




Significant role of perfectionism in the mental health crisis in graduate education

O papel do perfeccionismo na crise de saúde mental na pós-graduação

Función significativa del perfeccionismo en la crisis de salud mental en la enseñanza superior

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ABSTRACT

Given the prevalent mental health crisis among graduate students, it is crucial to understand the specific characteristics that contribute to the development of psychological distress in this demographic sample. This study aims to determine whether the transdiagnostic process of perfectionism is a significant predictor of psychological distress in graduate students and to compare its importance with other transdiagnostic processes, such as negative repetitive thinking (rumination and worry) and neuroticism. The sample comprised 3,534 graduate students aged between 20 and 60 (mean age = 30.60; SD = 6.73; 70.7% female students). These students represented various fields of study, with 49.1% (n = 1,736) pursuing a doctorate and 50.9% (n = 1,798) working toward a master's degree. Perfectionistic Concerns emerged as the strongest predictor of psychological distress, second to worry and tied with neuroticism. Collectively, Perfectionistic Concerns, worry and neuroticism accounted for 81% of the psychological distress in the sample, compared to less than 1.5% attributed to rumination and Perfectionistic Striving. The findings suggest that perfectionism should be considered when devising intervention and prevention strategies, as well as in the development of explanatory models.

Keywords: perfectionism, psychological distress, Education, Graduate, Mental Health.

RESUMO

Dada a crise de saúde mental predominante entre os estudantes de pós-graduação, é fundamental entender as características específicas que contribuem para o desenvolvimento do sofrimento psicológico nesse grupo demográfico. Este estudo tem como objetivo determinar se o processo transdiagnóstico do perfeccionismo é um preditor significativo de sofrimento psicológico em estudantes de pós-graduação e comparar sua importância com outros processos transdiagnósticos, como o pensamento repetitivo negativo (ruminação e preocupação) e o neuroticismo. A amostra incluiu 3.534 estudantes de pós-graduação, com idade entre 20 e 60 anos (M = 30,60 anos; DP = 6,73; 70,7% de estudantes do sexo feminino), de várias áreas de estudo, sendo que 49,1% (n = 1.736) estavam fazendo doutorado e 50,9% (n = 1.798) estavam fazendo mestrado. As preocupações perfeccionistas surgiram como o segundo indicador mais forte de sofrimento psicológico, perdendo apenas para preocupação e empatando com neuroticismo. Coletivamente, preocupações perfeccionistas, preocupações e neuroticismo foram responsáveis por 81% do sofrimento psicológico na amostra, em comparação com menos de 1,5% atribuídos à ruminação e ao esforço perfeccionista. Os resultados sugerem que o perfeccionismo deve ser considerado na elaboração de estratégias de intervenção e prevenção, bem como no desenvolvimento de modelos explicativos.

Palavras-chave: Perfeccionismo, Saúde mental, Educação de pós-graduação.

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RESUMEN

Dada la crisis de salud mental prevalente entre los estudiantes de posgrado, es crucial comprender las características específicas que contribuyen al desarrollo de malestar psicológico en este grupo demográfico. Este estudio tiene como objetivo determinar si el proceso transdiagnóstico de perfeccionismo es un predictor significativo de malestar psicológico en estudiantes de posgrado y comparar su importancia con otros procesos transdiagnósticos, como el pensamiento repetitivo negativo (rumiación y preocupación) y el neuroticismo. La muestra fue compuesta por 3.534 estudiantes de posgrado con edades comprendidas entre 20 y 60 años (edad media = 30,60; DE = 6,73; 70,7% estudiantes mujeres). Estos estudiantes representaban diversos campos de estudio, con el 49,1% (n = 1.736) cursando doctorado y el 50,9% (n = 1.798) en nivel de maestría. Las preocupaciones perfeccionistas surgieron como el predictor más fuerte de malestar psicológico, solo superado por el neuroticismo. En conjunto, las preocupaciones perfeccionistas, la preocupación y el neuroticismo representaron el 81% del malestar psicológico en la muestra, en comparación con menos del 1,5% atribuido a la rumiación y el esfuerzo perfeccionista. Los hallazgos sugieren que se debe considerar el perfeccionismo al diseñar estrategias de intervención y prevención, así como en el desarrollo de modelos explicativos.

Palabras clave: Perfeccionismo, salud mental, Educación de Postgrado.

Highlights of Clinical Impact

- The study identified perfectionism as a significant predictor of psychological distress in graduate students.
- In comparison to other transdiagnostic factors, such as worries and neuroticism, perfectionism emerged as a significant contributor to psychological distress.
- The findings indicated that perfectionistic concerns were a stronger predictor of psychological distress than perfectionistic striving, suggesting a differential effect between the two dimensions.
- The results underscore the necessity of incorporating perfectionism into the development of intervention and prevention strategies for psychological distress among graduate students.

A mental health crisis pervades graduate education. Graduate students exhibit levels of psychological distress and mental disorder prevalence several times higher than those in the general population (Akhtar et al., 2020; Barreira et al., 2018; Evans et al., 2018). This trend is evident in numerous countries (Akhtar et al., 2020; Woolston, 2022), with an apparent increase in psychological distress among this demographic (Oswalt et al., 2020). Recent research indicates that the coronavirus disease 2019 (COVID-19) pandemic has exacerbated this crisis. Furthermore, graduate students from minority groups in emerging and developing countries appear to face greater challenges (Chirikov et al., 2020; Liu et al., 2022; United Nations Educational, Scientific and Cultural Organization [UNESCO], 2020; Wildey et al., 2022; Woolston, 2020).

Consequently, the escalating need to comprehend the factors influencing graduate students' mental health has increased related research over the past decade (Okoro et al., 2022). This understanding is crucial for developing models that identify psychological distress among these students, a prerequisite for effective planning, implementing, and monitoring of prevention and intervention strategies (Emmelkamp et al., 2014; Haslbeck et al., 2022). Numerous theoretical approaches exist for these models of psychological distress (Richter &

Dixon, 2023). However, in the past two decades, the field has progressively shifted toward transdiagnostic processes and models to adopt an evidence-based approach, a shift characterized as revolutionary (Dalgleish et al., 2020; Lahey et al., 2021; Shah et al., 2020).

THE TRANSDIAGNOSTIC APPROACH AND THE GRADUATE EDUCATION

Transdiagnostic processes, psychological mechanisms that underpin and perpetuate various psychopathologies, have been a subject of interest in recent research. The seminal review by Harvey et al. (2004) identified 12 such processes, including recurrent negative thinking and negative metacognitive beliefs. Subsequent research has proposed additional transdiagnostic processes, such as perfectionism (Egan et al., 2011; Limburgh et al., 2017). The inherent nature of these variables allows for their dimensional exploration, facilitating the investigation of early subclinical presentations and the trajectory of psychological distress and psychopathologies (Shah et al., 2020). Bekkouche et al. (2022) suggested that psychological distress in graduate students tends to escalate progressively, highlighting the significant advantage of the transdiagnostic approach. Empirical evidence indicates that cognitive-behavioral interventions

targeting transdiagnostic processes are highly effective, yielding large effect sizes in reducing symptoms of anxiety, depression, generalized anxiety disorder, obsessive-compulsive disorder, and social anxiety disorder, among others (Sakiris & Berle, 2019).

Transdiagnostic processes potentially provide a theoretical foundation for identifying and testing variables relevant to the mental health crisis in graduate education. Irie et al. (2019) conducted a meta-analysis to investigate the association of transdiagnostic processes with nine mental health domains, including negative affect and general psychological symptoms, among college students. They discovered a medium correlation ($r = .32 - .46$). The study evaluated transdiagnostic processes as the overarching cognitive and behavioral processes of attention, thought, and behavior, as proposed by Harvey et al. (2004). The process most strongly associated with distress was “thought,” encompassing “variables such as rumination and belief” (Irie et al., 2019, p. 2) and worry. Rumination and worry, also commonly regarded as repetitive negative thinking, mainly differ by their temporal and content orientation. Worry encompasses a focus on events and in the future, and rumination a focus on feelings and on the past (Flett et al., 2016). Worry and rumination are recognized transdiagnostic processes (Ehring & Watkins, 2008; McEvoy et al., 2013) and, considering the parallels between college and the specific graduate environment, they could also be significant in understanding the mental health crisis in graduate education.

The graduate experience possesses unique characteristics that have been suggested as potential causes for psychological distress (Bekkouche et al., 2022; Hazell et al., 2020; Sverdlik et al., 2018). Graduates are usually at a different life stage than undergraduates, often juggling professional, financial, and familial responsibilities alongside the demands of their graduate courses, which can be a significant source of stress (Willey et al., 2022). In a study involving 724 doctoral candidates, Castelló et al. (2017) discovered that the primary reasons for considering dropping out were difficulties in balancing work, personal life, and doctoral studies, affecting one-third of the sample. Upon entering graduate education, students face new social and institutional structures that require acclimatization. Laboratories, departments, and universities often uphold specific cultural norms, such as high competitiveness (Posselt, 2021; Sverdlik et al., 2018). This stage is critical, as evidence suggests that a sense of belonging contributes to graduate students' retention and success (O'Meara et al., 2017) and acts as a protective factor against isolation, a known risk factor for mental health (Hazell et al., 2020). Students also embark on a relationship with a supervisor, a figure higher in the academic hierarchy who can significantly influence their academic and professional trajectory (Hazell et al., 2020). Zhao et al. (2007, p. 263) compared it to “a personal and professional relationship that rivals marriage and parenthood in its complexity.” Unsurprisingly, the quality of supervisory relationships is a crucial predictor of

students' mental health (Charles et al., 2022; Evans et al., 2018; Hazell et al., 2020; Sverdlik et al., 2018). Graduate students are expected to acquire advanced knowledge and research skills through rigorous, intense, focused, time-consuming, and independent work, surpassing the demands of undergraduate studies. They often have to balance research, classes, and teaching activities, encompassing writing, lab meetings, scientific presentations, extensive reading, class preparation, grading, and teaching. Additionally, they must acquire other “unseen” or implicit skills such as inter and transdisciplinary knowledge, general communication, written and oral communications, and project management skills (Senekal et al., 2022). Among these, writing is critical, as graduate students and supervisors are often evaluated based on the number and quality of their published journals. Graduate-level writing is argumentatively complex, precise, and knowledge-specific. It presents a steep learning curve and is closely tied to the “pressure to perform” climate of graduate education (Bekkouche et al., 2022).

High demands in graduate studies are often accompanied by constant evaluation and potential criticism. Work at various stages of completion is frequently assessed by supervisors, professors, students, and review boards. The comprehensive examination and the defense of a thesis or dissertation are often perceived as highly stressful events (Sverdlik & Hall, 2020). There is a possibility that a graduate student may not be allowed to become a doctoral candidate or receive their degree. Given the “all or nothing” nature of graduate courses, these stages are significantly more critical than others. A graduate degree typically culminates after 3–12 years, presenting a substantial opportunity cost as students often earn less than they would in the private sector (Bekkouche et al., 2022). The broader context in which graduate studies occur is also pertinent. Cultural differences can impact the value and support given to graduate education. Additionally, political and financial instability within a country or region can threaten institutional and research funding, thereby affecting students' well-being (Charles et al., 2022). In a study involving over 20,000 graduate students, Posselt et al. (2021) discovered that those who described their financial situation as “a struggle” were 2.3 and 3.2 times more likely to exhibit elevated depression and anxiety levels, respectively.

The aforementioned characteristics contribute to an environment of high pressure, elevated expectations, and intense competition, often punctuated by frequent and severe criticism. These environmental factors are significant as they are associated with heightened levels of perfectionism (Curran & Hill, 2018), a recognized transdiagnostic factor (Egan et al., 2011, 2012; Limburg et al., 2017). In a comprehensive meta-analysis and meta-synthesis examining the mental health of doctoral researchers, Hazell et al. (2020, p. 18) found that “perfectionism [is] a central challenge of their Ph.D. experience,” manifesting in an “overwhelming sense of responsibility” and a “tendency to position themselves as inadequate and inferior.” Furthermore, perfectionism is correlated with rumination and worry (see Xie

et al., 2019), transdiagnostic processes relevant to the mental health of college students (Irie et al., 2019).

PERFECTIONISM AND ITS CONNECTION WITH PSYCHOLOGICAL DISTRESS IN THE GRADUATE ENVIRONMENT

Perfectionism, a multidimensional personality characteristic, holds significant relevance to an individual's studies (Madigan, 2019; Osenk et al., 2020), work (Harari et al., 2018), and interpersonal relationships (Flett et al., 2022). Over the past few decades, its prevalence has increased (Curran & Hill, 2019), making it a focal point in clinical psychology for at least the last two decades. Statistical analyses from multiple proposed models supports an overarching general model of perfectionism with two bigger dimensions: Perfectionistic Striving (PS) and Perfectionistic Concerns (PC) (Stoeber, 2018). PS denotes the inclination to set high-performance standards for oneself, while PC signifies the propensity to self-criticize and evaluate oneself negatively (Flett & Hewitt, 2020a; Smith et al., 2022). High levels of perfectionism correlate with psychological distress and psychopathology (Limburgh et al., 2017), including symptoms of eating disorders, depressive disorders, anxiety disorders, suicide ideation, burnout, and obsessive-compulsive personality disorder. In the context of mental suffering, Shafran et al. (2002) introduced the concept of "clinical perfectionism." They defined it as "the overdependence of self-evaluation on the determined pursuit of personally demanding, self-imposed standards in at least one highly salient domain, despite adverse consequences" (Shafran et al., 2002, p. 778). Among the two dimensions, PC has a stronger association with psychopathology and psychological distress, except for eating disorders, which are strongly linked to both (Limburg et al., 2017). This finding has been replicated in studies exclusively involving graduate students (Cowie et al., 2018; Filipkowski et al., 2021).

The Achievement-Specific Vulnerability Hypothesis (ASVH, Curran & Hill, 2018) provides a framework for understanding the connection between perfectionism and psychological distress. According to the ASVH, individuals with high levels of PS and PC are particularly susceptible to the negative impact of failure in achievement-related areas. This susceptibility arises from the perfectionist perspective, which interprets such failures as indicators of personal inadequacy and interpersonal inferiority, thereby threatening the self-concept of those with high perfectionism (Curran & Hill, 2018; Shafran et al., 2002). The ASVH builds upon a prior hypothesis that identified perfectionism as a vulnerability factor for adverse outcomes in general (Curran & Hill, 2018; Flett & Hewitt, 2016). The ASVH's emphasis on the context of failure experiences highlights graduate education as a potential catalyst for the progression from perfectionism to psychological distress. Supporting this notion, research indicates a robust correlation between higher levels of PC and distress among graduate students, although the evidence is mixed or absent for PS (Comerchero & Fortugno,

2013; Cowie et al., 2018; Filipkowski et al., 2021; Suh et al., 2021).

Perfectionism is a personality trait closely linked with two higher-order characteristics of the Big Five Factor Model: neuroticism and conscientiousness (Smith et al., 2019; Stricker et al., 2019). These traits are etiological factors for perfectionism (Maloney et al., 2014; Stoeber et al., 2009). Despite distinct personality traits, perfectionism and neuroticism share a genetic etiology (Burcaş & Creţu, 2021). Neuroticism, a transdiagnostic process, consistently exhibits a strong association with psychological distress and psychopathology, making it a significant concern for public health worldwide (Lahey, 2009). Among graduate students, neuroticism demonstrates the most robust association with distress compared to the other Big Five traits (Lewis & Cardwell, 2020). Moreover, perfectionism has been found to predict psychological distress, even when controlling for neuroticism (Smith et al., 2016, 2017). Neuroticism remains one of the most critical single variables (and transdiagnostic processes) in predicting psychological distress (Strickhouser et al., 2017).

Given the lack of a comparative analysis regarding the significance of the aforementioned transdiagnostic processes (perfectionism, repetitive negative thinking, and neuroticism) to the mental health of graduate students, this study aims to fill that gap. Prior research has suggested the importance of controlling for higher-order vulnerability variables, such as neuroticism, when examining lower-order vulnerability variables like perfectionism (Enns et al., 2005). Consequently, this study seeks to determine whether perfectionism, as a transdiagnostic process, is a crucial predictor of psychological distress among graduate students. It also compares its significance with other transdiagnostic processes, specifically negative repetitive thinking (rumination and worry) and neuroticism. This study also aims to contribute to the literature on perfectionism by addressing three gaps that were pointed in reflections on the three decades of the scientific study of perfectionism, namely the small number of studies with bigger samples, the need for samples not formed by a majority of undergraduate students and not by a majority of participants from North America and Europe (Flett & Hewitt, 2020b; Smith et al., 2022) The hypotheses are as follows: (1) neuroticism will be the most significant predictor, (2) PC, not PS, will be the subsequent predictor, and (3) negative repetitive thinking will follow neuroticism and PC.

METHODS

PARTICIPANTS

The sample comprised 3,534 graduate students (70.7% women, $n = 2,499$). This sample size provided approximately 99.9% power to detect small associations as $f^2 = .02$ and error type I probability equal to .001. The average age was 30.60 years ($SD = 6.73$), ranging from 20 to 60. The majority of the

sample were adults aged 20–39 years (89.8%, $n = 3,173$). Nearly half of the sample, 49.1% ($n = 1,736$), were pursuing a doctorate, while the remaining 50.9% ($n = 1,798$) held a master's degree. The students represented a variety of fields of study: humanities (24.9%, $n = 879$), health sciences (14.7%, $n = 519$), biological sciences (12.1%, $n = 429$), applied social sciences (10.9%, $n = 385$), agricultural sciences (10.6%, $n = 374$), exact and earth sciences (8.3%, $n = 293$), engineering (6.2%, $n = 220$), and linguistics and arts (5.4%, $n = 191$). The remaining 6.9% ($n = 244$) of the sample identified their field of study as "other." Concerning monthly family income, 27.6% indicated receiving more than 4 Brazilian minimum wages (a minimum wage in Brazil is equivalent to 280 US dollars), 25.1% indicated receiving 1 to 2 minimum wages, 23.5% indicated receiving 2 to 3 minimum wages, 15.5% indicated receiving 3 to 4 minimum wages, and 8.7% indicated receiving up to a minimum wage.

MEASURES

The Almost Perfect Scale-Revised (APS-R; Slaney et al., 2001) gauges perfectionism via three subscales: standards, discrepancy, and order. For this study, we utilized two components from the Brazilian Portuguese version of the scale (APS-R/BR; Soares et al., 2020): standards (S; 7 items; e.g., "I have high expectations about myself") and discrepancy (D; 12 items; e.g., "My best never seems to be enough for me"). Participants evaluated items on a 7-point scale (1 = totally disagree; 7 = totally agree). The standards and discrepancy subscales were selected as they represent the two dimensions of perfectionism: Perfectionism Striving (PS) and Perfectionistic Concerns (PC) (Flett & Hewitt, 2020a; Smith et al., 2022; Stoeber & Otto, 2006). Both dimensions demonstrated acceptable or superior levels of internal consistency (S: $\alpha = .70$ and D: $\alpha = .94$) (Hair et al., 2019).

The shortened version of the Depression, Anxiety, and Stress Scale (Lovibond & Lovibond, 1995) is a globally recognized tool for assessing symptoms of depression, anxiety, and stress experienced within the preceding week. This study employed its Brazilian adaptation (DASS-21; Vignola & Tucci, 2014) to gauge psychological distress, an unspecific emotional state of suffering triggered by a stressor (Drapeau et al., 2012). This application aligns with recent research on the DASS-21 structure (Zanon et al., 2021). The DASS-21 comprises three subscales: depression (7 items; e.g., "I did not feel enthusiastic about anything"), anxiety (7 items; e.g., "I felt afraid for no reason"), and stress (7 items; e.g., "I intended to exaggerate when I reacted to situations"). Participants evaluated items using a 4-point scale (0 = did not apply to me at all; 3 = applied to me very much, or most of the time). The scale demonstrated exceptional internal consistency ($\alpha = .95$) (Hair et al., 2019).

The Big-Five Inventory (BFI; John & Srivastava, 1999) was developed to assess the five major personality traits: openness, conscientiousness, extraversion, agreeableness, and neuroticism (Smith et al., 2019; Stricker et al., 2019). This

study utilized one subscale from the adapted Brazilian version of the BFI (Andrade, 2008) to measure neuroticism (6 items; e.g., "Can be tense."). Neuroticism is the propensity to have a "negative emotional response to threat, frustration, or loss" (Lahey, 2009, p. 241). Participants are required to rate items on a 5-point scale (1 = Disagree strongly; 5 = Agree strongly). The subscale demonstrated satisfactory internal consistency ($\alpha = .86$) (Hair et al., 2019).

The Rumination and Reflection Questionnaire (RRQ; Trapnell & Campbell, 1999) was developed to assess two tendencies: rumination, which is the inclination to dwell on negative and threatening feelings or events, and reflection, which is the propensity to contemplate oneself from an abstract viewpoint (Trapnell & Campbell, 1999). The current study employed the rumination subscale (RRQ-R; 12 items; e.g., "I often find myself re-evaluating something I have already made.") from the Brazilian adaptation of the RRQ (Zanon & Teixeira, 2006). Participants were asked to rate items on a 5-point scale (1 = Totally disagree; 5 = Totally agree). The scale demonstrated exceptional internal consistency ($\alpha = .91$) (Hair et al., 2019).

The Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990) was developed to gauge the severity of an individual's worry, independent of the worry's content. The current study employed the adapted Brazilian version of the scale (PSWQ; Castillo et al., 2010) to assess worry (16 items; e.g., "My worries overwhelm me."). Participants evaluated items using a 5-point scale (1 = not at all typical of me; 5 = very typical of me). The scale demonstrated exceptional internal consistency ($\alpha = .91$) (Hair et al., 2019).

PROCEDURES OF DATA COLLECTION

This study constituted a segment of a research project that had previously received approval from the Ethical Committee of the Federal University of Minas Gerais (CAAE 63461916.4.0000.5149), based on Resolução 510 (2016) of Brazilian National Health Council. All participants provided their informed consent freely to partake in the study. The Research Electronic Data Capture (REDCap; Harris et al., 2019) online platform was utilized for data collection. To engage potential participants, the survey was disseminated via social media. Data collection occurred between March and June 2020, during the early phases of the pandemic, and it was part of a Master's Degree in psychology. The assessment took approximately 15 to 20 minutes.

PROCEDURES OF DATA ANALYSIS

The analyses were performed using R software version 4.3.1 (R Core Team, 2021). Total scores of the instruments were computed using factor scores, with the *lavaan* package (Rosseel, 2012). Univariate normality tests were applied to all variables using the Shapiro–Wilk test (Razali & Yap, 2011). Given the non-parametric distribution of the scores, Spearman correlation was performed to explore the bivariate relationship

among variables, employing the *psych* package (Revelle, 2022). Welch's t-tests and effect size were employed using the *psych* package to compare perfectionism levels between men and women and between adult (20–39 years) and middle-aged (40–60 years) graduates.

To investigate the patterns of association between neuroticism, perfectionism, worry, rumination, and psychological distress, a hierarchical linear regression was estimated using *lmtree* (Zeileis & Hothorn, 2002) and *lavaan* packages. Model steps were organized based on the tendency for the variables to be broad and stable, as well as previous research suggesting the importance of incorporating measures of higher-order psychological vulnerabilities when examining lower-order vulnerability variables (Enns et al., 2005; Smith et al., 2017). The first step included the variables of gender and age, as preliminary analyses showed significant differences in levels of psychological distress between the groups. The second step incorporated neuroticism and the third step included the variables of perfectionism (PS and PC), rumination, and worry. For all steps, psychological distress was inserted as a dependent variable. As the model showed problems with the normality of the residuals (Shapiro-Wilk test indicated $W = 0.99$, $p < 0.001$) and heteroscedasticity (Breusch-Pagan test indicated $BP(7) = 27.26$, $p < 0.001$), a bootstrapping analysis (95% CI) was performed using the *car* package (Fox & Weisberg, 2019). In addition, to deal with the outliers in the standardized residuals presented by the model (minimum = -3.65; maximum = 4.54), the model with and without the outliers was compared. Since there were no significant differences between the models, it was decided to use the database with the outliers. It should be noted that the Durbin-Watson test indicated independence of the residuals ($D-W = 1.94$) of the model, and the variance inflation factor (VIF) indicated no multicollinearity problems, with VIF values below 3 for all predictors (Hair et al., 2019).

RESULTS

DESCRIPTIVE STATISTICS, BIVARIATE CORRELATIONS, AND GROUP COMPARISONS

Table 1 presents the means, standard deviations, and ranges for the variables, both potential and actual, as recorded by the participants (calculated through the sum of the items). Table 2 displays the bivariate correlations among the study variables, all of which were significant ($p < 0.001$). The APSR-BR subscales, specifically standards (S) and discrepancy (D), served as indicators for PS and PC. These were found to be weakly correlated ($\rho = 0.26$). PS demonstrated weak correlations with neuroticism, rumination, worry, and psychological distress (correlations between $\rho = 0.17$ and $\rho = 0.29$), while PC exhibited moderate to strong correlations with neuroticism, rumination, worry, and psychological distress (correlations between $\rho = 0.46$ and $\rho = 0.57$).

Table 1. Means, standard deviations and ranges.

	Total (n = 3,534)		Women (n = 2,499)		Men (n = 1,025)		Adulthood (20 through 39; n = 3,176)		Middle-age (40 through 60; n = 361)							
	M	SD	M	SD	M	SD	M	SD	M	SD						
APSR/ BR-PS	38.92	6.39	7-49	11-49	39.34	6.22	11-49	37.97	6.65	15-49	39.06	6.36	11-49	37.7	6.48	19-49
APSR/ BR-PC	54.98	17.63	12-84	12-84	56.31	17.65	12-84	51.76	17.21	13-84	55.82	17.3	12-84	47.54	18.79	12-84
DASS -full scale	25.40	15.41	0-63	0-63	26.72	15.40	0-63	22.21	15.07	0-63	25.8	15.28	0-63	21.85	16.12	0-63
BFI-N	20.19	5.83	6-30	6-30	20.89	5.74	6-30	18.49	5.70	6-30	20.38	5.76	6-60	18.59	6.16	6-30
RRQ -R	45.75	9.77	12-60	12-60	46.43	9.62	12-60	44.10	9.93	15-60	46.23	9.52	12-60	41.53	10.91	12-60
PSWQ	64.72	11.53	16-80	18-80	66.17	10.93	18-80	61.27	12.15	21-80	65.07	11.36	18-80	61.60	12.50	21-80

Differences in PS and PC factorial scores were observed among gender and age groups. Women ($M = 0.03$, $SD = 0.62$) exhibited higher PS compared to men ($M = -0.07$, $SD = 0.56$) ($t(1894.70) = -4.69$, $p < 0.001$, $d = 0.17$), with a small effect size. Additionally, women ($M = 0.05$, $SD = 0.67$) showed higher PC compared to men ($M = -0.12$, $SD = 0.62$) ($t(2050.2) = -7.01$, $p < 0.001$, $d = 0.25$), with a small effect size. Similarly, adults (M

Table 2. Correlations between perfectionism, rumination, worry, neuroticism and psychological distress measures.

	1	2	3	4	5
1. APS-R/BR - PS	-				
2. APS-R/BR - PC	0.26**	-			
3. DASS - full scale	0.17**	0.57**	-		
4. BFI - N	0.17**	0.46**	0.60**	-	
5. RRQ - R	0.22**	0.52**	0.55**	0.55**	-
6. PSWQ	0.29**	0.54**	0.65**	0.64**	0.66**

Note: ** $p < .001$; APS-R/BR-PS represents the Almost Perfect Scale Brazil - perfectionistic standards, while APS-R/BR-PC denotes the Almost Perfect Scale Brazil - perfectionistic concerns. BFI-N stands for Neuroticism, and BFI-C signifies Conscientiousness. RRQ-R is the abbreviation for the Rumination and Reflection Questionnaire - Rumination, and PSWQ refers to the Penn State Worry Questionnaire.

= 0.01, $SD = 0.56$) demonstrated higher PS than middle-aged individuals ($M = -0.13$, $SD = 0.55$) ($t(449.45) = 4.66$, $p < 0.001$, $d = 0.26$), with a small effect size. Finally, adults ($M = 0.03$, $SD = 0.65$) displayed higher PC than middle-aged individuals ($M = -0.27$, $SD = 0.69$) ($t(435.51) = 7.83$, $p < 0.001$, $d = 0.46$), with a medium effect size.

HIERARCHICAL REGRESSION

A hierarchical regression model was employed which used three steps: the first step predicted psychological distress from sex and age, 2) the second step added neuroticism, and 3) the third step added perfectionism (PS and PC), worry, and rumination in the model. The first step accounted for a significant amount of variance ($R^2 = 0.03$, $F(2, 3531) = 29.03$, $p < 0.001$). The second step also revealed a significant proportion of variance in psychological distress ($\Delta R^2 = 0.34$, $F(1, 3520) = 2480.91$, $p < 0.001$). The final addition, in the third step, led to another significant increase in variance ($\Delta R^2 = 0.16$, $F(4, 3516) = 300.28$, $p < 0.001$). Refer to Table 3 for more information.

DISCUSSION

Graduate education is currently facing a mental health crisis. The levels of psychological distress and the prevalence of mental disorders among graduate students are several times higher than those in the general population across numerous countries (Akhtar et al., 2020; Evans et al., 2018; Woolston, 2022). Mental health models increasingly adopt a transdiagnostic perspective (Dalglish et al., 2020), which offers a more comprehensive understanding of the onset and subclinical presentation of psychological distress (Shah et al., 2020). Perfectionism, a transdiagnostic process, is amplified in highly demanding and critical environments such as academia (Flett & Hewitt, 2020a). This process could potentially elucidate the psychological distress experienced by this population. This study aimed to determine whether perfectionism, as a transdiagnostic process, is a significant predictor of psychological distress among graduate students. It

also sought to compare its relevance with other transdiagnostic processes, specifically negative repetitive thinking (rumination and worry) and neuroticism. The results suggest that PC plays a contextually relevant role in the mental health of graduate students. In comparison with the other variables, PC emerged as the second strongest predictor of psychological distress, tied with neuroticism, and second to worry. Together, the three accounted for 81% of the psychological distress in the sample. The remaining variables, rumination and PS, together accounted for less than 1.5% of the psychological distress in the sample. These findings indicate that the transdiagnostic variables of worry, neuroticism and perfectionism are crucial to understanding the mental health crisis in graduate education. And, therefore, should be incorporated into explanatory models of mental ill health in this population.

Worry explained 31% of the psychological distress in the sample, and rumination only 0.05%. The connection between perfectionism, worry, and rumination has been explored in the Perfectionism Cognition Theory (PCT; Flett et al., 2016). Worry and rumination are seen as the main cognitive components associated with high levels of perfectionism. Perfectionists are seen as more likely to be critical overthinkers, to adopt worry and rumination in an obsessive and chronic way, and to have its content related to the experience, real or imaginary, of being negatively evaluated by others. (Flett et al., 2016) Similar to the first hypothesis of this study, one of the main claims of the PCT is that rumination and worry are important variables that contribute to psychological distress. Supporting evidence has been found for this claim in samples mostly composed of graduate students (Xie et al., 2019). The results of this study do not support the first hypothesis, as worry was the strongest predictor of psychological distress. We hypothesize that may be the case among graduate students due to a specific characteristic of the graduate environment: the frequent evaluation by faculty and other researchers and the thesis or dissertation defense. These events are correlated with greater stress (Sverdlik & Hall, 2020) and, as they happen throughout the entire graduate education with the most relevant of them at the end, they may favor a

Table 3. Summary of hierarchical regression analysis for variables predicting psychological distress.

Variable	Model 1 ^a		Model 2 ^b		Model 3 ^c	
	β	95% CI	β	95% CI	β	95% CI
Age	-0.13	-0.16, -0.10	-0.05	-0.08, -0.03	-0.02	-0.04, 0.01
Sex	0.14	0.11, 0.17	0.02	0.00, 0.05	-0.00	-0.03, 0.02
BFI-N			0.59	0.57, 0.62	0.25	0.22, 0.28
PSWQ					0.31	0.27, 0.34
APS-R/BR - PC					0.25	0.22, 0.28
RRQ - R					0.09	0.05, 0.12
APS-R/BR - PS					-0.05	-0.07, -0.03
R^2		0.03		0.37		0.53
ΔR^2				0.34		0.16

Please note: APS-R/BR-PS refers to Almost Perfect Scale Brazil - perfectionistic standards, APS-R/BR-PC to Almost Perfect Scale Brazil - perfectionistic concerns, BFI-N to Neuroticism, BFI-C to Conscientiousness, RRQ-R to Rumination and Reflection Questionnaire - Rumination, and PSWQ to Penn State Worry Questionnaire.

^a = $F(2, 3531) = 64.61, p < 0.001$

^b = $F(3, 3520) = 682.8, p < 0.001$

^c = $F(7, 3516) = 563.7, p < 0.001$

future oriented repetitive negative thinking. Reflecting on the thesis/dissertation defense, a graduate student has compared the experience with playing poker. The student puts all of his or her earnings in a last bet and risks losing all that was gained in the period (Bekkouche et al., 2022). This characteristic could contribute to elevating the relevance of worry to the understanding of the psychological distress of graduate students when compared to rumination.

Neuroticism explained 25% of the psychological distress in the sample. The Big Five consistently correlates with and predicts various variables and outcomes throughout an individual's lifespan (Atherton et al., 2021). Among these traits, neuroticism is the most significant predictor of mental and physical health outcomes. Individuals with elevated neuroticism levels experience psychological distress and exhibit a higher prevalence of psychopathological diagnoses than the general population (Lahey, 2009; Strickhouser et al., 2017). Neuroticism, a personality domain, pertains to reactivity, sensitivity to punishment, and a propensity toward negative emotions. Its evolutionary function within our species was to trigger defensive responses in situations of uncertainty, threat, and punishment (DeYoung, 2015). In a study of a representative sample of the Dutch population, Cuijpers et al. (2010) discovered that over 60% of the top 5% with the highest neuroticism had a psychopathological diagnosis. Moreover, the top 25% with the highest neuroticism accounted for 80% of the total mental health expenditure. Consequently, it is anticipated that neuroticism would be a significant predictor variable in models of mental ill health. Unlike worry and rumination, neuroticism is a personality trait and a more stable characteristic. Potentially, this could make it less susceptible to rapid change due to specific stressors of

the graduate environment and therefore help explain the bigger comparative relevance of worry for the psychological distress of graduate students.

In the current study, PC accounted for 25% of psychological distress among graduate students, while PS accounted for a mere negative .05%. This disparity between the two dimensions of perfectionism aligns with our hypothesis and corroborates existing literature, which identifies PC as a more potent predictor of psychopathology and symptomatology, barring eating disorders where both dimensions hold equal significance (Limburg et al., 2017). This holds even when controlling for neuroticism (Smith et al., 2016, 2017). These findings underscore the significant role of perfectionism, particularly PC, in the mental health of graduate students and its heightened relevance compared to repetitive negative thinking. We propose four primary reasons to explain this.

First, perfectionism could be increased by the frequent criticism and pressure that characterize the graduate education environment, contributing to increased distress (Bekkouche et al., 2022). Second, Dalglish et al. (2020) contend that one of the five current challenges in the field is to focus not solely on the frequency of relevant psychological processes but also on their content. They argue that in certain situations, the content could be a more significant predictor of distress and could be crucial to understanding the emergence of psychopathologies. Third, Morris and Mansell (2018) propose that the rigidity or flexibility one engages in these transdiagnostic processes may determine their association strength with psychopathology. Perfectionism, a personality trait, aligns with both proposals. Individuals with high levels of perfectionism often base their self-worth on achievements and view them through the lens of high and rigid

performance standards, which aligns with Morris and Mansell's (2018) proposal. When individuals perceive that they have not met the standard, they tend to engage in harsh self-criticism. This criticism is not only seen as indicative of a specific failure but also as a reflection of the individual's overall failure, which aligns with Dalglish et al.'s (2020) proposal. The fourth point is based on research indicating that graduate students frequently report feelings of isolation. Flett and Hewitt (2020a) suggest that increased frustration in interpersonal needs may contribute to higher levels of perfectionism.

One question raised by the influence of perfectionism in the psychological distress of graduate students is its relation with other relevant factors. Bekkouche et al. (2022) explored the issue of variables that impact graduate students mental health utilizing a literary review and produced a model with systemic factors that can help answer the aforementioned question. The authors organized the found explanatory variables in four systemic factors and perfectionism can be associated with two of them: The Academic System, which encompasses the general academic practices and expectations such as the reception of new students, and The Socioeconomic System, which encompasses the general socio, economic and cultural context. While presenting these factors, Bekkouche et al. (2022, p. 7) highlight the "constant criticism of academic culture" and the "pressure to perform" (Bekkouche et al., 2022, p. 16), respectively, which are causes of higher perfectionism levels (Flett & Hewitt, 2020a). Additionally, Curran and Hill (2019, p. 412) have shown that perfectionism levels have increased in the last decades and propose three cultural changes that could help explain this phenomenon "(a) the emergence of neoliberalism and competitive individualism, (b) the rise of the doctrine of meritocracy, and (c) increasingly anxious and controlling parental practices." The first is explicitly mentioned by Bekkouche et al. (2022) in The Socioeconomic System and the other two, as predictors of higher perfectionism levels, could be included in this factor. The other two factors are The Organizational System, which encompasses the function and characteristics of the institutions and departments, and The Lab and Cohort System, that encompass the influence of networking, the relation with the supervisor and the culture of academic structures such as the lab and research groups. Models like these can help understand the role of perfectionism in the bigger context of the mental health crisis in graduate education: while interventions directed at preventing and reducing perfectionism levels in the individual and group levels have the potential to improve the mental health of the students, it cannot be argued as a solution, even in short term, to the crisis itself. Nonetheless, given the urgency implied in the context of a mental health crisis, the identification of relevant factors with associated effective interventions, such as perfectionism, can signal an important initial path.

This study presents a few limitations. One is that data collection occurred during the COVID-19 pandemic. Longitudinal studies indicate that the pandemic contributed to heightened

psychological distress in the general population (Robinson et al., 2022) and among graduate students (Liu et al., 2022; Mansur-Alves et al., 2021). Moreover, research suggests a correlation between perfectionism and increased distress during the pandemic (Pereira et al., 2022), including among graduate students (Bogardus et al., 2022). This correlation suggests that the pandemic may have amplified the association between perfectionism and distress among graduate students. The pandemic also presented graduate students with unique challenges, particularly in the early stages. These challenges included the inability to collect data, frequent use of laboratories and university resources, and overall uncertainty about their research and future careers, potentially heightening their distress perception. Flett and Hewitt (2020b) also propose that individuals with high perfectionism levels may have experienced increased distress during the pandemic due to their perfectionistic tendencies. Another limitation is the different distribution of female participants in the sample (70.7%) when compared with the actual number of female Brazilian graduate students at the time (54,21%) (Plataforma Sucupira, c2022). Although results are inconsistent, some research suggests men and women slightly differ in their levels of perfectionism in different life areas (Hibbard & Walton, 2014; Sherry et al., 2015; Stoeber & Stoeber, 2009).

The escalating mental health crisis in graduate education poses a potential risk to the broader scientific and technological enterprise. Graduate students, as future lead researchers and mentors to the next generation of scientists, are pivotal in this sector. The millions of lives saved through the swift development of effective vaccines during the COVID-19 pandemic underscored the significance of the scientific and technological enterprise for our species' survival and prosperity. Consequently, the deteriorating mental health of this demographic amplifies the societal importance of research into its causes and related factors. Such studies can guide the design, execution, and evaluation of preventive and intervention strategies (Emmelkamp et al., 2014; Haslbeck et al., 2022).

CONCLUSION

Perfectionism significantly contributes to the psychological distress experienced by graduate students, suggesting its importance in devising intervention strategies. Existing intervention programs and protocols designed to address perfectionism and effectively alleviate related symptoms in adults are available for interested parties and institutions. These can be implemented face-to-face and online (Suh et al., 2019). Future research should incorporate perfectionism when developing and evaluating interventions. Additionally, longitudinal studies should explore the causal relationships between worry, neuroticism, perfectionism, and psychological distress among graduate students. This study also adds to the literature on perfectionism by providing insight and data from a

large sample on how perfectionism presents in less frequently studied populations, namely South Americans and graduate students. (Flett & Hewitt, 2020b; Smith et al., 2022)

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