

UNIVERSITY OF PÉCS
FACULTY OF HEALTH SCIENCES
DOCTORAL SCHOOL OF HEALTH SCIENCES
Head of Doctoral School: Prof. Dr. István Kiss
Programme Leader: Prof. Dr. L. Gábor Kovács
Supervisor: Dr. habil Orsolya Máté

The Effect of Burnout Syndrome on Graduate Students during the COVID-19
Pandemic

Ph.D. Thesis Booklet

Diego Micael Barreto Andrade

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Introduction

Higher education beyond a bachelor's degree is essential for personal growth, independent research career, financial stability, and societal progress. Graduate students, including those pursuing masters and doctoral degrees, play a vital role in academic research (OECD, 2015; Trennt & Euler, 2019). Yet, there is a rising concern about the mounting levels of chronic stress in the academic work environment, leading to negative physical and mental health effects, affecting graduate students in particular. Undertaking a masters and doctoral degree potentially significantly increase the risk of academic burnout (Bullock et al., 2017; Kay Devine & Hunter, 2016; Kusrkar et al., 2021; Nagy et al., 2019; Pappa et al., 2020; Salgado & Au-Yong-Oliveira, 2021).

Although the Burnout Syndrome has been mainly studied in the occupational field, it is increasingly being recognized in human services such as education research among students. Burnout is a psychological disorder that emerges in response to chronic emotional and interpersonal stressors in the workplace. It is characterized by three dimensions: emotional exhaustion, depersonalization, and reduced personal accomplishment (Christina Maslach & Jackson, 1981). Emotional exhaustion refers to the depletion of emotional resources due to feeling emotionally overextended, exhausted, and drained. Depersonalization refers to cynicism, which includes negative attitudes towards other people, such as colleagues, patients, or clients. Reduced personal accomplishment refers to decreased job satisfaction and feelings of competence and successful achievement (Koutsimani et al., 2019).

In the academic context, burnout can be caused by excessive and prolonged stress due to heavy academic workloads and demands, leading to a depletion of energy, reduced enthusiasm towards academic tasks, negative attitudes, and low academic achievement (Charkhabi et al., 2013).

Several studies have confirmed the academic burnout among graduate students. Moreover, it has been reported that graduate students are more likely to experience higher levels of stress when compared to undergraduate students and the general public (Gewin, 2021; Lee et al., 2021; K. Powell, 2017; Salari et al., 2020).

In two separate studies, it was discovered that approximately 75% of graduate students in their samples reported feeling stressed or highly stressed (Kernan et al., 2011; Oswalt & Riddock, 2007). Additionally, another study showed that 46% of graduate students experienced frequent or constant feelings of being overwhelmed (Hyun et al., 2006).

The impact of academic life in university students is already well known (Pasic et al., 2020). However, this situation further deteriorated during the COVID-19 pandemic. It is undeniable that the novel coronavirus, COVID-19, has placed science at the center of recent studies. The COVID-19 pandemic forced the confinement of people at home and implied the academic life of university students who had to create strategies to learn online due curfews, social distance, and quarantines (Kee, 2021; Liu et al., 2022; Marinoni et al., 2020; N. Yusuf, 2021).

Several studies already reported higher stress levels and burnout during the pandemic. A heavier workload, lack of clarity about the future, reduced chances for learning or career advancement, longer research time, interruption of funding or grants, insufficient support and guidance from supervisors, inadequate mentoring, decreased focus in online learning, and exhaustion were the most factors reported among graduate students (Al Mamun et al., 2021; Kusrkar et al., 2021; Sahu, 2020; Suart et al., 2021).

In the context presented above, the high pressure in graduate students eventually depletes emotional and mental resources, resulting in the detriment of mental health and academic burn-out. Based on these findings, it is clear that burnout is a serious problem, especially in the pandemic

context, and may negatively impact the meaning and value of the respective degree for the graduate student, with consequent mental health issues. Since there are no studies have been conducted in Hungary to assess academic burnout among graduate students during the recent COVID-19 pandemic, this necessitated our research. Additionally, considering that the physical environment of academia itself was restrained due to curfews, quarantines, restrictions on social interaction, and the switched to online learning, there is a critical research gap concerning academic burnout and its external factors that may also affect the graduate students.

In the context of the above, we hypothesized that the covid-19 pandemic has a negative impact in graduate student's burnout.

Objectives

We aim in this research to evaluate the effect of Burnout Syndrome in graduate students during the COVID-19.

Detailed objectives:

- Systematically review COVID-19 pandemic on academic burnout.
- Assess family functionality, perceived social support, and coping with burnout syndrome among graduate students during the COVID-19 pandemic.
- Explore the factors associated with burnout syndrome among graduate students during the COVID-19 pandemic.

STUDY 1

A systematic review of the COVID-19 pandemic on academic burnout

Methods

This review was prepared and is reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

Literature Search

A systematic search was conducted (February 2021) on full text studies published in PubMed, Web of Science and Scopus bibliographical online databases, using the combinations of the following three classes of keywords: "burnout-related" (burnout OR burn out OR exhaustion), "university students related" (student OR academic), and "covid-19 related" (covid OR sars cov 2). For each class of keywords was combined with the operator AND. To try to identify missing studies, a double checked the reference and gray literature search was also performed using the same keywords on Google Scholar.

Eligibility Criteria and Study Selection

To be included in the final review, (1) the articles had to be about burnout/exhaustion, (2) contained coronavirus pandemic (COVID-19), and (3) needed to be include any university student. Two reviewers independently screened the titles and abstracts according to these eligibility criteria. Studies that (a) duplicate publications, (b) reviews, perspectives, editorials, letters, opinion and commentaries, were excluded.

Data Extraction and Synthesis

Two investigators performed the literature search also independently extracted the data from included studies. Disagreements were resolved with a third investigator or by consensus. We extracted the following variables: Author, journal, year of publication, origin of the study, design,

sample, measure of Burnout/exhaustion, measure of determinants and instruments used, and results. Due to few articles found and also to the variety of measurement and design methods, statistical analyses used in the studies, and lack of necessary data, a meta-analysis was considered inappropriate, since discarding any studies could imply to the exclusion of relevant studies. To avoid that and, the “vote counting”, and to explore as much as possible the research found, a standardized index of convergence (SIC) was calculated according to a method of Wielenga-Meijer et al. (2010) in order to quantify the strength of evidence for the relationship between COVID-19 and main academic burnout factors among university students. The formula of SIC is

$$SIC = \frac{n (positive) - n (negative)}{n (total)}$$

with $n (positive)$ representing the number of studies reporting a significant positive relationship, $n (negative)$ representing the number of studies reporting a significant negative relationship, and $n (total)$ representing the total number of studies (including studies that did not find a significant association). SIC values can therefore range from -1 (all studies reported a negative relationship) to +1 (all studies reported a positive relationship). A SIC value close to zero means that the studies either did not find a significant relationship or report inconsistent results. However, this does not give any information regarding the strength of the evidence. The strength of evidence is either “strong”, “moderate”, “weak”, or “inconsistent”. Strong evidence indicates that the findings are consistent across many studies (e.g., many studies find a negative or positive effect).

Main Results

Terms initially searched a total of 119 articles. After we removed duplicates, checked the title and abstract, and reviewed full-text, eight studies eventually met the predetermined inclusion and exclusion criteria. All the articles were published between 2020 and 2021, three research were conducted in Spain, two in China, and the others in Cyprus, Switzerland and USA. Mostly of the studies were cross-sectional design, with medical students, and the Maslach Burnout Inventory was the most used for measure burnout.

From the eight studies, six found significant relationship between COVID-19 and academic burnout factors and the scores was used to determine the degree of consistency in the three outcomes found: Mental health, academic performance in online teaching and social support. The corresponding SIC value for overall burnout indicates a limited evidence for negative relationship with academic performance in online teaching. However inconsistent evidence or no/insufficient evidence was scored on the others outcome related to overall burnout and separating dimensions (emotional exhaustion, cynicism and self-efficacy), this happened due the few number of studies and lack of significant association in some articles, since according to (Wielenga-Meijer et al., 2010) at least three studies should be used to determine the degree of consistency.

Discussion

The aim of this contribution was to present the outcomes of the, to the best of our knowledge, first systematic review on the relationship between COVID-19 pandemic on the university student’s burnout. We found a limited evidence for a negative relationship between overall burnout and academic performance in online teaching. Although the others outcome showed no consistent/insufficient evidence the results brought important outcomes of the COVID-19 on mental health of university students, such development of anxiety and depression, and the importance of social support, especially from the university during the pandemic.

Even though online education came as a solution for university students in most universities around the world, a negative relationship was perceived between overall burnout and academic performance in online teaching, although as a limited evidence (Bolatov et al., 2020; Jiang, 2021; Moreno-Fernandez et al., 2020). This displays when academic burnout increases, the motivation levels decrease together with inability and uninterested to learning, impacting direct academic performance. Increase of cynicism/depersonalization burnout dimension was described by Aebischer et al. (2020) and Zis et al. (2021) in all of medical students that can impact in less enthusiastic and interesting on theirs studies.

Emotional exhaustion burnout was the most impacted burnout dimension cited by Reverté-Villarroya et al. (2021) and Zis et al. (2021) as an adverse effect on mental health of nursing and medical students, especially in their last year, due the uncertainty of qualifications and experiences. Both studies made a comparison between students before and after the COVID-19 pandemic. Reverté-Villarroya et al. (2021) suggest the emotional exhaustion as a significant factor to psychological distress, mainly in this pandemic situation that produced a loss of control sense on the students, and consequently difficulties with self-confidence and academic performance. Zis et al. (2021) similarly added that although the overall burnout prevalence did not differ significantly between the two periods studied, the burnout dimensions had an interesting result with emotional exhaustion decreasing significantly in year 4 but increasing in year 6, explained that in fourth years start the clinical training and end in the sixth year, whereby the students spend most of their time in daily workload. A correspondently lower levels of emotional exhaustion in frontline medical students in comparison with frontline residents was found by Aebischer et al. (2020) in a cross-sectional study, and explained the student's employments for a limited duration as a reason.

An overall burnout was compared by Bolatov et al. (2020) during traditional learning and online learning in medical students, and found a lower prevalence after the transition to an online learning. Nevertheless, they also set up the increase of the level of cynicism and the prevalence of colleague-related burnout dimension during online learning, explained by difficulties in communication and interpersonal relationships. The authors concluded that even with the COVID-19 pandemic, online learning had a positive impact on the mental health of the students.

Harries et al. (2021) reported increased anxiety and burnout at the same time that the students felt supported by the university. Even though the medical students felt that the university was doing everything to improve the teaching by online systems and daily communication updates, they felt the need for training to acquire experiences and prepare for residencies. That is because most students (61.3%) wanted the continuation of the practices even agreeing and accepting the risk of infection with COVID-19 (83.4%). This worries about the problems related to the impact of the COVID-19 in their practices and mainly on their future professional careers is possibly the reason for the anxiety and burnout increased.

Limitations and future directions

We believe that one strength of this systematic review is that the literature search and synthesis of evidence were well-structured. We had several limitations, first, there was a limited number of articles focus on academic burnout and COVID-19; second, the inability to quantitatively determine more and strong strength of evidence; and third, lack of significative association between COVID-19 and academic burnout factors. Based on these, we suggest that new studies be prepared that contemplate burnout academic and COVID-19 among university students, covering more factors such fear of virus infection, family support, physical exercise, academic requirements, life satisfaction, that may compromise their academic and later performance at work. In conclusion, our systematic review suggests that COVID-19 pandemic impacted the academic burnout.

However, it is necessary more articles to establish more positive or negative strength relationship, since we believe those factors that might contributes to a poor mental health in university students.

Conclusions

Confinement itself can impact students' academic performance, generating feelings of exhaustion, negative self-criticism and loss of interest, and triggering significant risks to the mental health of university students. The online teaching system adopted by the universities around the world is one of the solutions for the current situation can be a great impact in the students' academic life. Thus, the adoption of appropriate strategies by the universities with a common agreement between teaching staff and students, open communication, constant updates, motivational extracurricular activities, psychotherapy and counselling is extremely important to support the students and avoid the academic burnout.

STUDY 2

Academic Burnout, Family Functionality, Perceived Social Support and Coping among Graduate Students during the COVID-19 Pandemic

Methods

Study Design and Data Collection

This was a cross-sectional analytical study conducted via an online questionnaire administered between September 2021 and March 2022. The survey was distributed via the Google Forms platform in collaboration with international graduate student associations and university departments. Participants were recruited through emails, social media, and referrals. Informed consent was obtained from participants by clicking the 'I consent' button on the questionnaire's welcome page, with an estimated completion time of 15 minutes.

Participation was entirely anonymous and voluntary. The exact number of views on the online invitation and the participation rate could not be determined. A total of 542 students participated, with 519 graduate students meeting the inclusion criteria (master's or PhD/DLA level, fluency in English, and voluntary participation) after incomplete responses were excluded, resulting in a 95.75% completion rate.

Measures and Variables

The questionnaire used in this study consisted of four sections, namely Copenhagen Burnout Inventory—Student version (CBI-S) (Kristensen et al., 2005), Family APGAR Index (Family APGAR) (Gabriel Smilkstein, 1978), the brief form of the Perceived Social Support Questionnaire (F-SozU K-6) (Kliem et al., 2015; M. Lin et al., 2019) and the Brief Resilient Coping Scale (BRCS) (Sinclair & Wallston, 2004). All questionnaires have a psychometric content that quantitatively assessed traits linked to the psychological functioning of the evaluated individuals.

The CBI was developed by Kristensen et al., and adapted for students by Campos, Carlotto, and Maroco (Campos et al., 2013). This scale consists of 25 items that represent 4 subscales: Personal Burnout (PB), Studies-related Burnout (SRB), Colleague-related Burnout (CRB), and Teacher-related Burnout (TRB). It is a 5-point Likert scale, ranging from 1 (never) to 5 (always). The answers are quantified as 0, 25, 50, 75, and 100% respectively, with a reverse scoring for item 10. We used the Kristensen's criteria for burnout score: 50 to 74 is considered moderate, 75–99 is

high, and a score of 100 is considered severe burnout (Borritz et al., 2006). In the current study, the Cronbach's alpha for the CBI-S scale was 0.93, indicating good internal reliability.

The Family APGAR, consisting of five questions, was developed by Smilkstein (Gabriel Smilkstein, 1978) and has well-established reliability and validity. This scale evaluates a family member's perception of family functioning by assessing his/her level of satisfaction with each statement on a 3-point Likert scale, ranging from 0 (hardly ever) to 2 (almost always). The points from each item were calculated to obtain the total score. A higher score indicated better family functioning (Duarte, 2001; G Smilkstein et al., 1982). The Family APGAR scale has been widely used, with satisfactory reliability and validity (Shao et al., 2020; G Smilkstein et al., 1982). In the current study, Cronbach's alpha value was 0.87.

The brief version of F-SozU K-6, developed by Kliem et al. (Kliem et al., 2015), measures general perceived social support, rated on a 5-point scale ranging from 1 (not true at all) to 5 (very true). Higher scores indicate higher levels of perceived social support. The Brief Perceived Social Support Questionnaire has been widely used, with satisfactory reliability and validity (M. Lin et al., 2019). In the current study, Cronbach's alpha value was 0.86.

The BRCS was developed by Sinclair and Wallston (Sinclair & Wallston, 2004) and is a measurement tool that has been proven to measure resilience with adequate levels of reliability and validity. BRCS has a unidimensional outcome conceptualized to assess the ability to handle stress in a highly adaptive manner. It is a 4-item scale with five options, where 1 means the statement "does not describe me at all" and 5 means "it describes me very well". The sum score ranges from 4 to 20; the higher the score, the more resilient. The BRCS scale has been widely used, with satisfactory reliability and validity (Kocalevent et al., 2017). In the current study, Cronbach's alpha value was 0.78.

Statistical Analysis

We considered the potential influence of academic burnout on the loss of family functionality, social support, and coping while constructing the theoretical model. We used structural equations modeling (SEM) to identify the effect between the measurement scales of these variables (i.e., academic burnout and Family APGAR, social support and coping). SEM consists of analyzing trajectories, characterized by addressing the problems of dependence between variables. The proposed structural equation model included all observable variables directly and indirectly (i.e., latent variable). The measurement model (confirmatory factorial analysis) was performed for CBI as a latent variable, using each of the components of the instrument in question as indicators. The other variables were measured directly, and their relationships measured by multiple regressions. A *p*-value of 0.05 (two-tailed) was considered as statistically significant.

To assess the model fit, the root mean square error of approximation (RMSEA) was used. Values lower than 0.05 indicated adequate fit, with an upper limit of the 90% confidence interval lower than 0.08 (Kline, 2011); the comparative fit index (CFI) and the Tucker–Lewis index (TLI) with values above or equal to 0.95 indicated a good fit; and, the standardized root mean square residual (SRMR) with a value of less than 0.05, was considered a good fit (Kline, 2011; Wang & Wang, 2012).

Standardized coefficients (SC) were interpreted according to Kline (Kline, 2011), where an SC of 0.10 indicates a small effect, an SC of 0.30 indicates a medium effect, and an SC > 0.50 indicates a strong effect.

Mplus software, version 7 (Muthén & Muthén, Los Angeles, CA, United States) (Muthén & Muthén, 2017) was used for the statistical analysis. The estimation was performed using the mean-corrected Satorra–Bentler's maximum likelihood method (MLM), due to the absence of univariate and multivariate normality.

Main results

A total of 519 graduate students who participated in the study (365 women [70.30%]) with a mean age of 31 years (± 7.76) were evaluated. Overall, 292 (56.30%) were doctoral students enrolled in PhD or DLA programs and 227 (43.70%) were students studying at master's level. Of all graduate students, 360 (69.40%) were in the first and second year, 116 (22.40%) in the third and fourth year, and 43 (8.30%) in the fifth year or beyond of their degree.

The structural model proposed below (Figure 1) shows the totality of the proposed relationships. The standardized effects are presented in Table 1. The discriminant validity of the variables involved could be attested, since none of the correlations were greater than 0.9. Furthermore, it was found that the proposed model presented better indices of model adjustment: CFI = 0.98; TLI = 0.96; RMSEA (90% CI) = 0.049 (0.04–0.07); and SRMR = 0.02.

The measurement component analysis shows that the factor loadings (FC) were significant for the latent variable CBI (PB = 0.82; SRB = 0.80; CRB = 0.40; TRB = 0.50). Despite the CRB indicator being below the recommended cutoff (0.5), it was maintained in the model to respect the validated version of the proposed construct. It was then possible to provide evidence of the presence of a greater contribution of the PB and SRB indicators in the composition of the latent CBI (Table 1).

Table 1. Standardized coefficient (SC), 95% confidence interval (95%CI), and p-value of the structural equation model.

	SC	<i>p</i>	95%CI
Measurement model			
Personal burnout (PB) ← CBI-S	0.82	<0.01	0.64–0.99
Studies-related burnout (SRB) ← CBI-S	0.80	<0.01	0.64–0.96
Colleague-related burnout (CRB) ← CBI-S	0.40	<0.01	0.24–0.45
Teacher-related burnout (TRB) ← CBI-S	0.50	<0.01	0.33–0.55
Structural model			
Direct effect			
CBI-S ← Social Support	–0.12	<0.05	–0.21––0.02
CBI-S ← Coping	–0.26	<0.01	–0.37––0.18
CBI-S ← Family APGAR	–0.28	<0.01	–0.36––0.16
Coping ← Social Support	0.18	<0.01	0.09–0.26
Family APGAR ← Social Support	0.12	<0.01	0.04–0.20
Indirect effect			
CBI-S ← Coping ← Social Support	–0.05	<0.01	–0.07––0.02
CBI-S ← Family APGAR ← Social Support	–0.03	<0.05	–0.06––0.01

Note. CBI: Copenhagen Burnout Inventory-Student; PB: Personal Burnout; SRB: Studies-related Burnout; CRB: Colleague-related Burnout; TRB: Teacher-related Burnout.

The observation of the structural model (Figure 1) showed a moderate and negative direct effect of Family APGAR (–0.28) and coping (–0.26) on burnout measured by the CBI-S. Furthermore, a weak negative effect of social support (–0.12) on burnout was also found. These findings provide evidence that an increase in family functionality, coping, and social support can reduce burnout level.

Upon observing the indirect paths of effect, it was identified that the inverse relationship between social support and CBI-S was mediated by coping (–0.05) and Family APGAR (–0.03), even though this path had a small but statistically significant effect.

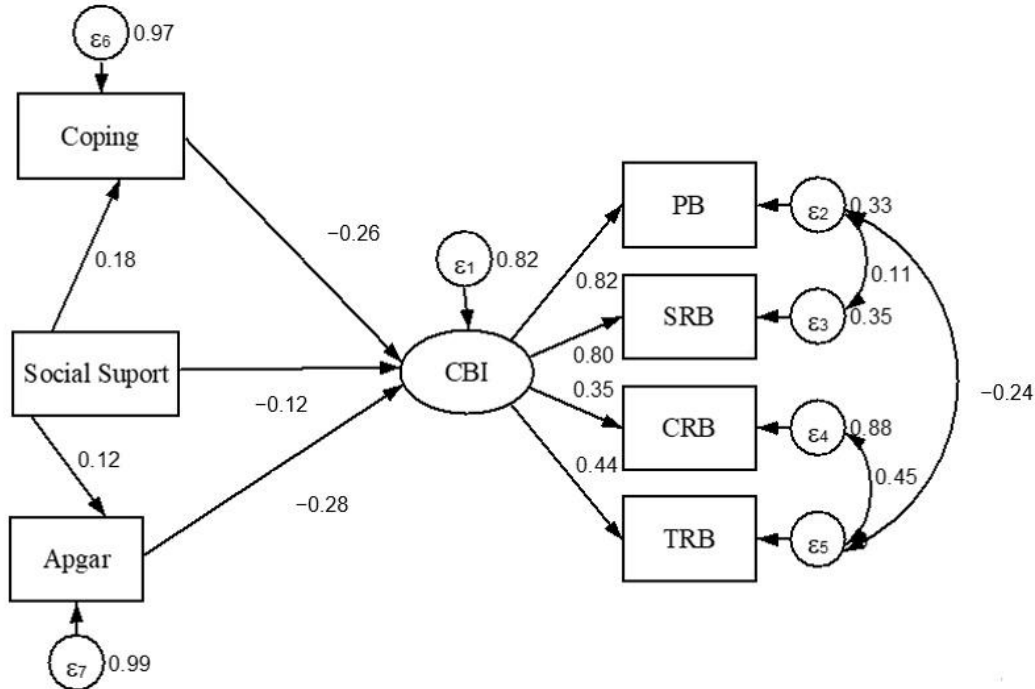


Figure 1. Visual representation of the structural model. CBI: Copenhagen Burnout Inventory-Student; PB: Personal Burnout; SRB: Studies-related Burnout; CRB: Colleague-related Burnout; TRB: Teacher-related Burnout.

Discussion

The current study discloses the influence of academic burnout on the mental health of graduate students by relating it to family functionality, perceived social support, and coping during the COVID-19 pandemic. We revealed a negative effect of family functionality, perceived social support, and coping on academic burnout. The opposite direction was also observed; the higher the family functionality, perceived social support and coping, the lower the academic burnout. Among the academic burnout dimensions, personal burnout and studies-related burnout were the ones that contributed most to the composition of the latent CBI-S.

We found a negative effect of family functionality on academic burnout as measured by the Family APGAR Index. This complex and dynamic relationship present in most families can be healthy and functional when the members live in harmony, and protects the integrity and the functional autonomy of the family system. Unhealthy and dysfunctional dynamics occur when there is a lack of compromise between the members. This is primarily caused by prioritizing interests that are detrimental to the other members (Dias, 2011; G Smilkstein et al., 1982).

Reports of the association between academic burnout and family functionality are limited (Szwako, 2013; Wu et al., 2022), and to the best of our knowledge, our study is the first to explore this relationship among graduate students during COVID-19. Graduate students have to deal with their work–life balance, especially between their academic life and their families. While pursuing a master’s or doctorate degree, a great workload with considerable productivity is expected, and this may contribute to family issues and expose the students to burnout (K. Powell, 2017; Stoliker & Lafreniere, 2015). The results of our study suggested that this finding also applied to graduate students during the COVID-19 pandemic.

Curfews, restricted traveling, and quarantines forced families to remain in their homes. Due to this social isolation and confinement, students experienced new demands in addition to their preexistent roles in the family, such as online learning, managing a home office, fear of being infected and exposing their family, financial concerns from funding/grant discontinuation, and many others. This resulted in exhaustion and family imbalance, which can sustain family cohesion and support the social network system or generate a family crisis by creating new difficulties, dissatisfaction, and violence in some cases, affecting all the family members (Fernandes et al., 2020; Johnson et al., 2020; Kusurkar et al., 2021; Reizer et al., 2020; Stuart et al., 2021). This association shows that the mandatory COVID-19 isolation forced families to spend more time together. This interaction may expose more family issues and problematic relationships, which can affect the family environment/functionality and further expose the graduate student to academic burnout.

The perceived social support in this study refers to the graduate student's overall impressions of others regarding their availability and effective help when the student is in need (Bagci, 2018). When this social network works, the help is usually offered by family members, friends, colleagues, supervisor, and teachers by either material resources and/or psychological support (Borup et al., 2020; Sheldon Cohen, 2004; Farajollahi & Moenikia, 2010). Social support, therefore, helps to regulate the stress itself, as well as the impact on the individual coping process, by providing a better way to deal with the issues (Thoits, 1995).

Social support has been shown to be negatively associated with academic burnout and correlated with low academic engagement and loneliness, even before the COVID-19 pandemic. The main social support predictors of burnout include insufficient support from supervisor/research community and especially from friends, low participation in extracurricular activities, and lack of leisure (Galdino et al., 2016; Peltonen et al., 2017; Singh et al., 2020); these factors were worse during the COVID-19 pandemic, when loneliness became more frequent and support from friends and the academic community shifted predominantly to online chats and meetings. In our finding, social support was the lowest in the construct. Social support from family members may have contributed to this, along with the use of social media to connect and communicate with others experiencing similar situations.

In line with other research, the reduction of social support in our study is linked with maladaptive coping strategies in stressful situations which directly affect the mental health of students and their study engagement and performance, all of which contribute to academic burnout (Barratt & Duran, 2021; Erschens et al., 2018; Karimi et al., 2014; Vizoso et al., 2019; Ye et al., 2021). Social support has a protective effect on academic burnout, since the perception of a good supportive network increases motivation and engagement in studies, and overall life satisfaction for the student (Dupont et al., 2015; Karimi et al., 2014). Perceived social support has been linked with good coping strategies that help students to develop resilience and perseverance to achieve their goals, allowing students to be less prone to stress and consequently protecting them from academic burnout (Alarcon et al., 2011; Barratt & Duran, 2021; Sheldon Cohen, 2004).

A functional family serves as a protective factor against academic burnout, and helps the student to develop proper autonomy and adequate problem-solving strategies. These may shape the student's resilience to deal with university demands, difficult issues and academic pressure (Hou & Liang, 2018; Wu et al., 2022).

Our finding, which contribute the PB and SRB dimensions to the composition of the latent CBI, are in agreement with the report data presented in previously published studies (Campos et al., 2013; Maroco & Campos, 2012). PB is related to the level of physical and psychological exhaustion experienced by the graduate student, and SRB is related to the level of physical and

psychological exhaustion perceived by the graduate student in association with the academic work and tasks (Kristensen et al., 2005). These dimensions provide a clear indication of burnout (Maroco & Campos, 2012). These findings show that the personal stressors and those related to study contribute directly to graduate student exhaustion and academic burnout.

As mentioned previously, our findings highlight the crucial role of family functionality, perceived social support, and coping in the mental health of graduate students as predictors of academic burnout, particularly in the context of the COVID-19 pandemic. Graduate students may benefit from this study by understanding the causes of particular behaviors related to academic burnout and by providing insight to higher education institutions on how to make improvements during online learning, especially in the midst of pandemics such as COVID-19.

Limitations and future directions

However, our study has some important limitations, including the cross-sectional design, which limited our ability to establish causality between the associations. To address this, future experiments or longitudinal studies may be more suitable. Furthermore, future researchers may consider the extension of this work by exploring other factors beyond academia that predict academic burnout. Additionally, the online assessment used to collect data during the COVID-19 outbreak may carry response bias, making them less reliable. Finally, the research was conducted during the COVID-19 pandemic and hence burnout levels may have been impacted by this. Therefore, we have used screening tools in this study and our findings should be interpreted carefully, since it is not a clinical psychiatric diagnostic instrument.

Conclusions

This study analyzed predictive factors outside of academia that significantly influenced the development of academic burnout among graduate students during the COVID-19 pandemic. These factors are family functionality, perceived social support, and coping. Low perceived social support and poor coping results in a negative impact on academic burnout for graduate students, especially in dysfunctional family settings. In a functional family, with the perception of strong social support, and appropriate coping, the opposite outcome is expected. We believe that these findings can offer patterns and predictors for future graduate students and higher education institutions to better identify external factors implicated in academic burnout, specifically in stressful settings such as a pandemic. It is important to mention that these adverse consequences are not only for graduate students but also a concern for academia, since mental issues directly impact the quality and quantity of research. We suggest that academia implements improvements to its institutional support in order to prevent academic burnout among graduate students.

STUDY 3

Academic Burnout among master and doctoral students during the COVID-19 pandemic

Methods

Study design and data collection

This is a cross-sectional analytical study. Data was collected through an online survey between September 2021 and March 2022. We tested a pilot of our preliminary instrument to ensure question clarity and confirm completion of the survey in approximately 15 minutes. Data collection was done by virtual distribution over the Google Forms platform, along close co-operation with

international associations of graduate students and university departments. The form was disseminated through emails and included an invitation to participate, social media channels from communities for graduate students, and by asking participants to pass along the survey link to other eligible participants. The survey was designed and carried out in accordance with the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) (Eysenbach, 2004).

Participation was entirely anonymous and voluntary. A total of 542 students participated, with 519 graduate students meeting the inclusion criteria (master's or PhD/DLA level, fluency in English, and voluntary participation) after incomplete responses were excluded, resulting in a 95.75% completion rate.

Measures

The dependent variable was academic burnout syndrome, which was evaluated through the Copenhagen Burnout Inventory – Student version (Kristensen et al., 2005). The CBI was developed by Kristensen et al. (2005), and adapted for students by Campos, Carlotto, and Maroco (2013). This scale consists of 25 items that represent 4 subscales: Personal Burnout (PB), Studies-related Burnout (SRB), Colleague-related Burnout (CRB), and Teacher-related Burnout (TRB). The answers are quantifying as 100, 75, 50, 25, and 0% respectively, with a reverse scoring for item 10. We used the Kristensen's criteria of burnout score, 50 to 74 is consider moderate, 75–99 is high, and a score of 100 consider as severe burnout (Borritz et al., 2006). In the current study, the Cronbach's alpha for the CBI-S scale was 0.93, indicating good internal reliability.

All the other selected variables were classified according to sociodemographic, academic and health status by self-reported answers.

- Sociodemographic variables: age, sex (male, female, prefer not to mention), marital status (single, married, other), education level (PhD/DLA, master's), and origin country (Hungary, European, non-European).
- Academic variables: university of origin, study year, university's drop-out intention (3-point scale ranging from: frequently; sometimes; never), university's satisfaction during COVID-19 pandemic (5-point scale ranging from: strongly disagreed; disagree; neutral; agreed; strongly agreed), university's support during COVID-19 pandemic (5-point scale ranging from: strongly disagreed; disagree; neutral; agreed; strongly agreed).
- Health status and life habits variables: alcohol consumption (excessively; moderately; no consumption), antidepressant medications in use (yes; no), and quality of sleep (4-point scale ranging from: poor; regular; good; very good).

Statistical analysis

Statistical analysis was performed using initially the Microsoft Excel for Microsoft 365 (Microsoft Corp., Redmond, WA, USA). A p-value of 0.05 (two-tailed) was considered to be statistically significant. Descriptive statistics were performed with the calculation of the mean (M) and standard deviation (SD) for quantitative variables, and percentages were calculated for qualitative variables.

In order to verify the difference between the means of the CBI dimensions and the independent variables, the t test (two groups) and the ANOVA (more than two groups) were applied, given the normality of the data attested by the Kolmogorov Smirnov test. All analyses were performed using the Stata statistical package version 12 (Stata Corp., College Station, TX, USA), with a significance level of 5%.

Main results

A total of 519 students (365 women [70.30%]) with a mean age of 31 years (± 7.76) were included in the evaluation. Single individuals (55.3%), from non-European countries (43.4%), from the

University of Pécs (49.1%) and with PhD/DLA educational level (56.3%) prevailed.

Higher averages of burnout were observed in all the dimensions of the CBI for females, with a significant difference for the dimensions CRB (CRB, $p < 0.01$). With regard to marital status, all dimensions of the CBI were higher among singles and the difference was significant for all dimensions (PB, $p = 0.04$; SRB, $p < 0.01$; CRB, $p = 0.02$; TRB, $p < 0.01$).

Evaluating aspects related to academic life, those who thought often about dropping out of the course had higher levels of burnout for all dimensions. With regard to how the university dealt with the pandemic, burnout was more frequent among those dissatisfied with the strategies used. Finally, among those who did not feel supported by the university, burnout was also higher.

Excessive alcohol consumption (CRB, $p < 0.01$) and use of antidepressants (CRB, $p < 0.01$; TRB, $p = 0.04$) were also associated with higher levels of burnout, but only for the CRB and TRB dimensions. With regard to sleep quality, among those who rated it as poor, they had higher levels of burnout for the PB and SRB dimensions (PB, SRB, $p < 0.01$).

Discussion

The current study discloses the influence that the COVID-19 pandemic has had on the mental health of graduate students by analysing the factors associated with Burnout Syndrome. We analysed sociodemographic, academic, health and life habits factors. We found that being single had an effect in all burnout domains and the sex female as well with the colleagues related burnout domain along the sociodemographic characteristics. Among the academic characteristics, we found high levels of academic burnout for all dimensions among those who had university drop-out intentions, were dissatisfied with how the university dealt with the pandemic and also those who did not feel supported by the university during the outbreak. We found high levels of academic burnout among colleagues-related burnout and teacher-related burnout dimensions in the health and life habits characteristics with those who had excessive alcohol consumption and took antidepressants. The personal burnout and studies-related burnout presented a high level among those who had a bad sleep quality.

Sex differences associated with burnout is still without a literature consensus. Some authors suggest that females are more likely suffer from exhaustion and have higher levels of stress than males, while others report no difference between the two sexes regarding exhaustion and stress (S. H. Lin & Huang, 2014; Schmidt & Hansson, 2018). Nonetheless, our study found association between sex and the colleagues-related burnout dimension, corroborating that females are more likely to develop burnout. Studies has been reporting (Evans et al., 2018; McCarry & Jones, 2021; J.-E. (Wie) Yusuf et al., 2022) that the higher chronic stress level among females is influenced not only by the university environment that includes role conflict, excessive workload, competitive colleagues and considerable mental pressure to publish, but also by inappropriate behaviours, such as harassment, bullying and gender discrimination.

Woolston (2019) published a study by the Nature's survey with 6.296 PhD respondents, one-quarter of who identified as female reported personally experiencing harassment or discrimination compared with 16% of those identifying as men. Moreover, 57% of students who experienced bullying reported fear of personal repercussions if they discuss their situation. This discloses that sex differences associated with burnout exist and being a woman researcher is still a challenge.

We also found that being single was associated with higher burnout scores in all dimensions compared to those with married or other marital status. This result was well reported by Maslach, Schaufeli, and Leiter (2001) that found higher burnout among those who identified as single rather

than married. Among postgraduates, other study also found higher burnout scores in single individuals compared to the married ones (Mackie & Bates, 2019). Marriage as a social support may act as a protecting factor from chronic stress and can play a role in reducing academic burnout.

Evaluating aspects related to academic life, we found that many graduate students at some point had considered abandoning their studies. Several studies have reported high rates of university withdrawal intentions, for example, 30% to 70% of doctorate students will may not complete their PhD degree (Cornér et al., 2017, 2018; Gardner & Gopaul, 2012; Jump, 2013). Experiences of high stress, anxiety and exhaustion, demonstrated a lack of interest in their studies which appears to influence drop-out intentions (Cornér et al., 2017, 2021; Rigg et al., 2013). In contrast, satisfaction and engagement in research, supervision from several supervisors, integration and networks in the research community has a reverse effect in reducing burnout rates and enhancing success to degree completion (Castelló et al., 2017; Graham & Massyn, 2019). This reveals that the decision to drop out of studies has a direct influence on burnout experiences, as shown by an association in all the four burnout dimensions.

Furthermore, relating to the academic life, we found that the feeling of not being supported by the university during the COVID-19 outbreak had an association with all burnout dimensions. The academic support that graduate students receive from their department, faculty or university is essential to develop the sense of belonging and fitting in the educational environment. The lack of this perceived organizational support can increase the risk of experiencing exhaustion and the dissatisfaction with the doctoral studies, leading to academic burnout and consequences such as the intention to leave the degree (Cornér et al., 2017; Kay Devine & Hunter, 2016; Peluso et al., 2011).

The dissatisfaction with how the university dealt with the pandemic was another result found associated with the dimensions studies-related burnout, colleague-related burnout and teacher-related burnout, showing the direct influence of the institution, work environment and supervision on student satisfaction and well-being (Holbrook et al., 2014; Peluso et al., 2011; Wörfel et al., 2016). Particularly, the perceived organizational support and satisfaction with the institution can be decreased when the graduate students need to deal with the lack of transparency, undefined career prospects, unclear expectations during an outbreak such the COVID-19, thus the aforementioned factors can raise the risk for developing burnout.

Analysing the health and life habits characteristics we found that a bad sleep quality is associated with two burnout dimensions, personal burnout and studies-related burnout. Allen et al. also found in their study with graduate students that sleep quality has more consistent relationship with burnout and might be more important than sleep duration in order to reduce burnout levels (Allen et al., 2021). It is already known that a poor sleep quality is associated with higher levels of fatigue and exhaustion, and when it comes to graduate students, this can impact directly and negatively the student's personal life and academic productivity (Amaral et al., 2021; Maheshwari & Shaukat, 2019). Given that together with prolonged and chronic stress, the lack of energy and motivation can make students less interested in their studies and more prone to develop academic burnout.

Moreover, with regards to the health and life habits factors related to academic burnout we found that self-reported excessive alcohol consumption and use of antidepressants are both associated with colleague-related burnout and teacher-related burnout. The association between burnout syndrome and the consumption of alcohol has been widely reported, although a limited number of studies have examined this relationship among graduate students. The vulnerable situations of the students, emotional conflicts in the academia environment, excess of activities and competitiveness are pointed as the most contributing factors in the development of high levels of stress and alcohol misuse. This excessive alcohol consumption may be viewed as a dysfunctional

coping mechanism, since the students may abuse alcohol as a strategy for regulating tension and stressful situations in the academia (Andrade et al., 2021; Aresi et al., 2016; Lamberti et al., 2017; Pacheco et al., 2017).

The use of antidepressants can be also observed as a way of coping with adversity in the academia. It is already known that the academic stressors are related to stress, anxiety, depression, and when combined with extra load on studying as well as the need to enhance performance and concentration, students may resort to the use of antidepressants to avoid episodes of social anxiety and depressive behaviour. This finding is consistent with other studies, that reported students who use antidepressants, present high levels of burnout (López-Alegría et al., 2020; Naser et al., 2021; Salgado & Au-Yong-Oliveira, 2021). The misuse of alcohol and/or other substances are linked with burnout, and by neglecting that, it can lead to serious consequences.

Limitations

Our study has some important limitations. The cross-sectional study design limited our ability to establish causality between the associations. The online assessment to collect data during the COVID-19 outbreak may carry response bias and are less reliable. Therefore, we have used screening tools in this study and our findings should be interpreted carefully, since it is not a clinical psychiatric diagnostic instrument.

Conclusion and implications

This study analysed a number of factors thought to influence graduate students to develop academic burnout during the COVID-19 pandemic. Burnout showed significantly lower among graduate students who receive high levels of support from their university, were satisfied with how their university dealt with the pandemic and had a good sleep quality. The excessive consumption of alcohol, the use of antidepressants, being single and thinking about abandoning the university had a negative impact academic success and were predictive to burnout. We believe that these findings can offer patterns and predictors for future graduate students and university administrators to identify, promote and implement changes to help those who are facing the academic burnout and prevent other graduate students from develop it.

Summary of Novel Findings

1. Study 1 (A systematic review of the COVID-19 pandemic on academic burnout):
 - a. To our knowledge was one of the first to review the COVID-19 pandemic on academic burnout.
 - b. We found a limited evidence for a negative relationship between overall burnout and academic performance in online teaching. Although the others outcome showed no consistent/insufficient evidence the results brought important outcomes of the COVID-19 on mental health of university students, such development of anxiety and depression, and the importance of social support, especially from the university during the pandemic.
2. Study 2 (Academic Burnout, Family Functionality, Perceived Social Support and Coping among Graduate Students during the COVID-19 Pandemic):
 - a. To the best of our knowledge, was the first to explore the relationship between academic burnout and family functionality among graduate students during COVID-19.
 - b. The results from the proposed Structural Equations Model revealed a negative effect of family functionality, perceived social support, and coping on academic burnout. The inverse relationship between perceived social support and the Copenhagen Burnout Inventory was identified, and mediated by coping and family functionality, indicating that the higher the family functionality, perceived social support and coping, the lower the academic burnout.
 - c. These findings can offer patterns and predictors of academic burnout for graduate students and to higher education institutions to better identify external factors implicated in academic burnout, specifically in stressful settings such as a pandemic.
3. Study 3 (Academic Burnout among master and doctoral students during the COVID-19 pandemic):
 - a. Our findings displayed burnout significantly lower among graduate students who had good sleep quality, receive high levels of support from their university, and were satisfied with how their university dealt with the pandemic. The excessive consumption of alcohol, the use of antidepressants, being single, and thinking about dropping out were shown as predictive factors of burnout.
 - b. Among the academic characteristics, we found high levels of academic burnout for all dimensions among those who had university drop-out intentions, were dissatisfied with how the university dealt with the pandemic and also among those who did not feel supported by the university during the outbreak.
 - c. We found high levels of academic burnout among colleagues-related burnout and teacher-related burnout dimensions in the health and life habits characteristics with those who had excessive alcohol consumption and use of antidepressants. The personal burnout and studies-related burnout also rated a high level of burnout among who had a bad sleep quality.
 - d. We believe that these findings can offer patterns and predictors for future graduate students and university administrators to identify, promote and implement changes to help those who are facing the academic burnout and prevent others graduate students from develop it.

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List of Publications

Published article related to the thesis

Andrade D, Ribeiro IJS, Prémusz V, Maté O. Academic Burnout, Family Functionality, Perceived Social Support and Coping among Graduate Students during the COVID-19 Pandemic. *International Journal of Environmental Research and Public Health*. 2023; 20(6):4832. <https://doi.org/10.3390/ijerph20064832>

Andrade D, Ribeiro IJS, Maté O. Academic Burnout among master and doctoral students during the COVID-19 pandemic. *Scientific Reports*. 2023; 13:4745. <https://doi.org/10.1038/s41598-023-31852-w>

Additional published articles related to “health sciences”

Andrade DMB, Rocha RM, Ribeiro IJS. Depressive symptoms among older adults with diabetes mellitus: a cross-sectional study. *Sao Paulo Medical Journal*. 2022. <https://doi.org/10.1590/1516-3180.2021.0771.R5.09082022>

Barreto Andrade DM, Montargil Rocha R, Santos Ribeiro IJ. Depressive Symptoms and Family Functionality in the Elderly With Diabetes Mellitus. *Issues in Mental Health Nursing*. 2020; 41(1): 54–58. <https://doi.org/10.1080/01612840.2019.1636167>

Barreto Andrade DM, Oliveira Damasceno R, Martins Miranda CG, Tavares Reis T, Santos Duarte AC, Silva de Oliveira Boery RN. Síndrome de burnout em profissionais de saúde: relato de experiência [Burnout syndrome in health professionals: experience report]. *Revista Saúde.Com*. 2019;15(3). <https://doi.org/10.22481/rsc.v15i3.4129>

David O, **Andrade D**. Magnitude and socio-economic effects of tobacco use among youths in resource limited settings. *Tobacco Prevention & Cessation*. 2019;5(Supplement):A115. <https://doi.org/10.18332/tpc/105231>

Rosa RS, Silva OC, Picanco CM, Biondo CS, **Andrade DMB**, Oliveira BG (2018). Intervenções de enfermagem nas alterações dos parâmetros clínicos cardiorrespiratórios em pacientes com sepse [Nursing interventions in changing cardiarrespiratory clinical parameters in sepsis patients]. *Revista de enfermagem da ufsm*. 2018;8(2):399-409. <https://doi.org/10.5902/2179769224668>

Full chapter in book related to “health sciences”

Silva RA, **Barreto Andrade DM**, Lopes VM, Nery AA, Casotti CA, Norberto MS. Autopercepção da saúde de trabalhadores rurais [Self-perceived health of rural workers].

In: Marileila Marques Toledo. (Org.). *Ações de Saúde e Geração de Conhecimento nas Ciências Médicas 2*. 2ed. Ponta Grossa: Atena Editora (2020) p. 57-68. ISBN 978-65-86002-47-8. <https://doi.org/10.22533/at.ed.4782013036>

Silva RA, **Barreto Andrade DM**, Nery AA, Vilela ABA, Filho IEM. Internações hospitalares envolvendo a população indígena no Brasil [Hospitalizations involving the indigenous population in Brazil].

In: Samuel Miranda Mattos; Kellen Alves Freire. (Org.). *Atenção Interdisciplinar em Saúde 4*. 1ed. Belo Horizonte: Atena Editora (2019) pp 165-174. ISBN 978-85-7247-764-2. <https://doi.org/10.1080/01612840.2019.1636167>