




Prevalence and Correlations Between ADHD and Burnout Dimensions in Brazilian University Students

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Abstract: This study aimed to verify the prevalence of Attention Deficit Hyperactivity Disorder (ADHD) and Burnout Syndrome and the potential correlations between the dimensions of both conditions among Brazilian college students. A total of 751 students participated; 71.9% were women, aged 23 on average ($SD = 3.46$). The instruments included a sociodemographic questionnaire, the Adult Self-Report Scale (ASRS-18), and the Maslach Burnout Scale for Students (MBI-SS). Regarding the sex variable, men scored lower for emotional exhaustion and higher for professional achievement. The inattention facet of ADHD was positively correlated with the emotional exhaustion and depersonalization dimension and negatively correlated with professional achievement, suggesting a connection between the disorder and the syndrome. This study is expected to contribute to the development of preventive programs and intervention protocols especially designed to promote the mental health of students attending public and private educational institutions and experiencing academic burnout.

Keywords: college environment, higher education, occupational stress, attention deficit disorder with hyperactivity

Prevalência e Correlações entre TDAH e Dimensões de Burnout em Universitários Brasileiros

Resumo: O objetivo desta pesquisa foi verificar a prevalência do Transtorno de Déficit de Atenção e Hiperatividade (TDAH) e síndrome de Burnout e as possíveis correlações entre suas dimensões em universitários brasileiros. Participaram 751 estudantes, 71,9% do sexo feminino e idade média 23 anos ($DP = 3,46$). Os instrumentos foram um Questionário sociodemográfico, a *Adult Self-Report Scale* (ASRS-18) e a Escala de Burnout de Maslach para Estudantes (MBI-SS). Quanto a variável sexo, o masculino apresentou menores pontuações para exaustão emocional e maiores para eficácia profissional. A faceta desatenção do TDAH apresentou correlações positivas com as dimensões exaustão emocional e descrença e correlações negativas com eficácia profissional, configurando entrelaçamentos do transtorno com a síndrome. O estudo pode contribuir para a elaboração de programas de prevenção e protocolos de intervenção especialmente para o burnout acadêmico em instituições de ensino públicas e privadas que favoreçam a saúde mental dos estudantes.

Palavras-chave: ambiente universitário, ensino superior, stress ocupacional, transtorno do deficit de atenção com hiperatividade

Prevalencia y Correlaciones entre las Dimensiones TDAH y Burnout en Universitarios Brasileños

Resumen: El objetivo deste estudio fue verificar la prevalencia del Trastorno por Déficit de Atención e Hiperactividad (TDAH) y del Síndrome de Burnout y las posibles correlaciones entre sus dimensiones en estudiantes universitarios brasileños. Participaron 751 estudiantes, 71,9% eran mujeres y la edad media 23 años ($DE = 3,46$). Los instrumentos fueron un cuestionario sociodemográfico, la Escala de Autoinforme de Adult (ASRS-18) y la Escala de Burnout para Estudiantes de Maslach (MBI-SS). En cuanto a la variable género, los varones obtuvieron puntuaciones más bajas en agotamiento emocional y más altas en eficacia profesional. La faceta inatención del TDAH mostró correlaciones positivas con las dimensiones agotamiento emocional e incredulidad y negativas con eficacia profesional, configurando entrelazamiento del trastorno con el síndrome. El estudio puede contribuir al desarrollo de programas de prevención y protocolos de intervención, especialmente para burnout académico en instituciones educativas públicas y privadas, que promuevan salud mental de los estudiantes.

Palabras clave: ambiente universitario, educación superior, estres ocupacional, trastorno por de éficit de atención e hiperactividad

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Attention Deficit Hyperactivity Disorder - ADHD is a condition investigated in the school context, considering its potential to interfere with students' academic performance and psychological well-being at the most varied levels

of education (Thapar & Cooper, 2016). ADHD has been identified as one of the primary reasons leading college students to seek specialized health services (Miyasaka & Nomura, 2022).

In addition to cognitive dysregulation, emotional dysregulation stands out in ADHD; 50% to 70% of children, young people, and adults with ADHD deal with deficient emotional self-regulation (Shaw et al., 2014). Hypothalamic-pituitary-adrenal axis dysregulation seems to play an important role in the pathophysiology of emotional regulation, as indicated by studies exploring this association, which found lower cortisol levels among individuals with ADHD (Corominas-Roso et al., 2015; Kamradt et al., 2018).

ADHD is a disorder characterized by age-inappropriate hyperactive behaviors, impulsivity, inattention, and disorganization in a wide range of tasks and contexts (Thapar & Cooper, 2016). Students with ADHD in Higher Education may present some changes in their mental health. The longitudinal study conducted by Miyasaka and Nomura (2022) addressing Japanese students with ADHD identified that students diagnosed with ADHD presented more symptoms of mental disorders throughout their academic training; such symptoms were even more frequent among students manifesting predominantly hyperactivity and impulsivity (Miyasaka & Nomura, 2022).

The main characteristics reported by Green and Rabiner (2012) include students with ADHD having to read a text repeatedly, finding it challenge finishing tests, working extra hours to obtain good grades, and scoring lower than their peers in aspects related to adaptation to the academic environment, motivation, effort, performance, and also experiencing low satisfaction levels with the educational environment (Green & Rabiner, 2012). From a psychosocial point of view, students with ADHD experience more significant emotional distress, low self-esteem, self-demand, procrastinate more frequently, and face more significant psychological difficulties than those faced by other students (Green & Rabiner, 2012).

A cross-sectional study investigated the prevalence of ADHD in college students using the ASRS-18. It addressed 980 students and found that 10.1% had sufficient symptoms to be assessed individually on a case-by-case basis. Of these, those who decided to continue the investigation participated in a re-evaluation, from which 48 students remained; only one had already been diagnosed by a health professional. The students with ADHD presented significantly more illnesses, academic failures, legal problems, suicide attempts, and greater Internet use. On the psychological spectrum, they frequently presented depressive or anxiety disorders, especially personality disorder symptoms (Kavakci et al., 2012).

The prevalence of college students with ADHD is estimated to range from 2% to 8%. This group's mean grades in tests are one standard deviation lower than those obtained by students without an ADHD diagnosis. Regarding academic success, students with ADHD rated their performance as not sufficient to achieve their goals (Green & Rabiner, 2012);

at the same time, the incidence of Burnout syndrome among college students ranges from 2.5% to 57.2% (Lima et al., 2022; Moura et al., 2019).

Similar to ADHD, Burnout symptoms in the academic context may interfere with the health of college students (Osorio Guzmán et al., 2020). The symptoms of burnout syndrome may differ according to gender (Osorio Guzmán et al., 2020), the year of the program, the study routine, and the field of knowledge. For example, in the health field, nursing and medicine students are considered a high-risk population (Osorio Guzmán et al., 2020; Lima et al., 2022).

Maslach and Jackson defined Burnout in the 1980s as a process that causes an individual's adaptive ability to collapse when in a work environment or when occupational-related stress exceeds one's adaptive levels without implementing effective coping strategies. Burnout has three dimensions: the first is characterized as emotional exhaustion, the second refers to depersonalization, and the third is reduced professional achievement (Vasconcelos et al., 2020).

Burnout syndrome was first listed as a disease in the 11th edition of the International Classification of Diseases - ICD-11 (World Health Organization [WHO], 2023) in 2022 and has not yet been identified in the 5th and current edition of the Diagnostic and Statistical Manual of Mental Disorders – DSM-V (American Psychiatric Association [APA], 2014).

Originally described as a process that would only occur in workplaces, Burnout syndrome has been identified and assessed in other contexts, such as the academic environment. Burnout in a college environment is classified as School Burnout or Academic Burnout and may emerge when a student enters an undergraduate program. As the educational journey is a period in which students receive training and seek improvement for professional practice, they may experience difficulties, sensations, or perceptions that affect engagement, motivation, and student performance (Usán Supervía & Salavera Bordás, 2020; Vasconcelos et al., 2020).

Furthermore, achieving academic success and meeting academic demands depend on the college student's effort and commitment. Prolonged stressful situations in the school environment may lead to a loss of interest, interfere with commitment, and raise students' doubts regarding their ability to manage academic demands. Higher education institutions can contribute to students' academic adaptation, especially in the initial years (Soares et al., 2024; Usán Supervía & Salavera Bordás, 2020; Vasconcelos et al., 2020).

The dimensions of Burnout syndrome in the academic context are emotional exhaustion, described as a feeling of fatigue caused by intense academic demands; cynicism manifested through escape behaviors, such as distancing oneself from educational activities; and the professional effectiveness dimension, when students perceive themselves to be incompetent (Vasconcelos et al., 2020).

Regarding the potential association between Burnout and ADHD, Higuchi et al. (2016) identified that when the participants scored high in ADHD symptoms, they also scored high for the Burnout syndrome. The previous authors

also described that personality traits associated with ADHD symptoms may increase the risk of developing Burnout syndrome (Higuchi et al., 2016).

Studies seldom investigate interfering factors and potential interventions to deal with Burnout syndrome and ADHD in a university context. Such studies are important to identify these conditions and enable educational institutions to implement academic support and prevent other clinical conditions related to mood disorders, such as depression and anxiety, to which these students may be susceptible (Miyasaka & Nomura, 2022).

Academic performance is a determining goal in university education, resulting from independent, cognitive, and psychosocial factors. Burnout syndrome and ADHD are believed to negatively impact performance; hence, students with symptoms associated with Burnout or ADHD generally perform worse during undergraduate studies. Thus, educational institutions can promote the conditions and implement strategies during academic activities to minimize potential impacts on undergraduates' performance (Gong et al., 2023).

Considering that Burnout syndrome and ADHD are described as potential conditions interfering with academic performance, mental health, and engagement, but no studies were found in the Brazilian context correlating both conditions, studies investigating the associations between Burnout and ADHD are relevant. Based on the references and questions presented earlier, a quantitative survey with a cross-sectional approach was conducted to identify the prevalence of Attention Deficit Hyperactivity Disorder (ADHD) and Burnout syndrome and the potential correlations between their dimensions among Brazilian undergraduates.

Method

Participants

A total of 751 students participated in this study; most were women, $n = 540$ (71.9%), aged 23 ($SD = 3.46$) on average. Regarding sociodemographic data, 715 (95.2%) reported they had no children, 607 (80.82%) had not failed nor were about to retake exams, 471 (62.71%) were enrolled in a public university, and 280 (37.28%) in a private institution. The participants' knowledge field was classified according to two large groups: 59.52% ($N = 447$) were enrolled in programs in the Health field (i.e., Biomedicine, Biology, Physical Education, Aesthetics, and Cosmetics, Pharmacy, Biochemistry, Physiotherapy, Speech Therapy, Gerontology, Medicine, Nutrition, Psychology, Radiology, Dentistry, or Nursing), and 40.47% (304) were enrolled in other knowledge fields (i.e., Zootechnics, Tourism, Information System, Social Work, International Relations, Chemistry, Advertising and Marketing, Pedagogy, Music, Fashion, Veterinary Medicine, Mathematics, Letters, Journalism, Hospitality, History, Geology, Geography, Gastronomy, Physics, Philosophy, Statistics, Engineering, Economy, Law, Design, Industrial

design, Dance, Computer Sciences, Accounting, Cinema and Audiovisual, Social Sciences, Astronomy, Visual Arts, Performing Arts, Architecture and Urbanism, Archeology, Anthropology, Systems Analysis and Development, or Business Administration). Regarding the year the students were attending, 174 (21.83%) were attending the first year, 131 (17.43%) the second year, 154 (20.49%) the third year, 139 (18.5%) the fourth year, 103 (13.7%) the fifth year, and a smaller portion, 60 students (7.98%), were attending the sixth year. The largest portion of students was in intermediate years. Note that only medicine lasts 6 years; the other programs require 4 to 5 years to complete.

Instruments

Sociodemographic questionnaire: developed for this study, consisting of two sets of questions: (1) Personal data: gender, age group, marital status, religion, and children; (2) Professional Data: Academic semester, macro-region where the university is located; and (3) Health information, such as medication in use and healthy lifestyle.

Adult Self-Report Scale (ASRS-18): Brazilian version (Mattos et al., 2006) – Scale assessing inattention, hyperactivity, and impulsivity, ADHD's main symptoms. Its answers are scored based on the frequency with which symptoms occur daily. It comprises two dimensions: inattention and hyperactivity/impulsivity. The scores in each dimension range from 0 to 36. Higher scores indicate a more significant number of symptoms. The scale's reliability is greater than 0.920; scores equal to or greater than 21 in any of the two dimensions correctly identify 94% of adults with ADHD compared to typical controls.

Maslach Burnout Inventory for Students (MBI-SS) was developed by Maslach and Jackson in 1981. It is rated on a seven-point Likert scale, ranging from 0 "never" to 6 "every day". It assesses Burnout indicators with scores in 3 dimensions: emotional exhaustion, depersonalization, and professional achievement. A participant must simultaneously score below the 33% percentile in professional achievement and above the 66% percentile in the other dimensions to be considered to have the condition. It is a valid and reliable scale in the different contexts in which the syndrome has been studied. Studies have already shown that the Brazilian version of the MBI-SS presents the requirements regarding internal consistency and factor validity to be widely used in assessing Burnout Syndrome among university students (Campos & Maroco, 2012).

Procedure

Data collection. Data were collected online using the Snowball dissemination strategy. An online form (Google Forms) was generated, and the link was published on social media. The participants first completed a free and informed consent form and then answered the ASRS-18, MBI-SS, and sociodemographic questionnaire. Data were collected between November and December 2021.

Data analysis. Data analysis included descriptive statistics and two latent variable models constructed using structural equation modeling, the measurement model, and the structure model. The Weighted Least Squares Mean and Variance Adjusted (WLSMV) was the estimation method adopted because it is suitable for categorical variables (Muthén & Muthén, 2017).

The adjustment indices used were χ^2 ; χ^2/df ; Comparative Fit Index (CFI); Tucker-Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA). The models are considered adequate when: χ^2 is not statistically significant, χ^2/df must be less than 5, CFI and TLI greater than 0.90, and the RMSEA must be less than 0.08 and the upper limit of its confidence interval < 0.10 (Brown, 2015).

Ethical Considerations

Data collection was initiated after authorization was provided by the Institutional Review Board at the Universidade do Oeste Paulista (CAAE: No. 46378021.6.0000.5515). The Snowball strategy was adopted, and only those who agreed to the free and informed consent form were included in the analysis.

Table 2

Adjustment indices

Measure	χ^2	χ^2/df	CFI	TLI	RMSEA (90%CI)
ASRS-18	715.514*	5.339	0.941	0.933	0.076 (0.071 - 0.082)
MBI-SS	318.747*	6.249	0.972	0.964	0.084 (0.075 - 0.093)

Note: χ^2 = Chi-square; df = Degrees of freedom; CFI = Comparative Fit Index; TLI = Tucker Lewis Index; RMSEA = Root Mean Square Error of Approximation. * $p < 0,05$.

The CFI and TLI are acceptable for both scales. The RMSEA is borderline only for the MBI-SS. Still, the upper limit of its confidence interval (90%) is acceptable for both questionnaires, and χ^2/df is also close to their maximum value, 5. Regarding the Structure Model, the ADHD latent variables (Inattention and Hyperactivity)

Table 3

Modification indices proposed for the model

Latent variable (TDAH)	Latent variable Burnout	Modification indices	Expected parameter change
Inattention	Depersonalization	142.839	0.616
	Professional Achievement	108.852	0.723
	Emotional Exhaustion	73.921	0.442
Hyperactivity	Depersonalization	58.363	0.396
	Emotional Exhaustion	55.743	0.381
	Professional Achievement	47.334	0.470

Results

The first analysis concerns the participants' scores on scales assessing burnout (MBI-SS) and attention deficit hyperactivity disorder (ASRS-18). Table 1 presents the means and Standard Deviations for inattention and hyperactivity symptoms and Burnout dimensions, i.e., emotional exhaustion, depersonalization, and professional fulfillment.

Table 1

Instruments' mean and standard deviations

	Mean	SD
Attention Deficit	24.160	7.728
Hyperactivity	20.652	7.115
Emotional Exhaustion	19.664	6.999
Depersonalization	12.647	6.304
Professional Achievement	20.462	6.619

The following analysis refers to the measurement model; Table 2 presents the scales' (ASRS-18 and MBI-SS) adjustment indices.

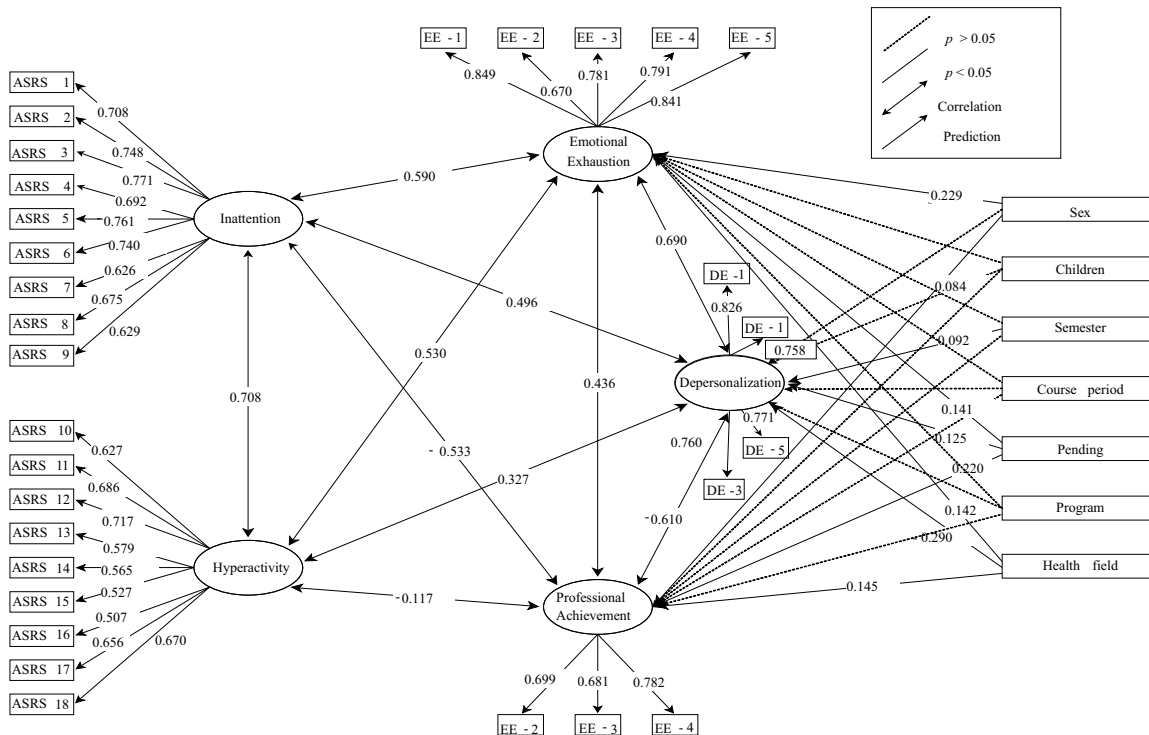
were first tested as independent variables for the latent variables of Burnout syndrome (Emotional Exhaustion, Depersonalization, and Professional Achievement); however, the modification indices of this model indicated an improvement in the fit indices when a correlation relationship was established between these latent variables (Table 3).

The inattention facet of ADHD showed positive correlations with the facets of emotional exhaustion ($r^2 = 0.590$, $p < 0.001$) and depersonalization ($r^2 = 0.496$, $p < 0.001$) and negative correlations with professional effectiveness ($r^2 = -0.117$, $p < 0.001$). Synergistically, the same occurs for the inattention facet ($r^2_{\text{Emotional Exhaustion}} = 0.496$, $r^2_{\text{Depersonalization}} = 0.327$, $r^2_{\text{Professional achievement}} = -0.117$, $p < 0.001$), indicating this disorder and syndrome are somewhat closely related.

Structural equation modeling was performed in the third analysis, though this procedure indicated a

modification of the relationships between the latent variables, from prediction to correlation; the fit indices did not change: $\chi^2 = 1546.890$; $\chi^2/df = 2.531$; CFI = 0.946; TLI = 0.961, and RMSEA (90%CI) = 0.045 (0.042 – 0.048). The results concerning the sociodemographic variables, the Attention Deficit Hyperactivity Disorder (inattention and hyperactivity) symptoms, and the Burnout dimensions (emotional exhaustion, depersonalization, and professional achievement) are presented in Figure 1.

Figure 1
Structural model, ADHD and Burnout Syndrome



Note. Standardized values.

The study measures, ASRS-18 and MBI-SS, are acceptable, considering most of the fit indices adopted in this study, CFI, TLI, and RMSEA Upper Limit (90%CI). Even though the raw RMSEA value is frequently used, it usually generates contradictory values compared to the CFI and TLI. Additionally, its cutoff points are arbitrary (Lai & Green, 2016); hence, it would not be configured as a parameter that defines the measures as being of poor quality, and their values in the current study are close to the proposed cutoff points. Regarding whether adopting the model suggested by the adjustment indices, the “D” criterion the DSM-V established for diagnosing ADHD was taken into account; i.e., ADHD symptoms must be dissociated from other disorders (Mattos et al., 2006).

In this study, the variables “children” and “course period” were not statistically significant predictors ($p > 0.05$) for the facets of Burnout, two characteristics that could be associated with overload and stress but which did not impact the syndrome

in this sample. The participants in more advanced semesters scored higher in the depersonalization facet ($\beta = 0.092$).

The results were ambiguous for sex. Male students scored lower in emotional exhaustion ($\beta = -0.229$, $p < 0.05$) and higher in professional achievement ($\beta = -0.229$, $p < 0.05$). The Variable concerning course failure was a statistically significant predictor ($p < 0.01$) for the three facets of Burnout ($\beta_{\text{Emotional exhaustion}} = 0.141$, $\beta_{\text{Depersonalization}} = 0.125$, and $\beta_{\text{Professional Achievement}} = -0.220$). This study’s results do not allow for accurately stating whether the relationship between Burnout and course failure is a cause or consequence, which constitutes a limitation. Finally, the health field variable, a classic predictor of Burnout syndrome, also presented an ambiguous relationship with the facets of the MBI inventory. The health field students showed a higher latent trait for emotional exhaustion ($\beta = 0.142$, $p < 0.05$) and professional achievement ($\beta = 0.145$, $p < 0.05$) and lower latent trait for depersonalization ($\beta = -0.290$, $p < 0.05$).

Discussion

The model analysis presented in Table 1 reveals that the students obtained higher mean scores for inattention than hyperactivity symptoms. These results corroborate Silva et al. (2022), in which 559 college students answered a sociodemographic questionnaire and the ASRS-18. Their results showed that most college students with ADHD presented a predominantly inattentive profile. Note that the current understanding of ADHD is that the intensity and symptoms vary among those diagnosed with the disorder; hence, this disorder occurs in a spectrum and is better approached from a continuous rather than categorical perspective.

Regarding the dimensions of Burnout, Table 1 indicates higher mean scores for emotional exhaustion, which is a prolonged feeling of being emotionally fatigued. Emotional exhaustion suggests impairments in a student's health. These findings corroborate the study by Lima et al. (2022), which identified 31.2% with signs of this syndrome, 30% at high risk, and 22% at low risk of experiencing Burnout (Lima et al., 2022). Additionally, the Peruvian study conducted in medical schools identified similar results among 165 participants; approximately 34% of the students from each year of the medical program presented Burnout syndrome (Chacaltana Linares & Rojas Cama, 2019).

Taking into account that ADHD and Burnout are related to cognitive and emotional functioning, the correlations found in the analysis of data from the latent variables suggest that people with ADHD who find it challenging to concentrate, manage, and organize their studies feel more stressed and are more susceptible to the development of burnout syndrome; thus, the relevance of adopting preventive and supportive strategies.

The Korean cross-sectional study by Bae et al. (2019) also presented similar results. The authors used similar instruments (Korean Adult Attention-Deficit/Hyperactivity Disorder Scale; Maslach Burnout Inventory) to assess 511 students and found significant results and a positive coefficient between the levels of Burnout syndrome and ADHD ($r = 0.368$, $p < 0.01$). Therefore, higher levels of Burnout correlated with higher levels of ADHD, and according to Cohen, the effect size for this study is considered intermediate (Bae et al., 2019).

Therefore, a correlation between the latent variables is plausible, considering that an individual with Burnout in the academic context may present symptoms of compromised attention due to physical and psychological exhaustion, fatigue, and lack of motivation and engagement. Mindfulness can contribute to improving Burnout symptoms among college students. In this sense, Yang et al. (2023) assessed the relationship between mindfulness, future prospects, and burnout among college students. They found that increasing levels of mindfulness and time management awareness, positive emotional experiences, better planning, and future prospects could decrease psychological exhaustion (Yang et al., 2023).

Among the sociodemographic variables, students attending more advanced semesters presented higher rates of depersonalization ($\beta = 0.092$), which may suggest demotivation, lack of confidence, and even loss of interest after the program's initial stages. These rates may also indicate dissatisfaction with the educational process or institution, impacting academic performance and professional prospects.

A Spanish cohort study assessed medical students throughout the program and found a similar prevalence; 34.2% scored in depersonalization. Furthermore, the students scored increasingly higher in all dimensions of the MBI inventory throughout the semesters. Note that the scores remained high over long periods and did not recede. None of the sociodemographic variables significantly influenced the scale or its dimensions (Amor et al., 2020).

The scores obtained in the sex and health field variables are not commonly found. Likewise, an international survey conducted with 166 nursing students, 142 women and 24 men attending Nursing Schools in Northern Spain, showed that sex did not show a significant difference in any dimension of Burnout syndrome (Manzano-García et al., 2017). Burnout syndrome is mainly recognized by its high prevalence among healthcare professionals and students. Previous studies identified that 14.8% to 79.9% of medical students experienced Burnout symptoms. In Brazil, the incidence in this group is between 40% and 76% (Hauck & Gabbard, 2019).

Admission to higher education may require psychological resources, social skills, and support so students can adjust. Students attending programs in the health field, such as medicine, have the same or a better mental health profile at the time of entering university than those enrolled in other undergraduate programs; however, they may start showing a different mental health profile as they advance in the program, with female students being more susceptible to experiencing symptoms of Burnout syndrome (Soares et al., 2024).

This study's results show that Attention Deficit Hyperactivity Disorder (ADHD) and Burnout syndrome can simultaneously affect a person, which is confirmed among college students. Nevertheless, the diagnosis of ADHD requires caution, as burnout symptoms are correlated with inattention and hyperactivity. Thus, a diagnosis of exclusion is needed.

Further studies are needed to address undergraduate students from different knowledge fields, as the students addressed here were predominantly from the health field. Likewise, potential associations between ADHD and other variables such as personality traits, resilience, and university teaching methodologies should be analyzed.

Furthermore, there are no Brazilian studies correlating both conditions; therefore, this study is relevant because both processes can cause individuals to face difficulties during their undergraduate education; students with ADHD are more susceptible to mental disorders throughout their academic life. Another suggestion for future studies is to analyze the impact of preventive programs and intervention protocols especially designed to provide care to the health

of students experiencing academic burnout attending public and private educational institutions.

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