Article

Mental Health in Doctoral Students: Individual, Academic, and Organizational Predictors

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ABSTRACT

Background: The mental health of doctoral students is a matter of concern, and several variables appear to be associated with the state of their mental health. However, there have been no studies on the population of doctoral students in Spain to date using validated instruments. **Method:** A cross-sectional observational study was conducted to assess mental health in 1,018 doctoral students. The impact of personal, academic, psychological, and social/organisational variables on their mental health was assessed. **Results:** Between 50% and 60% of the sample might be experiencing a common psychological disorder, while 18.8% of the sample might be experiencing passive suicidal ideation. In addition, using binary logistic regression, significant predictors of negative mental health were identified, including: sociodemographic variables (being female); academic variables (longer time spent in a doctoral programme); psychological variables (lower life satisfaction; greater interference and less clarity about negative emotions); and social and organisational variables (greater fear of losing tuition rights, lower social support, and greater interference of academic work with personal life). **Conclusions:** Doctoral students need measures to remedy and prevent mental health issues based on improving self-care and emotion regulation, promoting social support at university, and reducing the pressure of losing tuition rights among final-year students.

Salud Mental en Estudiantes de Doctorado: Predictores Individuales, Académicos y Organizacionales

RESUMEN

Antecedentes: La salud mental de los estudiantes de doctorado es preocupante, y diversas variables parecen asociarse con ella. No obstante, no existen hasta la fecha estudios sobre estudiantes de doctorado en España con instrumentos validados. **Método:** se efectuó un estudio observacional en 1018 estudiantes de doctorado. Analizamos el impacto de variables personales, académicas, psicológicas y organizacionales en su salud mental. **Resultados:** Entre el 50% y el 60% de la muestra podría padecer un trastorno psicológico común, mientras que el 18,8% de la muestra tendría ideación suicida pasiva. Mediante regresión logística binaria, se obtuvieron como predictores significativos del estatus negativo de salud mental variables sociodemográficas (ser mujer); académicas (más tiempo en el doctorado); psicológicas (menor satisfacción con la vida; mayor interferencia y menor claridad sobre las emociones); y organizacionales (mayor temor a perder la permanencia, menor apoyo social, y mayor interferencia del trabajo académico en la vida personal). **Conclusiones:** Es necesaria la puesta en marcha de medidas para la reparación y prevención de la salud mental en los doctorandos, basadas en mejorar el autocuidado y regulación emocional de los estudiantes; la promoción del apoyo social en la universidad, y la reducción de la presión asociada a la permanencia en últimos cursos.

Palabras clave:
Estudiantes de doctorado
Salud mental
Factores de riesgo
Factores de protección

Doctoral studies are a demanding stage of academic training, yet the study of their psychosocial effects is scarce. Nevertheless, there is evidence to suggest that the levels of stress experienced by doctoral students may be considerable (Hazell et al., 2020; Satinsky et al., 2021).

A recent meta-analysis reports the presence of depression and anxiety in 24% and 17% of PhD candidates, respectively (Satinsky et al., 2021). Nonetheless, only one of the included studies was European: in Belgium, prior to the COVID-19 pandemic, Levecque et al. (2017) used the GHQ-12 (Goldberg & Williams, 1988) to identify individuals at risk for common mental disorders. By using a categorical correction algorithm and setting the cut-off point at >3, they obtained a 39.5% point prevalence of potential cases of poor mental health in a large and representative sample of doctoral students in Flanders.

In Spain, however, few data are available, except for the study by Sorrel et al. (2020), who determined through a single, non-validated, dichotomic item that 35.8% of students struggle with anxiety and depression. The same study found a high prevalence of burnout, with 80.3% of students reporting emotional fatigue.

Research on mental health in college settings should be use validated instruments (Barkham et al., 2019). While some controversies exist regarding its factorial structure (Gnambs & Staufenbiel, 2018), the GHQ-12 has been used before in the population of doctoral candidates and other academic settings (Levecque et al., 2017; Satinsky et al., 2021), and also in many different epidemiological studies in Spain (Parrado-gonzález & León-Jariego, 2020), with categorical analytic strategies based on the number of symptoms present in the test. Different studies have employed a cut-off of two, three or four symptoms as criteria (GHQ2+, GHQ3+ and GHQ4+, respectively), each suggesting a greater chance of suffering a mental disorder.

The literature points to several variables linked to poor mental health, such as working long hours, a poor relationship with the thesis supervisor or department, the perception of not having control over the direction of the thesis and seeing academia as a source of burden (Levecque et al., 2017; Stubb et al., 2011, 2012; van Rooij et al., 2021). By contrast, focusing on non-academic careers, being enthusiastic about the thesis topic, and feeling empowered and in control of the demands of the project appear to act as protective variables (Levecque et al., 2017; Stubb et al., 2011, 2012). Hazell et al. (2020) conducted a mixed-methods systematic review on the mental health of doctoral students and identified protective elements as viewing the doctorate as a process, an optimal relationship between the student and their thesis supervisor, engagement in self-care, and having social support. They also identified feeling isolated and being female as risk variables. Thus, it seems that the mental health of doctoral students could be affected by different variables: personal (including sociodemographic and psychological variables) as well as academic, organisational and social variables. Completing a doctoral thesis can be understood as not only an intellectual but also an emotional challenge (Stubb, 2011), as there is risk of emotional exhaustion and of doctoral students dropping out of academia (Hunter & Devine, 2016; Devine & Hunter, 2017), and experiencing depression and anxiety (Satinsky et al., 2021). The role of emotional regulation within affective psychopathological processes can be explained in part from the emotional cascade model (Selby and Joiner, 2009), which proposes that the use of mechanisms such as suppression of negative thoughts and avoidance of unpleasant emotional states produce a positive feedback between rumination processes and high negative affect. A recent article (Preece et al., 2023) showed that the alexithymia present in different psychopathological disorders of an affective nature can affect emotional regulation. The researchers concluded that greater inability to recognize one's emotions exhibits a less adaptive profile of emotional regulation strategies. These data are consistent with the information presented by Aldao et al. (2010). These authors noted that disorders of an affective nature (internalization) were more consistently associated with regulatory strategies than other disorders.

Consequently, an important variable associated with mental health in PhD candidates could be emotion regulation, which encompasses external and internal processes responsible for monitoring, evaluating, and modifying our emotional reactions in order to meet our goals (Thompson 1994), i.e., how we influence what emotions we feel, when we feel them, and how we experience and express them (Gross, 1999).

A targeted examination of the mental health of these students is required, given how relevant of an issue it is (Hazell et al., 2020). There are approximately 86,619 people in Spain pursuing doctoral programmes (Ministerio de Universidades [Spanish Ministry of Universities], 2022), making an inconspicuous but significantly relevant contribution to the fabric of national research, development, and innovation (Auerbach et al., 2018; Levecque et al., 2017). However, there is evidence that poor mental health may be the main cause of abandoning doctoral studies (González-Betancor & Dorta-González, 2020), consequently producing a waste of time and resources (Levecque et al., 2017; Podsakoff et al., 2007). Moreover, doctoral students are the weakest link in the chain of knowledge production. This makes advocating for them an ethical imperative. On an international level, the mental health of university students is already recognised as a public health issue. For instance, the New Zealand Government (2019) and the UK Office for Students (2019) include measures to promote the wellbeing of their students and to address the increase in mental health problems within the university community in their respective agendas (Barkham et al., 2019). Currently, there are no comparable public policies in Spain.

For these reasons, it would seem relevant to empirically assess the mental health of doctoral students in Spain, as well as the personal, academic, and organisational determinants associated with it. In line with Barkham et al. (2019), we believe that it is crucial that this study be conducted using validated psychometric instruments in order to be able to compare it with other studies, and to capture mental health and psychological wellbeing in a differentiated manner throughout the process of completing a doctoral thesis. The objectives of this study were: 1) to analyse the prevalence of mental health problems in the doctoral student population in Spain; and 2) to analyse the impact of personal, academic and organisational variables on the mental health of the doctoral student population.

Method

Participants

The online survey was accessed a total of 2,278 times and a total of 1,025 complete responses were collected. The exclusion criteria of not being a doctoral student at the university at the time of answering was applied. In the end, 1,018 students were included, all of them from the same university. The profile of the average participant was a woman (63.4%); aged 31.7 (*SD* = 7.7) years; with monthly salary of €1,214.00 (*SD* = €696.35); with a job outside academia (41.9%); living with a partner (43.3%) somewhere in Spain (92.8%), mainly in the Autonomous Community of Madrid. Full sociodemographic characteristics of the sample are shown in Table 1.

In terms of academic variables, 57.5% of participants were doctoral students with no link to the university other than their enrolment, while the rest of the sample had a doctoral research contract (25.1%) or were employed as research assistants and/or teaching assistants at the university. There was a greater number of participants who were working on science theses and a lower number of participants who were producing social sciences and health sciences theses than would be expected based on their proportion at the university ($\chi^2(4) = 89.868$; $p < .001$). The main figure responsible for supervising the doctoral theses was usually a senior lecturer (40% of cases) or a professor (33.8% of cases).

Regarding their reasons for pursuing a doctorate, 53.4% of the sample stated that they were seeking an academic career; 21.6% were seeking a non-academic career; 15.3% were doing it for personal growth; and the remainder had no clear reasons. In addition, 51.5% of the sample worked outside academia. Detailed information on academic variables can be found in Table 2.

Instruments

Sociodemographic data were collected using ad-hoc scales. A number of validated psychometric instruments were also used, as listed in Table 3. A brief 6-item instrument was also constructed to assess satisfaction with the thesis supervisor.

Table 1
Sociodemographic Variables (N = 1018)

	n (%)	Mean (*SD*)
Age		31.7 (7.7)
Gender		
Woman	645 (63.4)	
Man	365 (35.9)	
Non-binary	8 (0.8)	
Relationship status		
Single	310 (30.5)	
Has a partner	662 (65.0)	
Other	46 (4.5)	
Estimated monthly income		€1214.30
		(€696.35)
Lives alone	105(10.3)	
Lives in within the region where University is located	822 (80.7)	
Works outside academia	555 (54.5)	

Table 2
Academic Variables (N = 1018)

	n (%)	Mean (*SD*)
Branch of knowledge		
Health Sciences	242 (23.77)	
Arts and Humanities	278 (27.31)	
Sciences	203 (19.94)	
Social and Legal Sciences	238 (23.38)	
Engineering and Architecture	35 (3.44)	
Commitment to doctoral studies		
Full-time	754 (74.07)	
Part-time	264 (25.93)	
Years of study in doctorate		2.93 (1.54)
Satisfaction with the thesis supervisor		
Overall satisfaction with the thesis supervisor (0-10)		7.50 (2.69)
Satisfaction with the level of involvement of the thesis supervisor (0-10)		7.19 (2.79)
Student satisfaction with their thesis supervisor's willingness to engage in dialogue (0-10)		3.60 (3.58)
Satisfaction with the degree of recognition given by the thesis supervisor (0-10)		7.31 (3.10)
Satisfaction with the training offered to students by the thesis supervisor (0-10)		7.20 (2.96)
Satisfaction with the thesis supervisor's interest in the student's professional future (0-10)		6.72 (3.15)
Satisfaction with the competence of the doctoral thesis supervisor (0-10)		8.19 (2.33)
Enthusiasm for the subject of the doctoral thesis (0-10)		7.88 (2.18)
Pursuit of an academic career (0-10)		7.84 (2.54)
Perceived likelihood of pursuing an academic career (0-10)		4.71 (2.71)
Non-academic labour market readiness (0-10)		5.62 (2.91)
Added value of having a doctorate degree in non-academic jobs (0-10)		6.42 (2.85)

Procedure

An initial meeting was held with the staff at the Doctoral School to hear their views on the organisational problems of the studied group. Then, based on their input and a review of the relevant literature on the subject, an online survey was prepared using Google Forms, limiting the number of responses to one. The survey included ad hoc measures on sociodemographic, academic, and organisational variables, as well as a set of validated psychometric instruments for measuring mental health-related variables. The survey was pilot-tested with students from a doctoral programme, selected for convenience. Qualitative data on participants' opinions about the survey areas and phenomena of interest that might have been omitted in it was collected. The information from this pilot test was used to produce the final survey.

The survey was then approved by the Research Ethics Committee for the University and distributed to all 56 doctoral programmes at the university via email, social media, and the websites of the collaborating university institutions. The survey was available between 4 March and 4 June 2022.

Table 3
Psychometric Instruments

	Description	Cronbach's alpha	McDonald's omega
General Health Questionnaire – 12: GHQ-12 (Goldberg & Williams, 1988; Spanish validation: Sánchez-López & Dresch, 2008)	Self-administered screening questionnaire to identify a psychological distress and common mental disorders; 12 items arranged on a Likert scale.	α = 0.88	ω = 0.91
Patient Health Questionnaire-4: PHQ-4 (Kroenke et al., 2009; Spanish validation: Cano-Vindel et al., 2018)	Ultra-brief self-report questionnaire to assess anxiety and depressive symptomatology; 4 items arranged on a Likert scale (0. Not at all, to 3. Nearly every day).	α = 0.86	ω = 0.86
Beck's Depression Inventory, second edition (BDI-II) item 9 (Beck et al., 1996; Spanish validation: Sanz et al., 2003).	A single item that probes suicidal ideation. It has adequate sensitivity as an independent measure of suicidal ideation and attempt.	-	-
Satisfaction With Life Scale; SWLS (Diener et al., 1985; Spanish validation: Vázquez et al., 2013)	Brief instrument to assess the subjective well-being and the life satisfaction; formed by 5 items (7-point Likert-type) scales with response options from 1. strongly disagree to 7. strongly agree.	α = 0.88	ω = 0.88
Difficulties in Emotion Regulation Scale-SF: DERS-SF (Gratz & Roemer, 2004; Spanish validation: Navarro Carrascal et al., 2021)	Scale for the assessment of emotional regulation difficulties; formed by 6 subscales of 3 items on Likert scale (1. almost never, to 5. almost always): awareness, interference with goals, lack of acceptance, impulsiveness, lack of strategies, and clarity.	α = 0.87 (overall)	ω = 0.89 (for normally scored items) ω=0.90 (for reverse-scored items)
Work-Family Conflict Questionnaire: WAFCS (Haslam et al., 2015; Spanish validation: Blanch & Aluja, 2009)	Assesses the conflict that arises when work responsibilities affect family roles with 10 item on Likert scale (1. Strongly disagree – 7. Strongly agree). There are two subscales that measure the degree of work-to-family conflict (WFC) and the degree of family-to-work conflict (FWC).	α = 0.92 (overall)	ω = 0.92
Escala de satisfacción con el director de tesis [Satisfaction with the Thesis Supervisor Scale]	Ad-hoc scale made up of seven items (10-point Likert-type) scales, with response options from 1.not at all to 10 absolutely. that assesses doctoral students' satisfaction with their thesis supervisor.	α = 0.91	ω = 0.91

Prior to starting the survey, each participant gave informed consent through the survey platform. Participation was anonymous; however, personalised feedback on mental health, as well as timely information about university resources to turn to, was provided to students who requested it. More detailed information was sent to respondents who screened positive for suicidal ideation. Feedback was delivered within 24 hours of the participant's response. For confidentiality reasons, the data necessary for sending such feedback were collected in a separate database, right after the first survey was completed.

Data Analysis

The response rate of those who clicked on the link to the survey was 45.0%, representing 15.8% of the study population. This rate is lower than that reported by Levecque et al. (2017) in a benchmark study, with a 33% participation rate, and lower than those reported by the same authors in other studies in academic populations. However, in accordance with Holtom et al., (2022), even more important than the direct assessment of the survey response rate is analysing the representativeness and motivation of respondents, as well their relationship with the researcher and the survey's characteristics (complexity and length).

The data were exported to an SPSS 27.0 database for analysis. Database, syntax and result files are available at online repositories (Estupiñá et al., 2023). The reliability of the psychometric measures and the question sets about satisfaction with the thesis supervisor were calculated using Cronbach's alpha

and McDonald's omega (Doval et al., 2023). Comparisons were made using Student's *t*-tests for quantitative variables and chi-squared tests for categorical variables to explore similarities and differences between students above and below the GHQ-12 cut-off points (GHQ2+, GHQ3+, GHQ4+), setting the statistical significance threshold at 0.05. Statistically significant variables were entered into a binary logistic regression model to verify to what extent they helped to explain poor mental health. A blockwise approach was followed by including sociodemographic and personal variables first, followed by academic, psychological, and organisational or social variables. Model fit was calculated using the Hosmer-Lemeshow (*H-L*) and -2 Likelihood Logarithm (*-2LLL*) statistics. The value of Nagelkerke's pseudo-R-squared (R^2_N) was calculated for the regression models as a whole, as well as for each of the blocks, to estimate the percentage improvement in prediction over the null model provided by each set of predictors.

Results

Following Holtom et al., (2022), it is safe to assume that the sample obtained represents a valid and functional response rate for establishing the determinants of mental health among doctoral students. Biases, some of them contradictory, are present when it comes to assessing the generalisability of the results of this population's mental health prevalence. In any case, to our knowledge, this is the largest sample of Spanish doctoral students investigated to date.

At the clinical level, 51.8% of probable cases of psychological problems were identified based on the cut-off point of four or more positive items on the GHQ-12 (GHQ4+); 43.6% of participants manifested depressive symptoms and 58.7% presented anxious symptoms on the PHQ-2; and 18.8% of the sample answered item 9 of the BDI-II indicating passive suicidal ideation. The data can be found in Table 4.

In addition, 39.4% of the sample reported having sought professional help for their mental health, either psychological (25.3%), pharmacological (5.2%), or both (8.8%). When considering only those who had exceeded the GHQ4+ cut-off point, less than half (47.8%) had sought professional help.

Table 5 shows data on social and organisational variables.

Table 4
Clinical and Psychological Data of the Sample (N = 1018)

Instrument (scoring range)	*n* (%)	Mean (*SD*)
GHQ-12 (0-36)		15.54 (6.80)
Exceeds cut-off point 2 in GHQ-12 (GHQ2+)	714 (70.1)	
Exceeds cut-off point 3 in GHQ-12 (GHQ3+)	604 (59.3)	
Exceeds cut-off point 4 in GHQ-12 (GHQ4+)	527 (51.8)	
PHQ-2 *(0-6)*		2.61 (1.97)
GAD-2 *(0-6)*		3.24 (1.87)
Item 9 BDI-II *(0-3)*		0.22 (0.47)
0- I don't have any thoughts of killing myself	811 (79.7)	
1- I have thoughts of killing myself, but I would not carry them out.	191 (18.8)	
2- I would like to kill myself.	12 (1.2)	
3- I would kill myself if I had the chance.	4 (0.4)	
SWLS (5-35)		19.74 (7.11)
DERS-SF		
Awareness *(3-15)*		7.17 (2.97)
Interference with goals *(3-15)*		8.71 (3.41)
Lack of acceptance *(3-15)*		8.10 (2.96)
Impulsiveness *(3-15)*		6.35 (3.08)
Lack of strategies *(3-15)*		6.76 (3.08)
Clarity *(3-15)*		6.36 (2.78)

Table 5
Social and Organisational Variables (N = 1018)

Variable (*range*)	Mean (*SD*)
Social and Organisational Variables *(0-10)*	7.67 (2.40)
Social support received within academia *(0-10)*	5.93 (3.01)
Regret about starting doctoral studies *(0-10)*	3.12 (3.21)
Negatively affected by the procedures involved in the doctorate *(0-10)*	7.26 (2.86)
Desire to change thesis supervisor *(0-10)*	3.12 (3.22)
Worried about losing tuition rights *(0-10)*	7.24 (3.02)
WAFCS - Work-to-family conflict subscale *(4-28)*	18.49 (7.00)
WAFCS - Family-to-work conflict subscale *(4-28)*	7.74 (4.55)

Three binary logistic regression models were then developed, with the GHQ2+, GHQ3+ and GHQ4+ as dichotomic (presence / absence of negative mental health status) dependent variables. We excluded a number of cases that could introduce empty cells in some categories of analysis, such as non-binary gender or failure to indicate the title of the doctoral programme. This resulted in a final *n* of 982 individuals, with 31 variables as predictors (many more cases than predictors, $p \ll n$). Also, after exploring the variance inflation factor and tolerance statistics in order to assess multicollinearity, the DERS-S-SF total score was excluded from the analysis in favour of the different factors, as was the confidence in attaining an academic position after completing the doctorate. As for the psychometric measures, all reliability indices were found to be acceptable, with Cronbach's alpha and McDonald's omega above 0.75, with the exception of two subscales of the DERS-S-SF, which were excluded. Variables were included in the model in blocks (Block 1: sociodemographic variables; block 2: academic variables; block 3: psychological variables; block 4: organisational and social variables). As shown in Table 6, each block of the models resulted in a significant increase in the fit of the prediction to the data and an equally adequate goodness of fit, with non-significant values of the Hosmer and Lemeshov statistic indicating an adequate fit of the models to the data. In the final models, the R^2_N indicated a 43%, 47% and 49% reductions in classification errors compared to the null model for the GHQ2+, GHQ3+ and GHQ4+ cut-off scores, respectively. In the final step, 78.1%, 77.8% and 76.3% of all cases were correctly classified according to GHQ2+, GHQ3+ and GHQ4+ cut-off scores, respectively.

Seven variables were found to be significant predictors across all 3 models. For significant variables, the Exp(B) values of the model, with their 95% confidence intervals, which can be interpreted as odds ratios (OR) (Ranganathan et al., 2017), are included in Table 7.

It appears that a negative state of mental health is associated with variables in each block across the three models. In terms of sociodemographic variables, being a woman would double the likelihood of having a common mental disorder. In terms of academic variables, being more years into a doctorate also increases the chances of experiencing a common mental disorder (by 14% for each year after the first year across the three models). Psychological variables included interference from negative emotions, which increase the likelihood of having a common mental disorder by 17%-20% for each point on the DERS-S-F subscale, and lack of clarity about one's emotions, which increase this likelihood by 14%-10% for each point on the DERS-S-F subscale. Regarding social and organisational variables, academic-work-to-personal-life conflict increases this likelihood by 6% for each point on the 0-10 scale. Also, fear of losing tuition rights, desire to change supervisor, and regrets of pursuing doctoral studies were present among more distressed students.

At the same time, several variables exhibited a protective effect, namely, the SWLS score, which reduced the likelihood of having a probable mental disorder by about 9% for every additional point on the scale, and family emotional support, which reduced this likelihood by around 8% for every point on the 0-10 scale, or seeking a non- academic career, which reduced the likelihood of being above GHQ4+ by about a 40%.

Table 6
Effects of Including the Different Variable Blocks on the Prediction of Mental Health (n = 982)

	GHQ2+				GHQ3+				GHQ4+			
	χ^2	R^2_N	H-L test	% of correct classification (positive cases)	χ^2	R^2_N	H-L test	% of correct classification (positive cases)	χ^2	R^2_N	H-L test	% of correct classification (positive cases)
Block 1: Sociodemographic variables	$\chi^2(8) = 58.352$; $p < .000$***	.082	$\chi^2(8) = 6.640$; $p = .576$	72.7 (97.6)	$\chi^2(8) = 50.966$; $p < .000$***	.068	$\chi^2(8) = 10.734$; $p = .217$	64.2 (88.8)	$\chi^2(8) = 51.240$; $p < .000$***	.068	$\chi^2(8) = 8.389$; $p = .396$	59.6 (69.3)
Block 2: Academic variables	$\chi^2(8) = 58.407$; $p < .000$***	.160	$\chi^2(8) = 7.127$; $p = .523$	72.9 (93.7)	$\chi^2(8) = 87.457$; $p < .000$***	.178	$\chi^2(8) = 7.080$; $p = .528$	66.83 (81.6)	$\chi^2(8) = 82.075$; $p < .000$***	.169	$\chi^2(8) = 5.607$; $p = .691$	63.3 (68.2)
Block 3: Psychological variables	$\chi^2(8) = 183.399$; $p < .000$***	.376	$\chi^2(8) = 5.933$; $p = .655$	78.1 (89.8)	$\chi^2(8) = 216.185$; $p < .000$***	.409	$\chi^2(8) = 6.363$; $p = .607$	76.6 (83.5)	$\chi^2(8) = 261.771$; $p < .000$***	.442	$\chi^2(8) = 13.927$; $p = .084$	76.1 (77.1)
Block 4: Social and organisational variables	$\chi^2(8) = 56.492$; $p < .000$***	.434	$\chi^2(8) = 12.562$ $p = .128$	78.1 (88.8)	$\chi^2(8) = 66.673$; $p < .000$***	.471	$\chi^2(8) = 4.246$ $p = .834$	76.8 (82.8)	$\chi^2(8) = 58.385$; $p < .000$***	.493	$\chi^2(8) = 9.365$ $p = .312$	77.3 (77.9)

Sociodemographic variables: Gender, living situation, relationship status, household income, living far away from the place of study, estimated personal disposable monthly income. **Academic variables:** Branch of knowledge of doctoral studies, commitment to the doctoral programme, years of study in doctorate, employment status, reasons for pursuing a doctorate, discrepancy between academic aspirations and expectations, non-academic career preparation, added value of doctoral studies in non-academic jobs, general satisfaction with the thesis supervisor; interest in and enthusiasm for the subject of the thesis. **Psychological variables:** SWLS total score, DERS-S SF awareness subscale score, DERS-S SF interference with goals subscale score, DERS-S SF impulsivity subscale score, DERS-S SF clarity subscale score. **Social and organisational variables:** Emotional support from the personal environment, emotional support from the academic environment, distress due to paperwork, concerns about losing tuition rights, desire for change, regret about starting doctoral studies, work-to-family conflict, family-to-work conflict

Table 7
Significant Individual, Academic, Psychological, and Organisational Predictors of Mental Health in Doctoral Students (n = 982)

	GHQ2+				GHQ3+				GHQ4+			
	Exp(B)/OR	95% CI	Wald	Significance	Exp(B)/OR	95% CI	Wald	Significance	Exp(B)/OR	95% CI	Wald	Significance
Sociodemographic variables												
Identifying as a woman	2.077	(1.445 - 2.985)	15.616	0.000***	1.628	(1.150 - 2.306)	7.537	0.006**	2.072	(1.454 – 2.952)	16.271	0.000***
Academic variables												
Years of study in doctorate	1.14	(1.008 - 1.289)	4.330	0.037*	1.147	(1.021 – 1.288)	5.315	0.021*	1.139	(1.014 – 1.280)	4.818	0.028*
Branch of knowledge (Arts and Humanities)	0.6	(0.405 - 0.890)	6.462	0.011*	0.764	(0.528 - 1.105)	2.046	0.153	0.942	(1.657 -1.353)	0.103	0.748
Aspire to non-academic career	0.888	(0.558 - 1.415)	0.250	0.617	0.587	(0.376 – 0.917)	5.472	0.019*	0.604	(0.385 – 0.947)	4.830	0.028*
Psychological variables												
SWLS	0.916	(0.887 - 0.946)	28.542	0.000***	0.922	(0.895 – 0.950)	28.178	0.000***	0.914	(0.887 – 0.942)	34.8484	0.000***
DERS – Interference with goals	1.172	(1.085 – 1.266)	16.191	0.000***	1.175	(1.094 – 1.262)	19.756	0.000***	1.258	(1.171 – 1.352)	39.482	0.000***
DERS - Clarity	1.131	(1.038 – 1.232)	7.929	0.005**	1.141	(1.055 – 1.233)	10.939	0.001***	1.105	(1.025 – 1.191)	6.789	0.009**
Social and organisational variables												
Emotional support outside academia	0.841	(0.766 - 0.924)	13.000	0.000***	0.877	(0.805 – 0.955)	9.021	0.003**	0.866	(0.797 – 0.941)	11.499	0.001***
Fear of losing tuition rights a	1.062	(-1.000 - 1.128)	3.791	0.052	1.102	(1.038 – 1.169)	10.266	0.001**	1.066	(1.003 – 1.132)	4.244	0.039*
Desire to change supervisor	1.062	(0.984 - 1.147)	2.363	0.124	1.053	(0.982 - 1.128)	2.111	0.146	1.092	(1.022 – 1.168)	6.687	0.010**
Regret of pursuing doctoral studies	1.076	(0.992 - 1.167)	3.121	0.077	1.099	(1.021 – 1.183)	6.386	0.012*	1.061	(0.990 - 1.139)	2.779	0.096
WAFCS – Work-to-family conflict	1.061	(1.033 – 1.090)	18.584	0.000***	1.06	(1.033 – 1.088)	19.510	0.000***	1.063	(1.036 – 1.092)	21.369	0.000***

a: in Spanish doctoral programs there is a 5-year time limit to present the thesis dissertation, after which the candidate losses tuition rights.
*: $p < 0.05$; **: $p < 0.01$; ***$p < 0.001$

Discussion

Results—which were obtained using reliable and valid psychological instruments on a large sample of doctoral students at a major university, with the appropriate distribution of participants by academic year, and by full-time or part-time commitment — show that between 50% and 60% of the sample may be experiencing a common mental disorder, while around 19% of the sample may be having passive suicidal ideation.

By way of comparison, several studies in the Spanish population have used the GHQ-12, albeit with different correction criteria and cut-off points. Henares Montiel et al. (2020) report that in 2006, 22.2% of the Spanish population had some type of psychological condition (INE [Spanish National Institute of Statistics], 2008), remaining stable in 2011 at 22.1% (Ministerio de Sanidad, Consumo y Bienestar Social [Spanish Ministry of Health, Consumer Affairs, and Social Welfare], 2013), and decreasing to a prevalence of 19.1% in 2017 (Ministerio de Sanidad, Consumo y Bienestar Social [Spanish Ministry of Health, Consumer Affairs, and Social Welfare], 2018). During the stringent lockdown prompted by the COVID-19 pandemic, Parrado González and León Jariego (2020) reported a 48.8% prevalence of positive cases using a cut-off point of 3 in the categorical correction of the GHQ-12. Moreover, our percentages are higher than those obtained among Belgian students by Levecque et al. (2017), which ranged from 39.5% to 51% depending on the different categorical cut-off points of the GHQ-12. Prevalence in our study sample may have been higher due to certain characteristics of doctoral studies in Spain, or due to the effect of the COVID-19 pandemic on this population — since all the other studies mentioned were conducted before the pandemic — or due to a self-selection bias, which would have made it more likely for students who were more affected or concerned about their mental health to complete the survey. However, the sample composition, in terms of distribution by academic year, commitment to the doctorate, and other variables, is consistent with the university's own data, suggesting representativeness. This is in line with studies that emphasise the poor mental health of doctoral students compared to the general population (Levecque et al., 2017; Satinsky et al., 2021), as in other stages of academic life (Auerbach et al., 2018; Hill et al., 2022).

In addition, negative mental health is found to be associated with several significant predictors, like being a woman, in line with the findings of epidemiological studies in the general population (Gabilondo et al., 2010) and in academia (Hazell et al., 2020).

Taking more years to complete a doctoral programme also increases the likelihood of experiencing a common mental disorder. This seems consistent with increased wear and tear from contact with academia and the mounting pressure as the deadline for completing the doctoral thesis approaches, which would promote viewing the doctoral thesis as a product rather than as a process (Stubb, 2011, 2012). The inclusion in two models of the fear of losing tuition rights —i.e., fear of exceeding the deadlines for writing the doctoral thesis, and being expelled from the programme — points in the same direction.

The largest contribution to the model is made by individual psychological variables. The interfering roles of negative emotions and lack of clarity about one's own emotions — which are strongly related to negative mental health in the model — should be highlighted. This suggests that difficulties in managing one's own emotions have a huge impact on the onset or management of mental health problems during doctoral studies. Satisfaction with life, as understood from a hedonic perspective, plays an important protective role (Vázquez et al., 2013). In the aggregate, these data would justify creating intervention programmes for improving emotion regulation and self-care skills among doctoral students.

These predictors are similar to those found in other studies (Hazell et al., 2020). In particular, the study by Levecque et al. (2017) reports R^2_N values obtained from a set of academic and organisational predictors that are very similar to those obtained in our study, excluding psychological variables. These results are novel in the Spanish academic context, as is their linkage to emotion regulation.

Interestingly, social support in the academic environment does not act as a protective variable and satisfaction with the supervisor is not significant in our models. These results are at odds with those reported by other studies (Hazell et al., 2020; van Rooij et al., 2021). Our study has also found protective effects for the desire for a non-academic career in two of the models, which also stands out as a protective variable in Levecque et al. (2017). This group might be made up of older students with a markedly different economic status, a reminder that doctoral students do not necessarily constitute a homogeneous group. In parallel, other studies indicate that the mental health of senior researchers is also compromised (Hill et al., 2022), which would point to the fact that perhaps not only financial status and job security have a bearing on mental health, drawing our attention back to academia as a structure. Regarding the supervisor's role, Dericks et al. (2019) report that the supervisor's academic variables have little impact on student satisfaction with the doctoral programme, and the same may be true for mental health. Psychological characteristics might be acting as a moderator of the direct effect of student satisfaction with the supervisor and academic career prospects. Exploring these moderating relationships using network analysis would help to clarify the role of these variables.

In any case, the set of variables related to mental health is broad and covers various spheres. The steps needed to address this situation will therefore have to be ambitious and far-reaching. For instance, there is a need to strengthen students' ability to regulate their emotions and to engage in effective self-care, particularly in the final years of their doctoral studies. Actions that could have a positive impact on the mental health of doctoral students may include equipping them with adequate work-life balance strategies; preparing supervisors and research groups to become a source of support; and building an academia that minimises the negative impact of gender on mental health. However, these actions should be implemented by taking an evidence-based approach and in a way that contributes to generating useful models for other universities and research facilities. To this end, it is worth bearing in mind that university students seem to respond less favourably to standard psychotherapeutic interventions (Barnett et al., 2022) and that a community-based preventive approach may have a reach and scalability that would not be possible with individual psychotherapy services (Hart et al., 2022; Kazdin, 2021).

This study has several limitations. Firstly, the data were collected in a self-selected and self-reported manner, which means that certain data distortions caused by a higher participation of

individuals more affected by or committed to their mental health cannot be excluded, thereby casting doubt on the true rates of poor mental health in the doctoral student population. Secondly, several variables reported in the literature, such as viewing the doctoral thesis as a process or a product and satisfaction with the department or the thesis project, could not be tested directly. Thirdly, generalization of results might be limited to students and programs of similar characteristics. Fourthly, some variables were assessed through single items, which might hamper validity. Finally, although analysis of the survey response rate suggests that it is functional according to Holtom et al., (2022), follow-up use of the links reveals significant drop-out rates among those who started the survey, which could mean that survivorship bias was present in participation rates.

It is therefore of the essence to put in place measures for mental health remediation and prevention among doctoral students. It is necessary to involve the doctoral student community itself and the relevant stakeholders when proposing solutions that are organic in nature. For this to be possible, it is essential to share these findings with the affected groups.

Author Contributions

Francisco Estupiñá: Conceptualization, Data Curation, Formal Analysis, Funding Acquisition, Methodology, Project Administration, Writing - Original Draft. **Álvaro Santalla:** Investigation, Data Curation, Methodology, Writing - Original draft. **Maider Prieto-Vila:** Conceptualization, Methodology, Writing - Reviewing & Editing. **Ana Sanz:** Supervision, Writing - Reviewing & Editing. **Cristina Larroy:** Conceptualization, Funding Acquisition, Methodology, Project Administration, Resources, Writing - Reviewing & Editing.

Declaration of Interests

The authors declare that there is no conflict of interest.

Data Availability Statement

Data are available online under the following reference: Estupiñá, F. J., Santalla, Á., Prieto, M., Sanz, A., & Larroy, C. (2023, July 31). Mental health in doctoral students. Retrieved from osf.io/9jsez

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