and studying specific groups (see, for example, Bekova et al. 2017; Gruzdev, Terentev, 2017).

The second objective is to identify the relationship between a doctoral student's prior academic experience and their subsequent performance in doctoral program. A significant amount of research has been conducted abroad that has shown that the traditional criteria used for admission to PhD programs, such as the average grade point average (GPA) at previous educational levels and standardized entrance exams (GRE), are not able to accurately predict a student's future success, particularly in terms of program completion, time-to-degree, and number of publications (see reviews: Kuncel et al., 2001; Bair, Haworth, 2005). In the context of high heterogeneity of the doctoral student body and limited resources for complex selection processes (Kent, McCarthy, 2016), it is important to find other criteria that can be used to evaluate future doctoral students. However, relevant empirical studies have only recently begun to emerge and are primarily conducted in the United States, where the practice of applying to doctoral school immediately after completing undergraduate studies is widespread. For this reason, a direct transfer of the findings from these studies to the Russian context is not possible. Additionally, current research primarily focuses on some separate indicators, such as publications presented at the time of application (Cunningham-Williams et al., 2018; Laurance et al., 2013; Pinheiro et al., 2014), experience of participating in conferences (Cunningham-Williams et al., 2018), the prestige of the previous university (Stock, Siegfried, 2015), a match between previous major and the chosen field on doctoral programs (Burmeister et al., 2014; Stock, Siegfried, 2015). In the dissertation, we explore the role of the student's previous academic experience and consider it comprehensively as a set of formal academic

achievements (having a diploma with honors, publications, victories in student olympiads, etc.), research experience that does not have such a formal result, as well as teaching experience.

The third objective is to assess the prevalence of various selection methods for doctoral programs in Russian universities. The inefficiency of the selection process is often discussed in relation to the poor effectiveness of doctoral education in Russia (Maloshonok, 2016; Maloshonok, Terentev, 2019; Rybakov, 2008; Senashenko, 2016; Terentev et al. 2018; Vershinin, 2015). In particular, this inefficiency may be due to the fact that the selection tools used do not take into account the diversity of the student population due to their overly formal nature (Bednyi, 2017; Terentev et al. 2018). The rules for selecting doctoral students in Russia are determined at the level of institutions, and currently, institutions are not limited in how they can design this process. However, until now, there has been little research on what tools are actually used in practice and how they match the conditions of a highly diverse student body. This research aims to fill this gap by identifying the range of tools used in selecting doctoral students in Russian universities.

The fourth objective is to identify the different types of departmental academic support provided to doctoral students at Russian universities and to assess the relationship between these types of support and doctoral students' confidence in defending their thesis. The type of support refers to a combination of actors that help graduate students during their studies and the functions that they perform. Most research on the factors affecting the performance of graduate students focuses on the role of the supervisor (Sverdlik et al., 2018), while the role of department remains underexplored. At the same time, over the past 20 years, in connection with the transition to more structured programs that are better suited to a diverse student body, many efforts have been made to implement distributed support practices abroad (Hasgall et al., 2019), and in some countries, models of team supervision or co-supervision have become the preferred way to organize doctoral training (Kumar, Wald, 2024). In Russia, historically, co-supervision (the presence of two supervisors) has been officially allowed in a limited number of cases, i.e., when a graduate student conducts interdisciplinary research or studies on a joint program (Terentev, Kuznetsov, 2024). In this regard, the importance of studying other, more informal practices of collective support for doctoral students is growing. However, empirical research on supervision, both in Russia and abroad, rarely considers the diversity of types of academic support related to the different roles and functions of those involved.

The objectives allow us to identify the characteristics of the doctoral experience and performance of various groups of students, as well as to assess the extent to which the practices of selecting and supporting doctoral students in Russian universities correspond to the identified specific features. The results of these objectives are presented in four publications, details of which are provided in Table 1.

Table 1

Research objectives and publications

№	Objective	Publication	The author's contribution
1	To identify differences in the portrait and doctoral experience of students with the gaps of different length before admission	Zhuchkova S., Terentev E. Non-linear path to a doctorate: a comparison of direct- and indirect-pathway doctoral students at Russian universities // Higher Education. 2024. Vol. 87. No. 6. P. 1729-1747. http://doi.org/10.1007/s10734-023-01087-9	Literature review, data processing and analysis, description of results, discussion
2	To identify the relationship between a doctoral student's prior academic experience and their subsequent performance in doctoral program	Zhuchkova S., Bekova S. Building a strong foundation: How pre-doctorate experience shapes doctoral student outcomes // Plos One. 2023. Vol. 18. No. 9. Article e0291448. http://doi.org/10.1371/journal.pone.0291448	Formulation of a research question, data collection, processing and analysis, description of results, discussion
3	To assess the prevalence of various selection methods for doctoral programs in Russian universities	Zhuchkova S. How is Doctoral Students' Admission Arranged at Russian Universities? // University Management: Practice and Analysis. 2022. Vol. 26. No. 2. P. 92-104. http://doi.org/10.15826/umpa.2022.02.015	Formulation of a research question, review of regulatory changes, coordination of data collection, data processing and analysis, description of results, discussion
4	To identify the different types of departmental academic support provided to doctoral students at Russian universities and to assess the relationship between	Zhuchkova S., Terentev E., Saniyazova A., Bekova S. Departmental academic support for doctoral students in Russia: Categorisation and effects // Higher Education Quarterly. 2023. Vol. 77. No. 2. P. 215-231. http://doi.org/10.1111/hequ.12389	Data processing and analysis, description of results

№	Objective	Publication	The author's contribution
	these types of support and doctoral students' confidence in defending their thesis		

Research methodology

Theoretical framework

In this study, doctoral education is considered as a social field in the context of Bourdieu's theory, which sees it as a specific system of relationships between individuals and their positions in society, with their own "rules of the game" (Bourdieu, 2005). A classic analogy to explain the concept of a social field is a football field, where players occupy different positions and play by proposed rules (Thomson, 2008). This conceptual framework offers several assumptions (Bourdieu, 2005, 2007; Gopaul, 2011, 2015, 2016; Thomson, 2008), which form the boundaries and content of our research as follows:

- *The field contains individual and collective social actors interacting with each other within a set of "rules of games".* In the context of doctoral education, these actors include applicants, doctoral students, supervisors, and other staff who work with graduate students. They also include universities and scientific institutions, as well as government, that establish some of the "rules of the game". The interaction between these actors forms the basis of the research in this study. This interaction is particularly evident in tasks 4 and 3, which focus on identifying the types of support provided to doctoral students and examining institutional practices for selecting students for doctoral programs, as well as in task 1, where different questions related to supervisee-supervisor interaction are considered.

- *agents in the field occupy unequal positions. The position of the agent determines what he can and cannot do in the field, as well as their chances of winning in this field. The position that an agent holds depends on the amount and structure of their capitals. Agents can start with different levels of capitals, which affects their future position.* The described assumption, on the one hand, reinforces the hierarchical nature of the relationship between the doctoral student and their supervisor, as well as between the doctoral student and department. However, it is especially relevant for our research because it allows us to examine the unequal positions held by doctoral students and the dependence of these positions on the level of capitals. We are not necessarily talking about direct and purposeful competition among doctoral students – but only about the fact that they are not equal. The role of capital can

manifest itself both at the stage of selection for doctoral programs (whether an applicant was enrolled), and further in the learning process (for example, it can determine the consent of the supervisor to work with a doctoral student, the opportunity to find a job in a scientific department during doctoral studies, apply for scholarship or grant competitions, etc., and eventually determine whether the doctoral student will defend his dissertation). This role becomes more significant with increasing diversity in the student body. This assumption forms the basis for the second research objective, which examines the relationship between a student's prior academic experience (their capital) and their performance in a doctoral program (their position in the field). As an indicator of a doctoral student's performance and the culmination of their academic journey, we use the dissertation defense. Many authors conceptualize doctoral training as a transition from being a student who consumes knowledge to becoming a researcher who produces knowledge (Gopaul, 2016), and the completed dissertation is considered as a universal indicator of the ability to produce knowledge for different groups of doctoral students. An additional assumption appearing in Bourdieu's theory suggests that agents in the field are able to "feel" their position. Based on this assumption, in task 4 we use the level of uncertainty of the doctoral student that he or she successfully defend the thesis as one of the dependent variables.

- *in each specific field, a specific capital is valued.* This assumption explains the choice of a doctoral student's prior academic experience as a predictor of their future performance in the second objective, as well as some indicators used to operationalize this concept. Empirical studies applying the theory of social fields to doctoral education demonstrate that students consider experience in conferences, publication of articles, and receipt of funding as essential for successful completion of their studies (Gopaul, 2016). However, the issue of determining the appropriate type and nature of capital for the doctoral education is still open, and therefore, an expanded list of potential indicators is proposed in the second objective.

- *the "rules of the game" that agents follow are not always clearly defined. Agents may use different strategies to maintain or enhance their positions. However, the inability to fully understand the "rules of the game" and select an appropriate strategy can lead to frustration and varied experiences in the field.* The first objective is based on this assumption as it analyzes the differences in student experience of different groups of students, depending on the duration of the gap before admission to a doctoral program. The fourth objective, among other things, is to assess the relationship between different types of student support and their

confidence in defending a thesis. The first objective also examines a wide range of aspects of the doctoral student experience, which reflect possible strategies doctoral students use (how they choose a supervisor, how often they interact with them, how they select their dissertation topic). It also considers obstacles students face as well as their general satisfaction with being in doctoral program (both reflect the “frustration” mentioned in the assumption). In the context of Russian doctoral education, it is important that the rules by which agents operate in the field of doctoral education may differ significantly in different universities, depending on the number of doctoral students, the amount of resources at the university, the amount of autonomy (for example, literally different rules of the game regarding the process of defending a thesis are set by universities that have and do not have the right to award their own degrees) and other factors.

- *the field has its own generating mechanisms, meaning that applicants are accepted or rejected based on certain conditions.* This aspect of the social field's functioning is reflected in the third objective, which is devoted to defining doctoral student selection tools.

Bourdieu's theory of social fields is widely used to explain the mechanisms of science, the academic profession, and higher education (see, for example, Bourdieu, 2005; Gonzales, 2014; Katchanov, 2016; Thomson, 2008), however, it is only beginning to be introduced into doctoral education research (Gopaul, 2011, 2015, 2016). In our opinion, the increasing heterogeneity of the doctoral student body sets a context in which the mechanisms described by Bourdieu become more relevant. At the same time, the broad conceptual framework allows us to combine different objects within one study, both in terms of subject matter and level of analysis (individual and institutional), covering various aspects of doctoral education and experience: from admission to dissertation defence. It is important to note that our research does not aim to operationalize Bourdieu's concepts or empirically verify all of the listed assumptions. Rather, we use his theory as a frame of reference, providing a set of boundaries and principles for our approach to conceptualize doctoral education.

Data and methods

The work consists of four studies, each based on a different set of empirical data. These include the results of three online sociological surveys (objectives 1, 2, and 4) and a content analysis of local admission policies (objective 3). This dissertation focuses on the university

segment of Russian doctoral education, which is the most prevalent (87% of doctoral students in Russia study at universities⁸).

The survey data were collected within the framework of research projects of the Center for Sociology of Higher Education at the Institute of Education, HSE University (the place of work of the author of the dissertation), two of which – for tasks 1 and 2 – were conducted with the support of the Ministry of Science and Higher Education of the Russian Federation and covered 248 and 119 universities, respectively, throughout Russia (71 and 57 regions). The scope of the research project, which collected data for task 4, was limited to six partner universities from four regions of Russia. The samples for each of these three tasks include universities of different profiles, with and without special statuses (such statuses as federal university, national research university, member of the Association of Leading Universities, member of the excellence program "5-100").

To achieve objectives 1 and 4, doctoral students were surveyed, while to achieve objective 2 doctoral were surveyed. The collection of survey data was organized online, participation in the surveys was anonymous and voluntary. When collecting data, we were not limited to certain criteria for the selection of respondents, so initially the sample could include graduate students and graduates of any field of study, years of study and admission, forms of education and funding. At the stage of data analysis, in cases where the research tasks involved the construction of regression models (tasks 2 and 4), to ensure the reliability of statistical inference, underrepresented groups of respondents were excluded from the analysis: representatives of medical and agricultural sciences, respondents who studied at the place covered by employer or who combined part- and full-time of studying, doctoral students of the fifth year of study. In task 1, which did not involve the analysis of multivariate models, these groups were included in the analysis.

The sample of universities for study 3, which is based on content analysis, was formed completely randomly from those universities that met the criteria: state university; head university; not a university with specialization; the university trained doctoral students in 2015-2020. The admission rules were searched on the official websites of the selected universities.

A detailed description of all data sources can be found in Table 2.

⁸ Federal State Statistics Service. URL: <https://rosstat.gov.ru/statistics/education> (accessed: 10.03.2024).

Table 2

Description of data sources used in the dissertation

Criterion	Objective 1	Objective 2	Objective 3	Objective 4
Description of objective	To identify differences in the portrait and doctoral experience of students with the gaps of different length before admission	To identify the relationship between doctoral students' prior academic experience and their subsequent performance in doctoral program	To assess the prevalence of various selection methods for doctoral programs in Russian universities	To identify the different types of departmental academic support provided to doctoral students at Russian universities and to assess the relationship between these types of support and doctoral students' confidence in defending their thesis
Method for data collection	Online survey	Online survey	Content analysis of local admission rules	Online survey
Period of data collection	May-June 2021	June-July 2022	June 2021 – February 2022	May-June 2019
Research project, under the framework of which data were collected	Scientific and methodological support for the development of quality management system for higher education in Russia under the conditions of	Monitoring of Educational Markets and Organizations (MEMO) ¹⁰	Not applicable	Initiative project of the Center for Sociology of Higher Education at the Institute of Education, HSE University

¹⁰ See details: <https://memo.hse.ru/> (in Russian).

Criterion	Objective 1	Objective 2	Objective 3	Objective 4
	COVID-19 pandemic and after it ⁹			
Ways of the questionnaire distribution	Online mailing from the university administration and placing of individual links in university LMS	Online mailing from the university administration and placing of links in online graduate community	Not applicable	Online mailing from the university administration
Final sample size	5007	985	150	992
Unit of analysis	Doctoral student	Doctoral graduate	University	Doctoral student
N of universities	248	119	150	6
N of regions	71	57	65	4
Frequency distribution	Field of study: ¹¹ Engineering and technology – 21% Mathematics and natural science – 16% Humanities – 16% Medicine – 14% Social science – 14% Education – 7%	Field of study: Social science – 29% Engineering and technology – 27% Mathematics and natural science – 21% Humanities – 15% Education – 8%	Leading universities: Yes – 27% No – 73%	Field of study: Engineering and technology – 28% Social science – 26% Mathematics and natural science – 24% Humanities – 14% Education – 8%

⁹ See details: https://high-edu-quality.ru/research_project (in Russian).

¹¹ The table and analysis use the grouped fields of study proposed in the order of the Ministry of Education and Science of the Russian Federation dated 12.09.2013 No. 1061 (see in Russian: <https://base.garant.ru/70480868/172a6d689833ce3e42dc0a8a7b3cddf9/>, accessed: 18.08.2024). In the questionnaire, respondents were offered lower-level fields of study – those with codes of the type XX.00.00, which were then grouped. The “Other” category included those respondents who, for some reason, could not identify their field of study from the proposed ones.

Criterion	Objective 1	Objective 2	Objective 3	Objective 4
	<p>Agriculture – 3% Other – 9%</p> <p>Year of study: 1 – 39% 2 – 29% 3 – 22% 4 – 9% 5 – 1%</p> <p>Full-time studying: Yes – 81% No – 19%</p> <p>Tuition-free form of financing: Yes – 71% No – 29%</p> <p>Gender: Male – 48% Female – 52%</p> <p>Length of a gap: 0 years – 71% Less than 5 years – 15% 5 or more years – 14%</p>	<p>Leading universities: Yes – 40% No – 60%</p> <p>Full-time studying: Yes – 85% No – 15%</p> <p>Tuition-free form of financing: Yes – 77% No – 23%</p> <p>Year of enrolment: 2013-2016 – 44% 2016 or later – 56%</p> <p>Gender: Male – 45% Female – 55%</p> <p>Defended dissertation: Yes – 38% No – 62%</p>		<p>Year of study: 1 – 36% 2 – 30% 3 – 22% 4 – 13%</p> <p>Full-time studying: Yes – 86% No – 14%</p> <p>Tuition-free form of financing: Yes – 82% No – 18%</p> <p>Gender: Male – 51% Female – 49%</p>

As part of the first task, a comparison was made between three groups of students: those who did not have a gap before admission, those who had a gap of up to five years and those who had a gap of five or more years. The division into these three groups is borrowed from similar previous works (Baxter, Hatt, 1999; O’Shea, Stone, 2011). The differences between these groups of students were tested using two-dimensional analysis methods: chi-squared test (for nominal variables) and nonparametric Kruskal–Wallis test (for ordinal variables). If statistically significant differences were found, at the second stage, standardized chi-square residuals or a posteriori Mann-Whitney pairwise tests were analyzed to determine the different groups, respectively.

As part of the second task, the analysis was carried out in two stages (see details in Zhuchkova, Bekova 2023). At the first stage, using the principal component analysis, indicators describing the academic experience of were grouped into several variables that can be interpreted as 1) academic achievements, 2) research experience related to the dissertation topic, 3) research experience related to the dissertation topic, and 4) teaching experience. The factor loadings of the indicators and the commonalities of the components are presented in Table 3.

Table 3

The factor loadings of the indicators and the commonalities of the components

Variable	PC1	PC2	PC3	PC4	Commonality
Took first, second, or third places in student olympiads	0.799	0.024	-0.169	0.378	0.685
Received additional scholarships/funding for your academic or research activities	0.752	0.064	0.177	-0.061	0.720
Received a diploma with honors on any of your previous higher education programs	0.675	0.013	0.12	-0.077	0.531
Participated in competitions of research papers	0.569	0.223	0.188	0.115	0.615
Taught at a university	-0.498	0.333	0.292	0.372	0.621
Published papers on the topic related to your future dissertation	0.003	0.973	-0.169	-0.060	0.811
Conducted or participated in research related to your future dissertation	0.16	0.925	-0.198	-0.21	0.784
Participated in Russian or foreign research conferences	0.179	0.439	0.32	0.073	0.563
Published papers on the topic <i>not</i> related to your future dissertation	0.032	-0.203	0.985	-0.031	0.845

Variable	PC1	PC2	PC3	PC4	Commonality
Conducted or participated in research <i>not</i> related to your future dissertation	0.131	-0.134	0.873	-0.124	0.729
Taught in a school or a college	0.225	-0.223	-0.125	0.96	0.816

Note. PC stands for principal component. PC1 – academic achievements, PC2 – research experience related to the dissertation topic, PC3 – research experience not related to the dissertation topic, PC4 – teaching experience. The question used in the analysis: “Could you please remember which of the following activities you did before enrollment in your PhD program?” (multiple choice). Source: (Zhuchkova, Bekova, 2023)

As a result of this stage of the analysis, four standardized variables were obtained that reflected various dimensions of the pre-doctorate experience. At the second stage of the analysis, we explored associations between the extracted components of the pre-doctorate experience and the defense of the dissertation. Several models of binary logistic regression were built with the fact of dissertation defense as a dependent variable (the question “Have you defended your dissertation?”) and different sets of independent variables. The first model focused solely on the effects of the pre-doctorate experience (four components extracted earlier). Then, in the next models, we consequently added the previously described control variables:

- presence of non-academic motives to pursue a doctorate (model 2),
- presence and type of employment during doctoral training (model 3),
- presence of significant support from supervisor (model 4) and department (model 5).

Additionally, we included the following control variables in all models: year of enrollment, form of studying, form of financing, type of university (leading or not), and field of study.

As part of the third task, data collected using quantitative content analysis on the use of various selection tools were analyzed by comparing proportions (see details in Zhuchkova, 2022). The differences between leading and other universities were additionally analyzed (using the Fisher test and the standardized chi-square residuals). Due to the use of a random sample, the results obtained within this task are representative for Russian universities (state, head, without specialization).

As part of the fourth task, the analysis was carried out in two stages (see details in Zhuchkova et al., 2023). At the first stage, based on questions about who – the supervisor, the head of the department or other colleagues – and in what aspects helps the PhD student, six types of academic support were identified using latent class analysis. The model with six classes was chosen as the most optimal in terms of goodness-of-fit statistics, as well as ease of

interpretation. At the second stage, the relationship of these types with self-assessment of the chances of successful future dissertation defense as a proxy for future performance was studied. Two regression models with different dependent variables were built. In the first model, the linear regression, dependent variable reflected the doctoral student's uncertainty that they were able to prepare and defend a dissertation. The variable was obtained as a result of applying the CatPCA to the following set of statements (doctoral students could agree or disagree with them on a 4-point Likert scale):

- 1) I will not defend my dissertation in time.
- 2) I will not pass my next examination.
- 3) All my work is being done in vain and does not get me closer to the defence.
- 4) That my research does not correspond to the level of a doctoral dissertation.
- 5) That I will never be able to successfully defend a dissertation and get my degree even if I finish my dissertation.
- 6) I am not capable of completing my dissertation.

The data were combined into a single variable that retained 66% of the variation of the initial indicator statements. The resulting variable is a standardized continuous variable and is interpreted as “the uncertainty of a doctoral student that he or she is able to prepare and defend a dissertation”. The higher the value of the standardized variable, the more unsure the student is of his or her abilities.

In the second model, the binary logistic regression, the dependent variable was the doctoral student's assessment of their chances to defend their dissertation within one year after completing doctoral training. To create the variable, we used the following question: “In how many years do you plan to defend your PhD thesis?”. Respondents could choose answers from “Within one year” to “In 6 years or more”, as well as the option “I don't plan to defend my dissertation”. When converting this variable into a binary one, each respondent was assigned a category “1” if, according to the current year of study and the field of study, he chose the terms of defense corresponding to one year after graduation, and “0” in all other cases. In our sample, 84% of respondents chose the answer corresponding to the thesis defense within one year after graduation.

In both regression models, the same set of control variables was used: the form of studying, the form of financing, the year of study and the field of study. Both models were built with the calculation of clustered standard errors of regression coefficients. The university where the doctoral student studies was used as a clustering variable.

The main results of the study

Portrait and experience of doctoral students with different duration of a gap before admission

As part of the first objective, a comparison was made between three groups of doctoral students: those who did not have a gap before admission, who had a gap of up to five years (hereinafter referred to as students with a short gap) and those who had a gap of five or more years (hereinafter referred to as students with a prolonged gap).

In terms of the portrait, the following differences were observed:

- students with a prolonged gap are significantly more likely to be studying part-time than the other two groups,
- among students with a prolonged gap, doctoral students who pay their tuition fees are significantly more common than among the other two groups,
- women are significantly more common among students with a prolonged gap than among the other two groups,
- among students with a prolonged gap, married students with minor children are significantly more common than among the other two groups,
- among students with a prolonged gap, there are significantly more doctoral students who work full-time than among the other two groups,
- among students who work at their universities, the presence of a research position is more typical for doctoral students who did not have a gap, and teaching is more typical for students with a prolonged gap,
- among students with a prolonged gap, there are significantly fewer of those who previously studied at the same university than among the other two groups,
- although for all three groups of students, obtaining a degree is indicated as the main goal of admission to the doctorate, those who had a gap choose this reason more often than those who did not have a gap. Students who had a gap are less likely to indicate the desire to continue research on a particular topic as the purpose of admission, compared with those who did not have a gap. The most noticeable differences between the groups under consideration were revealed in relation to non-academic goals of admission to the doctorate: students who had a gap are less likely to be interested in the social bonuses that admission to Russian doctoral programs gives, such as the opportunity to live in a dormitory or a postponement from the army.

In terms of the doctoral experience, the following differences between the groups were observed:

- students with a prolonged gap are less likely to have previous experience of interacting with their current supervisors, and if this experience exists, it is more often associated with real research or applied projects (rather than academic papers or courses),
- students who had a gap are more autonomous when preparing a dissertation: doctoral students with both a short and a prolonged gap interact less often with their supervisors than those without a gap,
- most of the functions carried out by supervisors do not differ significantly between the three groups, but students with a prolonged gap are less likely to receive assistance from their supervisors in recommending experts for consultations and organizing the field stage of research,
- students with a prolonged gap are less likely to report that they have difficulties interacting with their supervisor,
- as difficulties during their studies, students with a prolonged gap often note the lack of necessary academic skills, problems with foreign language, the need to combine study with family responsibilities and work,
- as difficulties during their studies, students who have not had a gap often note a loss of interest in the topic of the dissertation. An analysis of how doctoral students choose their research topics shows that students with a prolonged gap are more proactive in this aspect. The latter are less likely to agree that their topics are related to the work of their supervisors and departments, or that they continue topics that they have previously explored. Instead, they are more likely to agree with statements that the dissertation topics are their personal choice and that they have a strong personal interest in them. It is also more typical for students with a prolonged gap that their work outside the university is related to the topic of the dissertation,
- students with a prolonged gap demonstrate a more intense publication activity,
- students with a prolonged gap are more likely to note that doctoral programs have helped them to develop skills such as research methodology and data collection, preparation of articles and other academic texts, knowledge of a foreign language, presentation of scientific results and time management,
- students with a prolonged gap are more satisfied with the quality of their doctoral education, are less likely to drop out of their programs and find courses more useful for themselves than students of the other two groups.

In general, the resulting portrait of doctoral students who had a gap before admission corresponds to the portrait of non-traditional doctoral students from previous studies conducted primarily in the United States (Offerman, 2011; Cornwall et al., 2019; Hill, Conceição, 2020). However, unlike other papers, our study revealed a specific feature of the Russian context: doctoral students who had a gap are focused on future academic career. Unlike other national contexts, where more diverse models of doctoral training are implemented and non-traditional doctoral students are represented mainly by those who work in the non-academic labor market (Offerman, 2011; Jablonski, 2001), among Russian students who have had a gap, there is a high proportion of those who already hold a position at the university. Apparently, this is a specific group of university lecturers who decide to get a degree, since the requirements associated with working at a university do not allow them to occupy higher positions and move up at their career. The revealed discrepancy with the results of previous studies, namely, the discovered different portrait of Russian non-traditional doctoral students, once again demonstrates the heterogeneity of the student body. In addition, this heterogeneity is evidenced by the fact that differences in many aspects were found not only between students who had and did not have a gap before admission, but also within the first group, i.e., between students with a short and a prolonged gap.

The relationship between doctoral students' previous academic experience and their subsequent doctoral results

In the second objective, we evaluate the relationship between the doctoral student's previous academic experience and the thesis defense through a series of regression models. The analysis shows that the previous academic experience of students is indeed associated with the successful defense of a dissertation, but not all components of this experience are important, and not all model specifications show a significant relationship. Table 4 shows the odds ratios obtained as a result of binary logistic regression analysis (the dependent variable is the fact of defending a dissertation).

Table 4

Results of the logistic regression analysis (odds ratios)

Variable	Model				
	(1)	(2)	(3)	(4)	(5)
Intercept	1.32	1.68	2.66 *	1.16	1.07

Variable	Model				
	(1)	(2)	(3)	(4)	(5)
Academic achievements	1.11	1.10	1.09	1.11	1.08
Research experience related to the dissertation topic	1.27 **	1.26 **	1.22 *	1.17	1.15
Research experience not related to the dissertation topic	0.97	0.99	0.99	1.00	1.00
Teaching experience	0.93	0.92	0.94	0.93	0.94
Non-academic motives		0.59 ***	0.61 **	0.61 **	0.61 **
Employment status (reference category – Not employed)					
Employment outside university			0.49 **	0.49 *	0.53 *
Research position at university			0.88	0.93	0.96
Another position at university			0.57 *	0.58	0.61
Significant support from supervisor				2.50 ***	2.11 ***
Significant support from department					1.55 **
Female	0.92	0.83	0.82	0.83	0.82
Leading university	1.10	1.07	1.04	1.17	1.19
Full-time	1.34	1.34	1.21	1.24	1.21
Tuition-free	0.84	0.85	0.88	0.88	0.95
Field of study (reference category – Mathematics and natural science)					
Engineering and technology	1.57 *	1.59 *	1.63 *	1.72 **	1.70 *
Social science	0.88	0.87	0.96	1.04	1.01
Humanities	1.37	1.32	1.48	1.49	1.51
Education and pedagogy	0.78	0.77	0.80	0.90	0.84
Year of enrollment	0.69 ***	0.69 ***	0.69 ***	0.69 ***	0.68 ***
Observations	985	985	985	973	967
R ² Tjur	0.105	0.116	0.129	0.156	0.164

Note: * p<0.05 ** p<0.01 *** p<0.001

The first model shows that among the retrieved components, only research experience on the topic of the dissertation is significantly associated with the defense of the dissertation. With an increase of one standardized unit, this indicator increases the probability of defending a dissertation by 27%. There is no statistically significant relationship between the other

components of previous academic experience highlighted in the study (academic achievements, research experience not related to the topic of the dissertation, teaching experience) and the successful defense of the dissertation.

The observed relationship of research experience on the topic of the dissertation remains significant in models 2 and 3. The second model shows that the presence of non-academic motives for admission reduces the chances of defending a dissertation by 39% but does not “neutralize” the relationship with previous research experience on the topic of the dissertation. The third model shows that different types of employment have different effects on the likelihood of defending a thesis. The found patterns are consistent with the results of previous studies (Bekova, 2021): employment outside the university and the presence of an administrative position reduce the chances of successful defense (by 51% and 44%, respectively), while the absence of work or a research position at the university is positively associated with the chance of defending a dissertation (see the intercept in the third model). In these models, previous research experience on the topic of the dissertation also remains significant.

Finally, the last two models show that with the inclusion of control variables in the analysis, reflecting significant support from the supervisor and the department, the relationship of experience on the topic of the dissertation with successful defense ceases to be statistically significant. The strongest relationship with successful defense is observed for the variable reflecting the support from the supervisor: its receipt increases the chance of successful defense by more than two times. The support from the department, all other things being equal, increases the chances of successful defense by 55%.

The prevalence of different selection procedures for the doctorate in Russian universities

The results of the content analysis of the local rules of admission to doctoral programs, reflecting the prevalence of certain selection procedures, are shown in Figure 1.

Exam	Leading universities	Other universities	All sample
<i>Entrance exams</i>			
Major	100%	98%	99%
Foreign language	77%	76%	76%
Philosophy ***	36%	52%	48%
<i>Individual achievements</i>			
Papers ***	94%	87%	89%
Patents ***	79%	58%	64%
Diploma with honors	66%	59%	61%
Winnings in student olympiads ***	61%	52%	54%
Participation in competitions of scientific papers	53%	54%	54%
Participation in conferences	53%	52%	52%
GPA	23%	22%	22%
<i>Additional requirements and criteria</i>			
Confirmation from future supervisor ***	25%	17%	19%
Interview	15%	18%	17%
Recommendation of state exam commission	17%	16%	16%
Project proposal	7%	8%	8%
CV	5%	6%	6%
Recommendation letters	5%	4%	4%
Motivational letter ***	7%	1%	3%
Continuation of previous research	2%	2%	2%

Figure 1. Prevalence of various selection tools, %
 (***) $p < 0.05$

The results of the analysis show that the key tools for selecting doctoral students in Russian universities are exams in the field of study and in a foreign language, as well as the assessment of formal academic achievements of applicants: publications, patents, diplomas with honors (these are the tools found in more than 60% of universities). In addition to formal exams and individual achievements, there are other more “flexible” procedures and requirements in the admission rules that allow to assess the motivation, research experience and potential of the applicant, including the groundwork for dissertation research – a key predictor of future performance identified in the previous study. Nevertheless, such practices are quite rare in Russian universities – they are used in 2-19% of cases. Some of them (requiring the consent of the supervisor and the preparation of a motivation letter) are more often used by leading universities.

Types of academic support of Russian doctoral students

As a result of the latent class analysis, six types of doctoral student support were identified, a description of which is presented in Table 5. Only three of the types found reflect different types of distributed (team) support.

Table 5

Description of the identified types of departmental academic

Type	Category	Description	%
Academic support from supervisor	Individual support	Only the supervisor is involved in the work with the doctoral student. His activity is limited to tasks directly related to the conduct of research and the preparation of the text of the dissertation.	29%
Full support from supervisor	Individual support	Only the supervisor is involved in the work with the doctoral student. His activities include both tasks related to conducting research and preparing the text of a dissertation, as well as organizational assistance.	28%
Faculty support with no help from head	Distributed (team) support	In addition to the supervisor, other colleagues participate in the work with the doctoral student, but not the head of the department. The department provides mainly informational and organizational support.	18%
Limited staff support	Distributed (team) support	In addition to the supervisor, other colleagues, including the head of the department, participate in working with the doctoral student. The activities of these colleagues are limited to information assistance.	9%
Total staff support	Distributed (team) support	In addition to the supervisor, other colleagues, including the head of the department, participate in working with the doctoral student. The activities of these colleagues include substantive, organizational and informational assistance, including text editing.	5%
No support	Absence of	Not anyone, including the supervisor,	11%

Type	Category	Description	%
	support	are involved in active work with the doctoral student.	

The final part of the analysis is devoted to assessing the relationship between the identified types of academic support and two dependent variables: the degree of uncertainty of graduate students in successful defense of the dissertation and the assessment of chances of defending their dissertation within a year after graduation.

Table 6 shows the results of the first regression model (linear regression). The dependent variable is a standardized variable obtained as a result of applying the categorical PCA reflecting how uncertain the student is in the future defense.

Table 6

OLS regression results (DV – students’ lack of confidence about completing their dissertation)

Variable	B	SE	p-value	LB CI 95%	UB CI 95%
Intercept	0.20	0.14	0.16	-0.08	0.48
Commercial	-0.13	0.07	0.06	-0.26	0.00
Mathematical and natural sciences	-0.03	0.07	0.69	-0.17	0.12
Engineering and technological sciences	0.00	0.09	0.97	-0.17	0.17
Humanities	0.16	0.16	0.29	-0.14	0.47
Education	0.19	0.26	0.45	-0.31	0.69
1 st year	-0.06	0.14	0.68	-0.34	0.22
2 nd year	-0.03	0.13	0.84	-0.28	0.23
3 rd year	-0.01	0.19	0.97	-0.39	0.37
Full-time	-0.02	0.10	0.84	-0.22	0.18
Full support from supervisor	-0.30	0.13	0.03*	-0.56	-0.03
Faculty support with no help from head	-0.28	0.12	0.02*	-0.52	-0.05

Variable	B	SE	p-value	LB CI 95%	UB CI 95%
No support	0.52	0.22	0.02*	0.09	0.94
Limited staff support	-0.58	0.14	0.00***	-0.85	-0.32
Total staff support	-0.53	0.19	0.01**	-0.90	-0.15

Note: F = 5.915, p-value = 0.000, adjusted R-squared = 0.076. Reference categories: academic support from supervisor, 4th year of study, social sciences. *p < 0.05; **p < 0.01; ***p < 0.001

The first model allows us to conclude that the presence of any type of support reduces the uncertainty of PhD students in their defense: the coefficients for all types of support, with the exception of “no support”, are negative and statistically significant. Only the “no support” has the opposite effect – it increases the uncertainty of the doctoral student. In this case, it is not possible to rank the effects of other types of support, since the confidence intervals of the coefficients overlap. In this case, it can be concluded that the presence of any support – regardless of its specific type – has a positive effect on the confidence of doctoral students in their successful defense.

Table 7 shows the results of the second regression model (logistic regression). The dependent variable reflects whether the doctoral student believes that he or she will be able to defend their thesis within a year after graduation.

Table 7

Binary logistic regression results (DV – students’ expectation that they will defend their dissertation during the normative period)

Variable	B	SE	p-value	Exp(B)
Intercept	0.85	0.59	0.15	2.35
Form of financing: commercial	0.09	0.37	0.81	1.09
Mathematical and natural sciences	0.49	0.44	0.27	1.63
Engineering and technological sciences	0.12	0.23	0.58	1.13
Humanities	-0.03	0.22	0.89	0.97
Education	0.65	0.27	0.02*	1.91
1 st year	0.52	0.42	0.21	1.68

Variable	B	SE	p-value	Exp(B)
2 nd year	0.18	0.33	0.58	1.20
3 rd year	0.15	0.38	0.70	1.16
Form of education: full-time	0.20	0.45	0.66	1.22
Full support from supervisor	0.26	0.37	0.48	1.30
Faculty support with no help from head	0.26	0.21	0.22	1.30
No support	-0.68	0.25	0.01**	0.50
Limited staff support	1.30	0.20	0.00***	3.67
Total staff support	0.26	0.28	0.34	1.30

Note: Nagelkerke R-squared = 0.056. Reference categories: academic support from supervisor, 4th year of study, social sciences. *p<0.05; **p<0.01; ***p<0.001

The second model confirms the previous conclusions. As in the first model, the only type of support negatively associated with confidence in defending a thesis within a year after graduation is “lack of support”. At the same time, there are no statistically significant differences between the other types of support, with the exception of one type. Thus, doctoral students who receive limited support from the department are the most confident in their defense within the specified period – their chances of being confident in timely defense are almost four times higher than those of students who receive all other types of support. This result allows us to conclude that the excessive involvement of other staff in working with doctoral students may be less productive than the active participation of the supervisor, accompanied by information support from other university staff. By information support we mean a combination of the following functions presented in the relevant question of the questionnaire: recommendation of literature and experts on the research topic, recommendation of research methods, providing information about relevant scientific events. These functions are related specifically to the provision of information and do not assume the involvement of department in the organization of research and in working with the texts of publications and dissertation (i.e., commenting and editing). A detailed distribution of functions according to the identified types of support is presented in the corresponding article of the dissertation.

Thesis statements

In accordance with the results of a series of studies, the following statements are formulated:

1) Doctoral experience varies among students depending on the presence and duration of the gap they had before admission. The most different group is students with a prolonged gap (five or more years). These students are more autonomous in preparing their dissertation, have more interest in the topic of their research, face a large number of difficulties (lack of necessary academic skills, problems with knowledge of a foreign language, the need to combine study with family responsibilities and work), while demonstrating greater performance and satisfaction with their studies. Unlike other national contexts, in Russia, doctoral students who had a gap before admission are more focused on obtaining a degree and building an academic career and often already occupy positions at the university.

2) All other things being equal, i.e., regardless of socio-demographic characteristics, the field of study, the reasons for admission to a doctoral program, the presence and type of employment, the key predictor of future successful thesis defense at the time of selection is the student's prior research experience on the topic of the dissertation. Other characteristics that can be assessed during the admission campaign (formal academic achievements, general research experience, i.e. unrelated to the dissertation, and teaching experience) are not related to future successful defense.

3) Despite the absence of regulatory restrictions on the choice of doctoral student selection tools, Russian universities are characterized by the use of rather formal procedures: traditional exams, accounting for formal individual achievements (papers, patents, diploma with honors). More flexible tools that comply with the principles of holistic admission, are not limited only by formal criteria and allow assessing the research background and potential of the applicant, are used extremely rarely and are more often used in leading universities.

4) The lack of research experience on the topic of the dissertation can be compensated by the support of the supervisor and department during doctoral training. The type of support that is universal, i.e. suitable for different groups of doctoral students, is limited staff support – active interaction of a supervisor and a student, accompanied by information support from department. Receiving such support is positively associated with students' assessment of their chances of successfully defending their dissertation shortly after graduation.

Theoretical and practical significance of the work

A series of studies conducted within the framework of the dissertation work contributes to the academic discussion about the transformation of doctoral education, doctoral student experience, and factors of doctoral students' performance in the following aspects:

1) The problem of heterogeneity of the doctoral student body previously discussed in foreign academic discussions was transferred to the Russian context for the first time. Differences were detected between students with different duration of a gap before. It is shown that the most different group among all doctoral students are those with a prolonged gap (five or more years), but in the Russian context this is a specific group of university teachers.

2) For the first time, the previous academic experience of doctoral students and its connection with the successful defense of a dissertation in the future are comprehensively considered. Most research on doctoral student performance factors focuses on the characteristics of the training, rather than on what preceded it. The analysis, which includes different control variables, allows us to draw conclusions not only about the role of previous experience, but also about the relative contribution of these two groups of factors: those that take place during the training and before it. Similarly, the results obtained allow us to draw conclusions about the relative importance of individual and environmental performance factors of doctoral students. Thus, the results show that environmental factors that take place in the process of training are more important, namely, the support of the supervisor and department.

3) Unlike most studies focusing on the role of a supervisor, academic support in our study was considered as a heterogeneous phenomenon, which implies different configurations and effects of involving more actors in the work with a doctoral student. The results are embedded in an academic discussion about the possible formats and effects of distributed academic support and raise new questions about the balance between support, control and autonomy of doctoral students.

In practice, the results of the research can be used by universities in designing admission campaigns and doctoral training programs, as well as building a system of distributed academic support for doctoral students (for example, in the format of doctoral schools). Thus, the patterns found in a series of studies already allow us to formulate a number of specific recommendations for the heads of departments of doctoral education and doctoral programs of Russian universities:

- during the admission campaign, evaluate the applicants' ideas about the future topic of the dissertation and research groundwork on this topic and pay less attention to their formal academic achievements;
- encourage the involvement of students in research and the choice of topics for future dissertation earlier than during the doctoral study period, for example, through the introduction of integrated programs;
- involve not only the supervisor, but also department in working with doctoral students, assigning the latter functions related to information support.

At the systemic level, the results of the study also actualize the discussion about the possible need to diversify doctoral training programs in Russia. Compared with the results of research in other national contexts, when analyzing the experience of Russian doctoral students who had a prolonged gap before admission, we did not find among them students focused on non-academic careers. This result may indicate that doctoral programs in Russia are currently not suitable for students with such goals, and returns to the question of the possibility of introducing professional doctorate in Russia, which currently does not exist. The existing track of *soiskatelstvo*, which potentially allows applicants who are not interested in building an academic career to obtain a degree, differs significantly from professional doctorates abroad, which involve the development of research skills by a doctoral student to apply them to a specific professional field (Kehm, 2020). The main barriers to the implementation of professional doctoral programs are related to the lack of regulatory recognition of professional degrees, as well as the lack of standards for the implementation of such programs (Bednyi et al. 2021). The cancellation of part-time studying during the reform of 2021-2022¹² may also be ambiguous in the context of the results obtained. In this regard, an important task for universities is to design the doctoral training in such a way that doctoral students have the opportunity to balance their studies and other activities. The autonomy necessary for the design of such programs was provided to organizations as part of the same reform of 2021-2022.

At the same time, it should be noted that the recommendations formulated may not be relevant for all Russian universities. In our opinion, the main recipients of the results of the conducted series of studies are primarily leading universities – for several reasons. Firstly, such universities experience massification of doctoral education to a greater extent. Relevant studies show that in the period from 2015 to 2020, there was a significant redistribution of the doctoral

¹² Resolution of the Government of the Russian Federation by 30.11.2021 №2122. URL: https://www.consultant.ru/document/cons_doc_LAW_401943/92d969e26a4326c5d02fa79b8f9cf4994ee5633b/ (accessed: 07.04.2024).

students in Russia towards leading universities, so that in 2020 42 leading universities with trained almost half of all Russian doctoral students (Zhuchkova, Bekova, 2023). The costs of introducing new practices for the selection and support of doctoral students are justified if there are quite a lot of students at the university, as well as if the competition for admission to doctoral programs is high. Secondly, the largest amounts of resources are concentrated in leading universities, which can ensure the introduction of new practices for the selection and support of doctoral students. Launched in 2021, The Priority 2030 support program for Russian universities could become a resource base for the implementation of the described innovations, in particular, given that one of the key indicators of the program is associated with an increase in the proportion of young researchers at the university and the absolute majority of universities of this program plan to use their doctoral programs to achieve the goals set in the program related to improvement of universities' scientific and technological potential (Zhuchkova, Pavlyuk, 2024). Thirdly, as the data available to us show, the level of heterogeneity of the doctoral student body is higher in leading universities. If we use the "statistical" definition of heterogeneity mentioned in the introductory section, then, according to the latest data from the MEMO project, which were used in task 2, the doctoral student body in leading universities is more heterogeneous compared to other universities, at least in terms of the presence of specific non-academic goals, as well as prior research experience. Table 8 shows the results of calculating the entropy coefficient for these characteristics, a statistical indicator that evaluates how close the distribution of values of a categorical variable is to a uniform one (the closer the value is to 1, the more heterogeneous the data for the analyzed variable).

Table 8

Indicators of heterogeneity level for leading and other universities

Variable	Other universities			Leading universities			P-value
The question "Which of the following goals did you pursue when applying to doctoral program?"							
	% students who chose this option	% students who did not choose this option	Entropy	% students who chose this option	% students who did not choose this option	Entropy	
To receive a scientific degree	84%	16%	0,634	87%	14%	0,571	0,271
To enhance my research skills	54%	46%	0,995	63%	37%	0,948	0,004
To enhance my teaching skills	47%	53%	0,998	37%	63%	0,952	0,002
To continue research a topic I am interested in	36%	64%	0,941	41%	60%	0,974	0,140
To advance my career in academia	30%	70%	0,884	36%	64%	0,939	0,077
<i>To get a job in this university/research institute</i>	22%	78%	0,762	29%	72%	0,862	0,023
To receive a doctoral program diploma	18%	82%	0,673	9%	91%	0,443	0,000
To advance my career outside academia	15%	85%	0,602	17%	83%	0,665	0,271
<i>To get a postponement from army</i>	8%	92%	0,395	12%	88%	0,521	0,038
<i>To go to a foreign university as part of a doctoral program</i>	3%	97%	0,204	13%	88%	0,544	0,000
<i>To live in a students dormitory</i>	2%	99%	0,112	5%	95%	0,291	0,001
Вопрос "Вспомните, пожалуйста, что из перечисленного Вы делали до поступления в аспирантуру?"							
	% students who chose this option	% students who did not choose this option	Entropy	% students who chose this option	% students who did not choose this option	Entropy	
Participated in Russian or foreign research conferences	62%	39%	0,530	70%	31%	0,523	0,010

Variable	Other universities			Leading universities			P-value
Received a diploma with honors on any of your previous higher education programs	58%	42%	0,525	61%	39%	0,530	0,290
Published papers on the topic related to your future dissertation	50%	51%	0,498	53%	47%	0,511	0,329
Published papers on the topic not related to your future dissertation	46%	54%	0,479	51%	49%	0,503	0,135
Participated in competitions of research papers	40%	60%	0,442	45%	55%	0,474	0,119
<i>Conducted or participated in research related to your future dissertation</i>	38%	62%	0,430	50%	50%	0,502	0,000
<i>Received additional scholarships/funding for your academic or research activities</i>	33%	67%	0,388	46%	54%	0,479	0,000
<i>Conducted or participated in research not related to your future dissertation</i>	30%	70%	0,356	43%	57%	0,462	0,000
Taught at a university	30%	70%	0,356	25%	75%	0,310	0,112
Taught in a school or a college	17%	83%	0,218	14%	86%	0,183	0,231
Took first, second, or third places in student olympiads	14%	87%	0,181	16%	84%	0,215	0,228

Note. Options, which are highlighted in italics, represent those for which the level of heterogeneity in leading universities is statistically significantly higher.

Limitations and future directions of the study

When interpreting the results obtained, it is necessary to take into account the limitations of the conducted series of studies related to the specifics of the empirical data used.

Firstly, the study uses a fairly broad basis for comparing groups of doctoral students – the presence and duration of a gap in education. The differences found between the three groups of students can be explained not by the presence and duration of the gap as such, but by the specifics of the activities that the doctoral students were engaged in during this gap. Taking into account the results of the analysis of the respondents' current places of employment, it can be assumed that many students with a long gap were engaged in teaching at the university, while in the study 2 we demonstrate that pre-doctorate teaching experience does contribute significantly to the future defense. However, more accurate data with which we can control the specifics of students' activities during the gap are not available.

Secondly, in the analyzed survey data and the results obtained, there may be biases caused by the chosen method of distributing questionnaires – mailing by the university administration. With this approach, students employed at the same universities may be more likely to become participants in the study – and this may also explain the conclusion that many doctoral students with a long gap are oriented towards building an academic career. According to the basic characteristics – gender, field of study, form of education and type of funding – there were no statistically significant differences in our data compared to official statistics, but it is not possible to control the representativeness of data on other characteristics.

Thirdly, the cross-sectional nature of the analyzed data does not allow us to draw unambiguous conclusions about the direction of the causal relationship and the mechanisms explaining the patterns found. So, in study 2, it was found that the link between research experience on the topic of the dissertation and successful defense disappears if the doctoral student has support from the supervisor and department during training. This result can be interpreted in different ways: on the one hand, the lack of experience on the topic of the dissertation can be compensated by the support of colleagues, but on the other hand, the very fact of having experience on the topic of the dissertation at the time of admission may imply active interaction with the supervisor before admission, and the discovered effect of experience on the topic of the dissertation may actually reflect the effect of earlier interaction with the supervisor. Similarly, in study 4, it was found that the lack of support is negatively associated with the students' confidence in the successful defense of their dissertation, but this does not necessarily mean that the lack of support *leads* to such an effect. An alternative explanation for

the discovered connection may be the following: doctoral students initially do not plan to defend their dissertation (for example, because they entered a doctoral program for social benefits, such as a postponement from army) and because of this do not receive support from the supervisor and department.

Fourth, a survival bias may occur in the study, since in all tasks based on survey data, there is no information about those who, for some reason, dropped out of doctoral school. For example, in study 2, data on doctoral graduates are analyzed and no significant relationship is found between most of the components of a student's previous academic experience and the defense of a dissertation – however, these variables may play a role even before the defense stage or completion of the program, for example, when deciding on dropping out. It is possible to overcome this limitation with the help of a longitudinal study, in which the same respondents would be surveyed regularly from the moment of admission to graduation.

Fifth, a significant limitation of the study is the inability to fully assess the disciplinary specifics of the identified patterns. Significant disciplinary differentiation in the doctoral and scientific community is demonstrated by the results of many foreign and domestic studies (Bair, Haworth, 2005; Bednyi, Mironos, 2008). For most key variables (the presence and duration of a gap in study 1, various components of pre-doctorate academic experience in study 2, identified types of support in study 4), the corresponding papers of the dissertation analyze differences in fields of study, and this variable is also used as one of the control variables in all regression models. Nevertheless, this is insufficient to determine whether the relationship between key variables and the experience or performance of doctoral students differs for different fields of study. To address this question, it would be necessary to reproduce the same models on separate subsamples of doctoral students from different fields of study, but the available sample size is insufficient for such analysis. Further research focusing on specific fields of study could address this gap.

Sixth, when studying institutional practices (studies 3 and 4), we draw conclusions only about their landscape and prevalence, but not about their effectiveness, which could be of great importance for doctoral education management practices. Task 3 is limited to defining the landscape and assessing the prevalence of various selection tools, task 4, although it includes a stage of assessing the relationship between the selected types of support and students' confidence in defense, nevertheless relies on students' self-assessment, therefore the results cannot be interpreted in terms of real effectiveness. Its evaluation also requires research performed in a different – experimental or quasi-experimental – design.

Finally, in all the studies conducted, only the university segment of the Russian doctoral education was studied. The decision to focus only on students studying at universities is due to the concentration of the student body in this type of organization and the lack of empirical data characterizing the experience of students who study in scientific organizations. Determining to what extent the discovered patterns are reproduced in scientific organizations may be the task of the following studies.

Among other possible research prospects that the results obtained in this work open up, the following can be suggested. Firstly, in the context of the heterogeneity of the student body, it seems productive to study the experience of other groups of students: working outside the academic sector during studies, foreign students, students who have changed their field of study, etc. Secondly, taking into account the wide representation of these groups in Russian doctoral programs (the relevant statistics were given in the introductory part), it may be promising to identify existing "latent" practices for diversifying training programs implemented by Russian universities, focusing not only on selection and distributed support practices, but also on the practices of individualizing students' educational trajectories, interaction with employers, organization of network programs, etc. Thirdly, the results obtained from the third task, which are related to the low variation in the tools used for doctoral admissions, highlight the importance of studying the reasons why doctoral program administration does not fully utilize their existing autonomy. Finally, at a theoretical level, an important continuation of the study may be an attempt to empirically verify the assumptions inherent in the theory of social fields, which in this study were taken as a starting point rather than as testable hypotheses. The differences found in the current study between different groups of students in terms of their student experience and performance largely correspond to the assumptions of the theory of social fields, however, a systematic analysis of how empirical patterns align with theoretical assumptions has yet to be carried out.

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