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Occupational Stress in Innovative Doctoral Research

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Abstract

Doctoral students often face significant occupational stress due to the high demands of conducting innovative research, meeting academic expectations, and managing personal responsibilities. The pressure to produce groundbreaking results can lead to both physical and mental strain, affecting their overall well-being and academic performance. Doctoral students are facing high levels of challenging, fast-paced, and sometimes even conflicting demands. The pressure to conduct studies, publish qualitative articles, disseminate research findings, and write doctoral theses represent stressors for doctoral students. The purpose of the research is to identify the main changes needed to reduce the occupational stress of doctoral students. Other research objectives are to discover the level of occupational stress, to identify the frequency, intensity, and impact of the main stressors, and to know the main causes of doctoral students' occupational stress. The research sample consists of first, second, third, and fourth-year full-time and part-time doctoral students enrolled in Management Doctoral School, one of the twelve doctoral schools in the Bucharest University of Economic Studies. The main research tool is an adapted questionnaire based on the Workplace Stress Scale developed by the American Society for Stress. Data was collected online using the Google Forms software program. Jeffrey's Amazing Statistics Program (JASP) was used to process and analyse the data and results. The research results are useful for both the management of the involved doctoral school and the university management. The decision-makers can become more aware of the doctoral students' occupational stress using science-based measurements. Based on the results of this research, they could adjust policies and strategies to reduce the occupational stress of doctoral students in all twelve doctoral schools of the university. The results may also be relevant for other doctoral schools from other universities and for the specialised literature in which this issue is very little addressed.

Keywords: occupational stress, doctoral students, management.

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1. Introduction

Around the academic world, pursuing and obtaining a doctoral degree represents a challenging, stressful, resource-consuming, confusing, and sometimes even solitary experience for doctoral students. It is important for doctoral students, supervisors, doctoral schools' management teams, and management research to understand the factors, manifestations, and effects of occupational stress encountered in doctoral education. In this regard, evidence-based measures can be studied, tested, and adopted, respectively, by these stakeholders, with the aim of improving stress management of students in doctoral schools.

Studies indicate that occupational stress is experienced at high levels by both doctoral students and doctoral supervisors. Time pressure, lack of confidence in assignments' completion, sense of belonging in scholarly community, and social isolation were experienced as stressors by most of the 152 doctoral students from a New Zealand university (Cornwall et al., 2019). In one year, works stress was experienced by more than 30% of supervisors in the United Kingdom, affecting their sleep quality (UK Council for Graduate Education, 2021).

The present study examined occupational stress levels, their causes (stressors) and outcomes in a sample of doctoral students from a management doctoral school of a Romanian university. The objectives of the study included the discovery of the main stressors, their classification, and the investigation of the preferred occupational stress' coping activities among doctoral students. Our aim was to answer the following questions: what are the main causes of doctoral occupational stress; how much occupational stress is perceived by doctoral students; and by what means can occupational stress levels be reduced, from the perspective of doctoral students.

2. Problem Statement

Occupational stress is a process that includes both the causes of stress and the associated reactions of these demands (Selye, 1950). Occupational stress can also be defined as the state in which a living system suffers imbalances due to various stressors (Miller, 1965). This phenomenon has been studied so far by researchers from various fields, predominantly from human resources management, organisational behaviour, organisational psychology, occupational health and even medicine, as well as other related disciplines.

Doctoral students face various challenges during their doctoral stages. Performing literature reviews, attending conferences, collecting data, interpreting results, and publishing research papers can become simultaneous, complementary stressors for doctoral students. These factors can affect the mental health, performance, research effectiveness of doctoral students, causing delays in their activities and low-quality research papers. Doctoral supervisors may also face pressures regarding their interactions with doctoral students; (e.g. the substantial time and resources required in order to provide feedback and improve the research skills for their doctoral students). Besides offering support for their students in achieving their targets, doctoral supervisors need to simultaneously manage their own research progress,

career advancement, and other activities. All of these stress factors combined can impede the collaboration between doctoral students and doctoral supervisors.

A model for doctoral students' occupational stress was developed by Offstein et al. (2004), based on a qualitative study. Their model includes causes, demands, contextual factors, coping strategies, and consequences (positive and negative) of stress. In this model, the academic requirements, reduced available time, and specific personality predispositions represent stressors for doctoral students. Contextual factors include internal and external demands, life stage, international study (if it is the case), and limited time available. Self-awareness, advice from mentors, relationships, and adoption of a routine are consequences of occupational stress. Positive consequences of doctoral stress are represented by feelings of balance, success, satisfaction and goal realisation while negative consequences are represented by imbalance, guilt, burnout, and depression, ultimately. Thus, the occupational stress of doctoral students is viewed by these authors as a process involving different intertwining factors, a perspective we share in explaining the phenomenon of stress in general, not just in doctoral research, in particular.

Psychological distress is experienced by most doctoral students, according to a study deployed on more than 3600 Belgian PhD students from Flanders. Even more alarming, the risk of developing a psychiatric disorder was present for 32% of these students (Levecque et al., 2017). Work-family conflict, job demands, job control, and inspirational leadership style, in this order, were the main factors that determined occupational stress levels in this sample. Thus, different academia and personal related causes seem to influence increased occupational stress for most doctoral students. These facts indicate that urgent organisational interventions and individual approaches are needed to reduce stress levels of PhD students, at least for the ones in this population.

Occupational stress levels of doctoral students appear to be higher than those of the general population, and the stress levels vary based on the year of the doctoral program. These were some of the findings of a research conducted on 81 Australian doctoral students, in which the highest levels of occupational stress were discovered among second year doctoral students. Also, students who were late on their assignments experienced more stress (Barry et al., 2018). The same study showed that stress associated with the doctoral programs generated negative effects for the students: disengagement, decrease in performance, difficulty in assignments' completion, reduced self-efficacy and loss of confidence, motivation and focus, among others. Thus, occupational stress could manifest at different levels on different categories, sub-groups of doctoral students and induce various outcomes that negatively affect doctoral students' progress in completing their doctoral programs.

It is worth mentioning that not all stressors are negative, some of them might prove to be beneficial, at least in some regards. Researchers McCauley and Hinojosa (2020), expanded the Job Demands-Resources model (Bakker & Demerouti, 2007) for the occupational stress encountered during management doctoral programs. Thus, doctoral students face two types of stressors: challenge stressors and hindrance

stressors. Challenge stressors stimulate doctoral students, provide opportunities for educational growth and career development, and include factors such as job complexity (hypotheses development, proposing research projects, analysing statistics, etc.), doctoral seminars, comprehensive exams, workload (research skills developed through workshops), and obtaining support, guidance from the doctoral supervisor. In comparison, hindrance stressors include factors such as role ambiguity (overlapping and unclear student responsibilities), organisational politics, difficult administrative requirements from the university, and harassment from the doctoral supervisor, among others.

A survey conducted by Jackman et al. (2022) during the COVID-19 pandemic revealed that 63.5% of 127 doctoral students from University of Lincoln, United Kingdom, experienced high levels of occupational stress. Interestingly, no statistically significant differences of stress were recorded for the students who completed the survey during the enforced restrictions (stay at home), and those who completed were not such restrictions existed. This could indicate that the stress levels were high and the phenomenon and associated negative effects were manifesting even before the pandemic or that the extraordinary conditions did not affect the doctoral students consistently. A negative correlation was discovered between high peer support and sense of identification on one side and psychological distress on the other side. This demonstrates the importance of quality relationships, social support between doctoral students as a buffer against occupational stress.

Doctoral students face institutional, supervision-based, and personal challenges during their academic stages. Role ambiguity, inadequate resources, student-supervisor, and student-family conflicts represent potential hindrance stressors for doctoral students. Role complexity, role responsibility, and appropriate workload can become challenge stressors for doctoral students and foster their research development (Acharya et al., 2024). Considering the above, establishing a healthy relationship between the student and the doctoral supervisor becomes a crucial element for a successful completion of the doctoral stage. The supervisor needs to properly assess the current and potential capacities of his/her doctoral student and provide adequate assignments, recourses, support and guidance. Simultaneously, doctoral students need a high degree of self-awareness and introspection, in order to know their limits and engage in doctoral activities accordingly.

The well-being state of students in doctoral programs can be significantly reduced by an increased level of perceived occupational stress. A study conducted on more than 2400 doctoral students from twenty Canadian universities demonstrated this relationship. Also, intention to quit and program satisfaction were negatively associated with occupational stress (Feizi et al., 2024). It was discovered that the intention to quit increased over the years of the doctoral program, while at the same time program satisfaction decreased, although most doctoral students dropped out during the first two years of their stages. We might assume that the levels of motivation or dedication of these doctoral students decreased in this period. In this regard, doctoral schools in general and doctoral supervisors in particular should pay attention to the guidance, support, and feedback they provide to their

doctoral students and ensure that they provide these resources constantly during the doctoral stages.

In the context of the scientific literature, a gap still exists regarding quantitative studies about stress experienced by current doctoral students, especially in the case of Romanian universities. Through this pilot study, we aimed to examine the current levels of occupational stress in the academic environment, from the perspective of doctoral students in management, based in the most prestigious higher economic education institution from Romania, the Bucharest University of Economic Studies. We plan to extend the current study to the rest of the doctoral schools of the selected university and also to other universities in the country.

Various methods can be implemented to reduce doctoral students' occupational stress levels, some being more desired than others by doctoral students. Despite the doctoral supervisor's best intentions, doctoral students' perception and opinions about the numerous challenges encountered during their PhD stages should be acknowledged and documented. These can provide valuable insights about the causes, manifestations and effects of what we can refer to as "doctoral occupational stress". Ryan et al. (2021) collected more than 800 suggestions in this regard from 595 doctoral students. It appears that doctoral students desire more resources (emotional, psychological, and social) to be provided by the university environment in which they pursue their doctoral program. Developing quality relationships with colleagues, supervisors, and peers represented more than two-thirds of all suggestions. These facts point out to the importance of social support, including guidance, mentorship, collaboration and socialisation activities as pillars to mitigate and potentially prevent increased doctoral occupational stress.

Pyykkonen (2021) stated that occupational stress impedes the cognitive processes of doctoral students. Long periods of exposure to stressors can cause increased cognitive load, working memory overload, and the reduction of the capacity to focus and inhibit reactions. Clarifying expectations, structuring the doctoral activities, maintaining simple administrative tasks, and supporting personal growth initiatives are stress reduction strategies proposed by the author. These can be implemented in doctoral schools through collaboration between the management team and the doctoral supervisors. According to Acharya and the collaborators (2024), universities should adopt specific means to better manage occupational stress levels of doctoral students. These interventions could include teaching time management strategies, dividing assignments into more less complex tasks, and developing the stress management skills of doctoral students through specialised counselling.

3. Research Questions / Aims of the Research

The aims of the research were to discover the causes of existing level of occupational stress, its characteristics and the main ways to reduce occupational stress among the doctoral students enrolled in the Management Doctoral School at the Bucharest University of Economic Studies. The research methodology was established based on the literature review and the identified gaps.

The main research objectives are: O1. To identify the main factors, associated with occupational stress for doctoral students; O2. To classify the main stressors in a hierarchy, based on their frequency; and O3. To discover the main ways to reduce the occupational stress of doctoral students.

The main research hypotheses are: H1. The main factors associated with the occupational stress of doctoral students are: interactions with the doctoral supervisor, progress reports completion, and scholar fees; H2. The majority of students experience high levels of occupational stress (a score of at least 4 on the scale); H3. For the majority of students, the main ways to reduce the occupational stress of doctoral students are: interactions with the supervisor, changing the title/theme of the doctoral thesis, and reducing administrative volume and/or frequency of administrative activities.

4. Research Methods

An applied research with a preliminary exploratory aim was conducted, using a cross-sectional study design and a quantitative research method.

An online-based questionnaire was distributed for two weeks, using the Google Forms software program, among 30 doctoral students of the Management Doctoral School, in the Bucharest University of Economic Studies.

Given the exploratory nature of the study, the sample size was determined by a simple random selection process, depending on the availability of doctoral students during the administration period of the instrument. We emphasise that the inclusion of respondents was without restrictive selection criteria, which reduces the risk of bias, systematic failure, and supports the authenticity of the data obtained. This approach is frequently used in preliminary studies, where the main purpose is to identify potential trends or relationships between variables, and they will be further investigated in research with a religious statistical methodology. This approach may limit the statistical representativeness of the results, but in line with the exploratory purpose of the research, the selected sample provides a relevant preliminary picture of the investigated phenomenon.

27 stressors were suggested to respondents, each one of them was evaluated on a Likert scale from 1 (“Very small measure”) to 5 (“Very large measure”), measuring the intensity of the induced stressor. Coding was used for the stressors included in the questionnaire, as shown in the Appendix.

Occupational stress levels of respondents were measured using an adapted version of the Workplace Stress Scale (American Institute of Stress, 1978) with Likert scales from 1 (“Never”) to 5 (“Very often”) that was included in the questionnaire.

The Workplace Stress Scale (WSS) is a self-reporting scale, meaning that respondents express their own perceptions about stress. The scale has items formulated on a Likert scale, which includes dimensions such as balance between personal and professional life; use of skills, competencies; the relationship with the supervisor, etc.”

The Workplace Stress Scale was chosen because it is a frequently used tool in research to assess the level of stress at work. This situation is suitable also for the

respondents of our research, who have a double-position, on one hand doctoral students, but also (part of them) employed in various organisations.

The Workplace Stress Scale measures the intensity of perceived stress of respondents, caused by stressors at work. The Workplace Stress Scale enables the analysis of the link between workplace (university) and research productivity, burnout, and research satisfaction of doctoral students. The scale supports identifying risks, psychosocial, and behavioural factors related to occupational stress.

The following coding was used for the 8 items of this scale, representing dimensions of occupational stress: "I feel that my status as a doctoral student is affecting my physical or emotional health." (15_2); "I have too many tasks to do and/or too many unrealistic deadlines." (15_3); "I find it difficult to convey to my doctoral supervisor my opinions or feelings regarding the conditions in which doctoral activities are carried out." (15_4); "I feel that the demands of my doctorate are impacting my relationships with my family or my personal life." (15_5); "I feel like I do not have enough control over my activities and responsibilities as a doctoral student." (15_6); "When I perform well, I receive recognition or rewards that are inappropriate for me." (15_7); and "There are no opportunities, no situations where I can fully utilise my knowledge, qualities, talents, skills, and competencies." (15_8).

Thirty survey responses were registered and a database was created using the Microsoft Excel software program.

Data analyses were conducted using Jeffrey's Amazing Statistics Program (JASP), an open-source software developed by the University of Amsterdam, recognised for its accessibility, intuitive user interface and the ability to perform classical statistical analysis and more.

The choice of this software was motivated by the need for a tool to facilitate efficient data processing and clear presentation of results. JASP also provides support for a wide range of statistical tests relevant to the research carried out, in a transparent and replicable framework, which are essential aspects in the context of modern research.

The use of Jeffrey's Amazing Statistics Program was driven by concern for calculating descriptive indicators (average, standard deviations, etc.) as well as correlation coefficients (Spearman), depending on the level of variables' measurement and the distribution of data. Also, JASP provided an intuitive and effective framework for investigating the relationships between the dimensions of occupational stress and the main stressors.

5. Findings

The vast majority of the participants in the survey (21 out of 30) were women. The average age of the respondents was 39 years (M = 39.43, SD=9.68). The minimum age recorded was 24 years and the maximum age was 55 years old. The majority of the doctoral students in the study (26) lived in an urban environment. In terms of previous academic studies, most participants completed bachelor and master degrees in economics (14 and 16, respectively), followed by engineering

and management (5 and 6, respectively). In terms of year of doctoral studies, most participants of the survey were enrolled in their first year (14 out of 30), followed by doctoral students in their second year (7), doctoral students in their fourth year (5) and in the third year (4). Regarding the doctoral program type, the majority of respondents (20) were enrolled in full-time education. Only 6 respondents were associate teachers and the other 24 worked in full-time jobs non-related to their doctoral student roles. 16 participants worked from the office, 6 worked in hybrid mode and 3 worked from home.

The first 3 most frequently encountered stressor categories were: administrative factors, including meeting the criteria for the doctoral degree (21 out of 30 responses); professional factors, such as research projects, scientific seminars (14) and legislative factors, including laws, academic regulations, bylaws, etc. (14).

The first three most intense and most frequently encountered stressors (a score of 5 on the scale) were: *Tasks that need to be performed in parallel* (12_9) for 15 respondents; *Effectively performing the research* (12_8) for 11 respondents; *The amount of knowledge, information, concepts, methodologies that must be learned to conduct research* (12_6) for 10 respondents; *Busy weekly schedule* (12_11): 10 answers and *Perfectionism* (12_22) for 10 respondents.

A threshold of at least 3.5 was set as the lowest end of a high score for the 27 stressors. Based on this, high scores were discovered, as means, only for 6 stressors: *The amount of knowledge, information, concepts, methodologies that must be learned to conduct research* (12_6); *The complexity of knowledge, information, concepts, methodologies that must be learned to conduct research* (12_7); *Effectively performing the research* (12_8); *Tasks that need to be performed in parallel* (12_9); *Busy weekly schedule* (12_11) and *Perfectionism* (12_22). These stressors represented the most relevant causes of stress for the doctoral students in the sample. Thus, these 6 stressors were included in the following analyses.

The occupational stress levels varied, on average, between 1.933 and 2.567 for the 8 dimensions, corresponding to the 8 items, as shown in Table 1. The dimensions “I have too many tasks to do and/or too many unrealistic deadlines” (15_3); “I feel that the demands of my doctorate are impacting my relationships with my family or my personal life” (15_5) and “I feel like I do not have enough control over my activities and responsibilities as a doctoral student.” (15_6) presented the highest means for the experienced stress. Thus, we can observe that occupational stress, represented through the 8 items, had a slightly moderate influence on the doctoral students in the sample.

It is worth taking in consideration that, even though the levels of 6 stressors were perceived as being high, on average, for the doctoral students, the supposedly associated manifestations of stress did not receive high scores. It could be the case that the items measuring occupational stress levels in the scale referred to manifestations not so relevant in the setting of students pursuing doctoral degrees.

The dimensions “I feel that the demands of my doctorate are impacting my relationships with my family or my personal life” (15_5); “I feel like I do not have enough control over my activities and responsibilities as a doctoral student.” (15_6)

and "I have too many tasks to do and/or too many unrealistic deadlines" (15_3); presented the highest means for the experienced stress, in this order. This is in correspondence with the research literature and indicates that occupational stress influences work-life balance, is associated with a high external locus of control and a high workload for the doctoral students. These findings can be explained by the specific work characteristics of a doctoral stage, in which research activities require substantial effort, attention, intellectual stimulation, and time resources. All these factors generate pressure for doctoral students as they intersect or sometimes even compete with other professional tasks, responsibilities, or matters of their personal life.

Table 1. Means, standard deviations, maximum values and sums for occupational stress

	Mean	Std. Deviation	Maximum	Sum
15_1	2.200	1.243	5.000	66.000
15_2	2.200	1.349	5.000	66.000
15_3	2.533	1.252	5.000	76.000
15_4	1.933	1.311	5.000	58.000
15_5	2.567	1.431	5.000	77.000
15_6	2.567	1.357	5.000	77.000
15_7	1.533	0.900	4.000	46.000
15_8	2.000	1.114	5.000	60.000

Source: authors.

Statistically significant Spearman correlations (rho coefficients) were discovered between the following dimensions of occupational stress, as shown in Table 2. The strongest correlations were discovered between: *unpleasant or unsafe conditions under which research is conducted* (15_1) and *effect of physical or emotional health* (15_2), (rho=0.752); *impact on relationships with family or personal life* (15_5) and *reduced control over doctoral activities and responsibilities* (15_6), (rho=0.776); and *reduced control over doctoral activities and responsibilities* (15_6) and *reduced use of knowledge, qualities, talents, skills, and competencies* (15_8), (rho=0.713). In terms of the doctoral occupational stress' dimensions, it appears that the strongest association exists between the influence of occupational stress on work-life balance and the perceived external locus of control. This is in line with previous findings, which showed how the experience of stress in a professional setting is reflected by symptoms in the private life. This phenomenon can further damage the well-being, mental health of doctoral students. Another facet is the reduced autonomy of doctoral students and the fact that the demands of the doctoral program depend, at least in students' perception, on external forces. In the academic environment, these forces may be represented by the supervisors, their demands, high expectations, achieving specific publishing targets, writing papers, attending conferences, etc.

Table 2. Correlations between the dimensions of occupational stress

Variable		15_1	15_2	15_3	15_4	15_5	15_6	15_7	15_8
1. 15_1	Spearman's rho	—							
	p-value	—							
2. 15_2	Spearman's rho	0.752***	—						
	p-value	< .001	—						
3. 15_3	Spearman's rho	0.605***	0.637***	—					
	p-value	< .001	< .001	—					
4. 15_4	Spearman's rho	0.492**	0.538**	0.232	—				
	p-value	0.006	0.002	0.217	—				
5. 15_5	Spearman's rho	0.645***	0.755***	0.450*	0.577***	—			
	p-value	< .001	< .001	0.012	< .001	—			
6. 15_6	Spearman's rho	0.487**	0.519**	0.345	0.685***	0.776***	—		
	p-value	0.006	0.003	0.062	< .001	< .001	—		
7. 15_7	Spearman's rho	0.434*	0.441*	0.198	0.199	0.292	0.242	—	
	p-value	0.016	0.015	0.293	0.292	0.117	0.197	—	
8. 15_8	Spearman's rho	0.653***	0.516**	0.352	0.517**	0.545**	0.713***	0.416*	—
	p-value	< .001	0.004	0.057	0.003	0.002	< .001	0.022	—

* p < .05, ** p < .01, *** p < .001

Source: authors.

The following Spearman correlations (rho coefficients) were identified between the 6 selected stressors and the 8 dimensions of occupational stress, as shown in Table 3. The strongest statistically significant associations (relatively moderate) were discovered for these pairs of stressors–dimensions of occupational stress: *Effectively performing the research* (12_8) and *effect of physical or emotional health* (15_2), (rho=0.610); *Busy weekly schedule* (12_11) and *too many tasks to do and/or too many unrealistic deadlines* (15_3) (rho=0.618); *Tasks that need to be performed in parallel* (12_9) and *impact on relationships with family or personal life* (15_5) (rho=0.624); *Effectively performing the research* (12_8) and *not enough control over activities and responsibilities as a doctoral student* (15_6) (rho=0.647); and *Tasks that need to be performed in parallel* (12_9) and *not enough control over activities and responsibilities as a doctoral student* (15_6) (rho=0.690). Thus, we can observe that the strongest association (moderate) exists between performing simultaneous tasks as a stressor and the dimension of occupational stress related to a high external locus of control for the tasks that have to be performed by doctoral students. This finding again illustrates a link between a high workload (as number of tasks) and the potential lack of autonomy as two intertwined work characteristics of the doctoral students.

Table 3. Spearman's Correlations between stressors and dimensions of occupational stress

Variable		12_6	12_7	12_8	12_9	12_11	12_22	15_1	15_2	15_3	15_4	15_5	15_6	15_7	15_8
1. 12_6	Spearman's rho	—													
	p-value	—													
2. 12_7	Spearman's rho	0.868***	—												
	p-value	< .001	—												
3. 12_8	Spearman's rho	0.744***	0.760***	—											
	p-value	< .001	< .001	—											
4. 12_9	Spearman's rho	0.714***	0.614***	0.671***	—										
	p-value	< .001	< .001	< .001	—										
5. 12_11	Spearman's rho	0.639***	0.530**	0.686***	0.540**	—									
	p-value	< .001	0.003	< .001	0.002	—									
6. 12_22	Spearman's rho	0.354	0.319	0.458*	0.400*	0.470**	—								
	p-value	0.055	0.085	0.011	0.029	0.009	—								
7. 15_1	Spearman's rho	0.229	0.188	0.337	0.285	0.296	0.437*	—							
	p-value	0.224	0.320	0.069	0.127	0.113	0.016	—							
8. 15_2	Spearman's rho	0.416*	0.446*	0.610***	0.421*	0.392*	0.397*	0.752***	—						
	p-value	0.022	0.013	< .001	0.021	0.032	0.030	< .001	—						
9. 15_3	Spearman's rho	0.481**	0.398*	0.463**	0.399*	0.618***	0.492**	0.605***	0.637***	—					
	p-value	0.007	0.029	0.010	0.029	< .001	0.006	< .001	< .001	—					
10. 15_4	Spearman's rho	0.245	0.392*	0.428*	0.289	0.163	0.069	0.492**	0.538**	0.232	—				
	p-value	0.192	0.032	0.018	0.121	0.388	0.718	0.006	0.002	0.217	—				
11. 15_5	Spearman's rho	0.504**	0.528**	0.550**	0.624***	0.351	0.328	0.645***	0.755***	0.450*	0.577***	—			
	p-value	0.005	0.003	0.002	< .001	0.057	0.077	< .001	< .001	0.012	< .001	—			
12. 15_6	Spearman's rho	0.541**	0.505**	0.647***	0.690***	0.395*	0.179	0.487**	0.519**	0.345	0.685***	0.776***	—		
	p-value	0.002	0.004	< .001	< .001	0.031	0.343	0.006	0.003	0.062	< .001	< .001	—		
13. 15_7	Spearman's rho	0.195	0.214	0.319	0.114	0.289	0.440*	0.434*	0.441*	0.198	0.199	0.292	0.242	—	
	p-value	0.302	0.255	0.086	0.549	0.121	0.015	0.016	0.015	0.293	0.292	0.117	0.197	—	
14. 15_8	Spearman's rho	0.192	0.239	0.391*	0.313	0.241	0.099	0.653***	0.516**	0.352	0.517**	0.545**	0.713***	0.416*	—
	p-value	0.309	0.203	0.032	0.092	0.199	0.601	< .001	0.004	0.057	0.003	0.002	< .001	0.022	—

* p < .05, ** p < .01, *** p < .001

Source: authors.

A linear regression model could not be established, as no meaningful information could be identified for the cause-effect relationship of the 6 stressors and the 8 dimensions of occupational stress.

Regarding the main ways to reduce occupational stress levels in a very large measure (a 5 score on the scale), respondents indicated the following 3 actions as being preferred: reducing volume and/or frequency of administrative activities (7 responses); regular physical activity (7 responses) and mentorship programs (7 responses).

A clear limitation of this study is the reduced sample size: only 30 respondents. Besides, the results cannot be generalised, as the sample was based on doctoral students originating from only one doctoral school of a large university. We plan to conduct future studies, that would include larger samples, with students from different doctoral schools, at an university level initially and then transposed to the national and international levels.

6. Conclusions

Although the limited sample restricts the generalisation of results, this study brings new insights into occupational stress among doctoral students, a professional category often neglected in research so far. The study provides an important basis for future research, as the results show that occupational stress is a significant factor in the experience of doctoral students. This exploratory study identified significant preliminary relationships between occupational stress and stressors in doctoral research, providing a basis for further investigation.

More than a third of doctoral students perceived professional, administrative, and legislative factors as stressors. One third of doctoral students experienced the highest

possible levels of 6 specific stressors. Occupational stress manifested the most intensely through the following dimensions: number of tasks required for completion and/or unrealistic deadlines; work-life balance and perceived lack of control over activities and responsibilities of doctoral students. In order to reduce occupational stress, doctoral students suggested limiting administrative activities, doing physical exercises, and taking part in mentorship programs.

The results of this research are important for the management of the doctoral school, as they provide a descriptive image of the current causes and levels of occupational stress experienced by the doctoral students. Thus, further discussions with doctoral students could help the doctoral school design specific interventions for occupational stress coping and even prevention, based on specific perceptions and experiences of doctoral students. The management of the doctoral school and the doctoral supervisors should take into account the work-life balance characteristics of students when assigning tasks to them. Assignments should not overload doctoral students, nor cause difficulties in their priorities. Research tasks should be tailored to the current levels of research skills of doctoral students.

Also, the study revealed the main ways to reduce occupational stress of doctoral students, based on their perspectives. Redesigning administrative activities and allowing doctoral students to have time for attending leisure, relaxation, and physical activities are useful measures in the process of reducing occupational stress. Another important initiative from the doctoral school would be to design a mentorship program for their doctoral students. In this regard, doctoral supervisors could be trained in order to improve their mentoring skills.

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Appendix

Coding for the occupational stressors in the questionnaire

Item	Code
Progress reports completion	12_1
Obtaining performance scholarships	12_2
Maintaining a budget study place	12_3
Scholar fees	12_4
Evaluations received from the doctoral guidance and academic integrity committee	12_5
The amount of knowledge, information, concepts, methodologies that must be learned to conduct research	12_6
The complexity of knowledge, information, concepts, methodologies that must be learned to conduct research	12_7
Effectively performing the research	12_8
Tasks that need to be performed in parallel	12_9
Short deadlines	12_10
Busy weekly schedule	12_11
Overlays	12_12
Duration/deadlines of academic assignments	12_13
The variation, diversity and complexity of academic tasks	12_14
Interpersonal relationships with doctoral colleagues	12_15
Interactions with the doctoral supervisor	12_16
Interactions with administrative staff	12_17
Interactions with members of the academic guidance and integrity committee	12_18
The disturbing behaviours of the doctoral supervisor	12_19
Information resources made available by the university during the doctorate	12_20
Level of satisfaction regarding academic research performance achieved	12_21
Perfectionism	12_22
Task prioritisation	12_23
Insufficient recognition and rewards	12_24
Non-existent psychological support	12_25
Inadequate guidance, support, and feedback from faculty on the academic integrity and guidance committee	12_26
Poor collaboration with colleagues in the same doctoral year	12_27