

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

Ph.D. Thesis

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DEDICATION

I dedicate this work to my beloved family, who have been my constant source of love and support throughout my academic journey. To my parents, Jailton and Deny, for always believing in me and encouraging me to pursue my dreams. To my brothers, Júnior and Roldí, for your unwavering support and for always being there for me. To my niece and nephew, you both bring so much joy to my life. I would also like to dedicate this work to my dear grandmother, Maria, who is a constant source of wisdom, and her love continues to guide me every day.

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LIST OF ABBREVIATIONS

ACT: Acceptance and Commitment Therapy

BBI: Bergen Burnout Inventory

BRCS: Brief Resilient Coping Scale

CBI: Copenhagen Burnout Inventory

CBI-S: Copenhagen Burnout Inventory-Student version

CBT: Cognitive Behavioural Therapy

CFA: Confirmatory Factor Analysis

CFI: Comparative Fit Index

CHERRIES: Checklist for Reporting Results of Internet E-Surveys

CI: Confidence Interval

COVID-19: Coronavirus disease 2019

CRB: Colleague-related Burnout

DLA: Doctor of Liberal Arts

GFI: Goodness-of-Fit Index

M: Mean

MBI: Maslach Burnout Inventory

MBI-SS: Maslach Burnout Inventory-Student Survey

MLM: Maximum Likelihood Method

OLBI: Oldenburg Burnout Inventory

PB: Personal Burnout

PhD: Doctor of Philosophy

PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyzes

RMSEA: Root Mean Square Error of Approximation

SARS: Severe Acute Respiratory Syndrome

SC: Standardized coefficients

SD: Standard Deviation

SEM: Structural Equation Modelling

SIC: Standardized Index of Convergence

SMBQ: Shirom-Melamed Burnout Questionnaire

SPSS: Statistical Package for the Social Sciences

SRB: Studies-related Burnout

SRMR: Standardized Root Mean Square Residual

TLI: Tucker-Lewis Index

TRB: Teacher-related Burnout

USA: United States of America

WHO: World Health Organization

CHAPTER 1

Introduction

1.1 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; Kusurkar 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; Kusurkar et al., 2021; Sahu, 2020; Suart et al., 2021).

1.2 Etiology of Burnout Syndrome

The study of burnout began in the recent date of the early 1970s when psychologist Herbert Freudenberger first used the term burnout to describe workers “response to occupational stress that presented as impaired interpersonal relationship”. Since then, this mental condition became a widely researched topic with several hundred scientific studies published.

While stress can be seen as positive and healthy when it is motivating, energizing, and focused, it can also be negative and unhealthy when it is overwhelming, exhausting,

and associated with distress. In the case of burnout, stress is always related to negative and unhealthy outcomes.

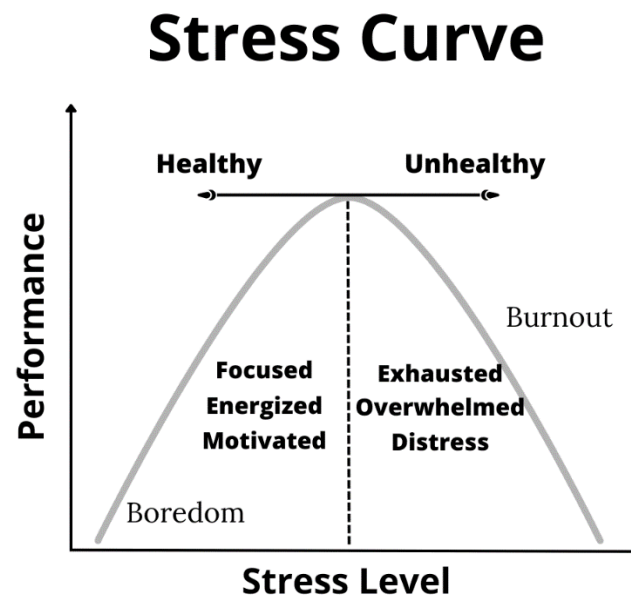


Figure 1: Performance and stress level. Adapted from P. Nixon (1979) (Nixon, 1976)

Christina Maslach (1976) was the first to formally define burnout as a syndrome. Together with Susan Jackson (1981), they proposed burnout syndrome as a response to chronic work-related stress with symptom of physical and psychological scopes, including negative attitudes towards work, life, and other people. The syndrome comprises three dimensions. And this definition is now widely accepted that positioned burnout syndrome as a state of emotional depletion and exhaustion resulting from prolonged and excessive workplace stress.

Burnout syndrome is a disorder that arises from prolonged exposure to stress, which becomes chronic and impairs an individual's ability to perform tasks that require psychological effort. This disorder manifests when individuals experience physical and emotional exhaustion, and this state is specifically related to their professional activities (Christina Maslach & Jackson, 1981).

This syndrome is composed of three dimensions, namely emotional exhaustion, depersonalization, and reduction in personal accomplishment. Emotional exhaustion refers to depletion of emotional resources to deal with professional demands by feeling

emotionally overextended, exhausted, frustrated and drained. Depersonalization is characterized by impersonality and often refers to cynicism, including negative attitudes toward other people, such as colleagues, patients, or clients. A reduction in personal accomplishment refers to negative self-assessment performance and is related to decreased job satisfaction and decline feeling of competence and successful achievement (Koutsimani et al., 2019; Christina Maslach & Jackson, 1981).

The causes of burnout are still in progress and researches have been approached numerous factors, but there is no doubt that changes in society and work system have led to new demands, which as a consequence increased social and psychological stress (H. Powell, 2022; Weber et al., 2000). Some of the main stressors and common causes of burnout include overwork, high pressure for results, dysfunctional workplace dynamics, lack of adequate social support, work-life imbalance, and poor self-care (Bakhamis et al., 2019; Bianchi et al., 2019; Dorrell et al., 2019; Christina Maslach & Leiter, 2017). Maslach and Leiter (1999) displayed six areas of work life that influence the burnout: workload, lack of control, insufficient rewards, low social support from the community, absent of fairness from supervisors and leadership, and values conflict.

The development of burnout can have negative consequences with high cost not only for the individual/personal life but also for the organization/workplace. As burnout is a stress phenomenon, both physical and mental health can be affected. Ahola and Hakanen (2014) stated that burnout has a complex pattern with physical and mental health, and it cannot be dissociated from each other. Either poor health can contribute to burnout, or burnout can contribute to poor health.

In the individual level, a state of emotional exhaustion where the individual feels physically exhausted, facing marital and family problems is commonly found; this increases the incidence of hypercholesterolemia, type 2 diabetes, coronary heart disease, hospitalization due to cardiovascular disorder, musculoskeletal pain, prolonged fatigue, headaches, gastrointestinal issues, respiratory problems, infection and trauma; as well as the occurrence of anxiety disorders, depressive symptoms, insomnia, tendency to alcoholism and abuse of psychotropic medications (Bakhamis et al., 2019; Carlotto, 2002; Salvagioni et al., 2017).

The consequences in the organizational level have the increase of absenteeism and turnover rates, poor job performance, work accidents, sick leaves, interpersonal conflicts and job withdrawal (Enache, 2013; Nicole et al., 2008; Salvagioni et al., 2017).

Burnout syndrome has been affecting different professionals since anyone exposed to chronically stressful conditions is potentially prone to develop burnout. Especially, those occupations who deal with extremely high requirements, responsibilities and pressure such as healthcare staff, teachers, students, social workers, police officers, and many others (Almašiová et al., 2019; Lastovkova et al., 2018; Stufano et al., 2022).

1.3 Conception of Academic Burnout

Although burnout syndrome is widely known as an occupational-related phenomenon, recent studies have confirmed the occurrence of burnout in other types of relationships and environments, such as among students. Burnout is often associated with chronic workplace stressors, such as long working hours, high job demands, low autonomy, and inadequate social support. However, burnout can also develop in other settings where individuals face similar stressors (Christina Maslach et al., 2001; Christina Maslach & Leiter, 2017).

Bearing in mind that the academic environment also tends to prioritize productivity, achievement, and perfectionism, under constant evaluation, researchers identified the need to investigate the burnout syndrome among students (Andrade et al., 2021; Kagawa et al., 2021; Karimi et al., 2014; López-Alegría et al., 2020; Maroco & Campos, 2012; Schaufeli, 2017).

The academic environment, in particular, is well-known for its significant pressure and stressor factors. Students are often required to balance their academic workload, extracurricular activities, and personal life, which can lead to chronic stress and contribute to the development of burnout (S. H. Lin & Huang, 2014; Singh et al., 2020; Stoliker & Lafreniere, 2015).

One of the primary causes of academic burnout is the heavy workload, with multiple courses, assignments, and exams that students are expected to manage (Maroco & Campos, 2012; Ye et al., 2021). Additionally, many students feel pressured to achieve

perfect grades and excel in all areas of their academic and personal lives, including extracurricular activities and part-time jobs (Fontana et al., 2020; Tomaschewski-Barlem et al., 2014; Verulava & Jorbenadze, 2022). Competitiveness between colleagues for top grades, honors, and other awards, also creates a stressful environment (G. Li et al., 2022; VanderLind, 2017). Lack of social support, financial stress, and external stressors, such as family problems or health issues, new responsibilities by living alone or with other people and away from family, can also contribute to academic burnout (Kaggwa et al., 2021; P. Lin et al., 2023; Zhai & Du, 2020). All these demands and pressure contribute to create a sense of overwhelm and make it difficult for students to focus on their academic responsibilities.

Students and workers experience chronic stress differently due to their distinct contexts and characteristics. However, the fact that students will eventually enter the job market after graduation, they may experience similar symptoms and feelings to those of workers experiencing work-related stress, particularly emotional exhaustion, which includes symptoms of excessive tiredness and exhaustion (Bhui et al., 2016; Drăghici & Cazan, 2022; Tomaschewski-Barlem et al., 2014). Physical symptoms, such as headaches, insomnia, gastrointestinal problems, irritability, and fatigue, are the most common among students experiencing academic burnout (Rosales Ricardo & Yury Rosales Ricardo, 2012).

The characteristics of academic burnout are similar to those of occupational burnout and consist of the three dimensions, namely emotional exhaustion, depersonalization, and decreased sense of personal accomplishment. Emotional exhaustion is characterized by feelings of being overwhelmed, anxious, or stressed due to academic demands, leading to a sense of hopelessness or helplessness in regard to academic success. Depersonalization can manifest as a sense of detachment or disconnection from others, including peers, professors, or academic activities; students experiencing depersonalization may feel emotionally disconnected or cynical towards academic pursuits. The decreased sense of personal accomplishment is another characteristic that refers to the decline feeling of competence and successful to meet academic goals; this can lead to a sense of dissatisfaction with academic progress and a

lack of motivation to continue pursuing the degree (Koutsimani et al., 2019; Schaufeli et al., 2002).

Academic burnout not only negatively impacts students' academic performance and engagement but also poses a potential risk to their academic future. Therefore, academic burnout is considered to be a significant predictor of job burnout (Caballero D. et al., 2007; Drăghici & Cazan, 2022; Singh et al., 2020).

1.4 Scale Measuring Burnout

To measure burnout syndrome various tools were proposed. Maslach Burnout Inventory (MBI) (Michael P. Leiter & Schaufeli, 1996; Christina Maslach & Jackson, 1981) was the first burnout measure developed to assess three dimensions of the burnout: emotional exhaustion, depersonalization and reduced personal accomplishment; and not only on the exhaustion dimension that was the focus until the MBI; initially the MBI was designed on an exploratory psychometric research with workers in various health and human service professions. Subsequently, the MBI underwent some adaptations in order to cover other occupational groups. It comprises 22 items with a seven-point Likert response scale from zero (“Never”) to six (“Every day”).

The Copenhagen Burnout Inventory (CBI) (Kristensen et al., 2005) is other widely burnout questionnaire that assesses three sub-dimensions of burnout: personal (degree of physical and psychological fatigue and exhaustion), work-related (degree of physical and psychological fatigue and exhaustion related to work), and client-related (e.g. patient, student) burnout. There are 19 items in the CBI questionnaire using a 5-point Likert scale from 5 (“always”) to 1 (“never/almost never”) that varies with the specific questions. The response items are recorded into scores of 100, 75, 50, 25, and 0 from always = 100 to never = 0.

Other burnout assessment tools include Bergen Burnout Inventory (BBI), Oldenburg Burnout Inventory (OLBI) and the Shirom-Melamed Burnout Questionnaire (SMBQ). The BBI (Feldt et al., 2014) consists of three subscales measuring each of the three dimensions of burnout: exhaustion at work, cynicism toward the meaning of work, and sense of inadequacy at work. The OLBI (Halbesleben & Demerouti, 2005) consists

of 16 items, eight of which measure the exhaustion dimension of burnout and eight measuring the disengagement dimension of burnout. The SMBQ (Kushnir & Melamed, 1992; Melamed et al., 1992) contains 22 items in four subscales: physical fatigue, cognitive weariness, tension, and listlessness.

When addressing the phenomenon of academic burnout, researchers commonly rely on three widely recognized assessment instruments. The Maslach Burnout Inventory-Student Survey (MBI-SS) (Schaufeli et al., 2002) is based on the original Maslach Burnout Inventory used to measure occupational burnout. The MBI-SS consists of 16-items scale and assesses emotional exhaustion, cynicism (equivalent to depersonalization), and academic efficacy (equivalent to personal accomplishment). The Copenhagen Burnout Inventory-Student version (CBI-S) (Maroco & Campos, 2012) was developed specifically for use with university students and consists of 25-items scale divided in 4 dimensions: Personal Burnout (PB), Studies-related Burnout (SRB), Colleague-related Burnout (CRB), and Teacher-related Burnout (TRB). And the Oldenburg Burnout Inventory-Student version (OLBI-S) (Reis et al., 2015) that consist in a 16-items scale based on two dimensions: exhaustion and disengagement.

1.5 Factors Associated with Academic Burnout Among Graduate Students

Graduate students are particularly susceptible to experiencing academic burnout due to the intense demands and pressures of their academic programs. These demands can include a heavy academic workload, research requirements, pressure to publish, active participation in conferences, teaching responsibilities, and a competitive job market, all of which can lead to a chronic stress and academic burnout (Anttila et al., 2015; S. Cohen et al., 1983; Divaris et al., 2012; Hou & Liang, 2018; Levecque et al., 2017; Mattijssen et al., 2020; Naumann et al., 2022; Tjldink et al., 2013).

Studies has identified that 30% to 40% of graduate students experience mental health problems and several of these factors can contribute to academic burnout (Divaris et al., 2012; Mattijssen et al., 2020). High workload and time demands are the most associated with chronic stress and burnout and this may lead to a poor work-life balance,

particularly when students get multiple responsibilities withing the research and coursework (Mattijssen et al., 2020; Moradi, 2019; Schmidt & Hansson, 2018).

Social support is another important factor, especially the support from family, friends, and peers that can provide emotional assistance and helps graduate students to cope with academic stressors; a lack of social support can lead to feelings of isolation and increase the risk of burnout (Hazell et al., 2020; Kusrkar et al., 2021; Peltonen et al., 2017). Financial issues also can contribute to burnout by adding to the overall stress of graduate student, that include the high cost of tuition and living expenses, as well as limited funding opportunities (Jaksztat et al., 2021; Nagy et al., 2019; Tikkanen et al., 2021).

In addition to these individual factors, organizational factors within the university can also play a role in graduate students' academic performance and mental health. The level of support offered by the university, including tutoring services, academic advisors, libraries, mental health services/counselling, and peer support groups, can have a significant impact on a student's ability to cope with academic stressors. When students feel unsupported by their university, they may struggle to navigate the academic demands of their program, leading to feelings of overwhelm and frustration (Jaksztat et al., 2021; Kusrkar et al., 2021; Nagy et al., 2019).

Clear communication and transparency from university administration are also important factors in reducing stress and burnout among graduate students. Additionally, the relationship with a student's supervisor can play a critical role in their success and well-being, with positive experiences leading to greater engagement and overall satisfaction, and negative experiences leading to reduced academic performance and increased drop-out intention (K Devine & Hunter, 2017; Kay Devine & Hunter, 2016; Jaksztat et al., 2021; Peltonen et al., 2017; Pyhältö et al., 2012; Schmidt & Hansson, 2018, 2022).

All these academic disruptions increase the apprehension about the quality of the work, degree completion, career prospect concerns, and together with other factors such as colleagues' competition, low autonomy, inadequate university support, insufficient supervision, unclear expectations in university degree processes, academic dissatisfaction can contribute to a chronic stress and result in academic burnout. These negative outcomes

can include decreased academic performance, mental health problems, and even dropping out of the program (Baum & Steele, 2017; Kay Devine & Hunter, 2016; Lovitts & Nelson, 2000; Nagy et al., 2019; Peltonen et al., 2017).

1.6 Academic Burnout: Implications and consequences in graduate students

Academic burnout can have a wide range of implications and consequences for graduate students, including decreased academic performance, decreased motivation and engagement, and reduced overall quality of life. Burnout can also lead to negative physical and mental health outcomes, including anxiety, depression, and other mental health disorders. Graduate students who experience burnout also struggle with interpersonal relationships, both within their academic communities and in their personal lives (Kusurkar et al., 2021; Rigg et al., 2013; Satinsky et al., 2021; Tikkanen et al., 2021).

One of the primary implications of academic burnout among graduate students is a decline in academic performance. Burned-out graduate students usually struggle to focus on their coursework and research, leading to lower grades or delayed progress towards their degrees. Furthermore, they are more likely to make mistakes or overlook important details due to exhaustion or lack of concentration (Broc et al., 2020; Bullock et al., 2017; Daumiller & Dresel, 2020; Drăghici & Cazan, 2022; Kernan et al., 2011).

Another consequence of academic burnout among graduate students is a decrease in motivation. Burned-out students feel disillusioned with their studies or research, and lose the passion that initially inspired them to pursue graduate studies. This can lead to feelings of apathy or disengagement, which can further exacerbate the burnout cycle (Barthauer et al., 2020; Daumiller & Dresel, 2020; Rigg et al., 2013).

In addition to academic consequences, academic burnout can have serious implications for graduate students' mental health. Burnout is often accompanied by symptoms of anxiety and depression, as well as physical symptoms such as fatigue and sleep issues. These symptoms can interfere with a student's ability to function both academically and socially, leading to isolation and a decreased quality of life (Allen et al., 2021; Evans et al., 2018; Kusurkar et al., 2021; Levecque et al., 2017; Tikkanen et al., 2021; Woolston, 2019).

These consequences can be severe and long-lasting, since burned-out students are in a high risk to drop out of their programs, fail to complete their research, or fail to meet academic deadlines. For example, studies found that only 50% to 75% of graduate students complete their degree. Burnout can also negatively impact career prospects, as students who experience burnout struggle to find employment or advance in their fields (Ali & Gregg Kohun, 2006; Barthauer et al., 2020; Nagy et al., 2019).

1.7 Therapeutic Approaches for Burnout

Treatments for burnout encompass various approaches, catering to individuals, teams, and organizations grappling with burnout-related challenges. For organizations, treatments involve interventions directed at groups of people, such as departments or entire businesses. These interventions often concentrate on areas like workload management, fostering teamwork, and establishing peer support systems. On the other hand, individual treatments for burnout typically center around psychological therapy, wherein individuals receive personalized counselling and support to address and cope with burnout symptoms on a personal level (McFarland & Hlubocky, 2021; Morales-Rodríguez et al., 2019; van Dam, 2021).

Psychotherapy is the use of psychological methods with aim to reduce psychological symptoms, treat mental disorders, and to learn new coping skills. Psychotherapy is showing as effective in treating burnout, in the reduction of burnout symptoms, and in the prevention of burnout. Examples of effective psychotherapies are Cognitive Behavioral Therapy (CBT), Acceptance and Commitment Therapy (ACT), mindfulness-based interventions, psychoeducation and any other supportive counselling (Erschens et al., 2018; Hathaishaard et al., 2022; Jaworska-Burzyńska et al., 2016; McFarland & Hlubocky, 2021).

Cognitive Behavioural Therapy has garnered significant attention as an evidence-based intervention for managing burnout in diverse populations, including students experiencing academic burnout. This therapeutic approach emphasizes the identification and modification of maladaptive thought patterns and behaviours that contribute to burnout. Through cognitive restructuring and behavioural change techniques, individuals

can develop more constructive coping strategies and enhance their resilience to stressors in the academic environment. CBT equips students with the tools to challenge negative self-perceptions, set achievable goals, and foster a healthier balance between academic demands and self-care (Bagheri et al., 2019; Hikmah et al., 2020).

Supportive counselling offers a safe and non-judgmental space for individuals to explore and process their feelings related to burnout. Therapists provide empathy and validation, allowing the participant to articulate their concerns and frustrations. Expressive therapies, such as art, music, and writing therapy, can complement traditional counselling approaches by providing alternative outlets for emotional expression and stress relief. These creative interventions foster self-awareness, emotional processing, and positive coping strategies, enhancing overall psychological well-being (Bagheri et al., 2019; Hathaisaard et al., 2022; Madigan et al., 2023).

Addressing academic burnout demands a holistic approach that emphasizes lifestyle modifications and self-care practices. Encouraging individuals to establish healthier work-life boundaries, engage in regular physical exercise, adopt effective sleep routines, and cultivate social support networks are essential components of burnout prevention and management. By prioritizing self-care, individuals build resilience and enhance their ability to cope with stressors effectively (Erschens et al., 2018; Potter & Cadiz, 2021; Shreffler et al., 2020; Vizoso et al., 2019).

1.8 The Impact of COVID-19 on Graduate Students' Academic Burnout

The COVID-19 pandemic has had a significant impact on the academic world and created additional stressors for graduate students who face unique challenges. These changes have led to a decreased sense of purpose and an increased anxiety, stress levels and burnout. Some reasons for this were isolation from peers and mentors; increased workload and pressure to maintain academic performance despite the disruptions caused by the pandemic; uncertainty about the future and research projects; and fewer learning and job opportunities (Byrom, 2020; Lee et al., 2021; Naumann et al., 2022; Pyhältö et al., 2022; Salari et al., 2020; Sharma et al., 2020; Woolston, 2020b, 2021, 2022).

Other reasons of academic burnout during the pandemic were research prolongation from closed laboratories and canceled/postponed experiments fieldtrips;

funding/grant discontinuation; lack of respect and understanding from supervisors; inadequate mentoring; reduction of concentration in online learning and difficulty of conducting research remotely; and fatigue, overwhelm and exhaustion (Byrom, 2020; Fleming et al., 2020; Levine & Rathmell, 2020; Sharma et al., 2020; Woolston, 2022).

Studies have been reporting an increased levels of burnout among graduate students during the pandemic. For instance, a study according to Nature's first-ever survey of postdocs worldwide eight out of ten postdoctoral researchers reported a significant negative impact on their research during the pandemic, indicating that this circumstance is clearly apparent (Woolston, 2022). Similarly, other studies found that graduate students are more affected by mental health issues and are more likely to present increased stress levels compared to undergraduate students and the general population during COVID-19, suggesting that the pandemic has exacerbated the pre-existing challenges faced by graduate students and contributed to their burnout (Lee et al., 2021; Salari et al., 2020).

Moreover, the pandemic has exposed the already existing inequalities and underlying weaknesses in academia. This is because certain groups have been more prone to mental health issues than others. The number of academic researchers experiencing burnout has increased significantly, especially among marginalized groups such as international students, women, and LGBTQ+ students (Byrom, 2020; Evans et al., 2018; Gewin, 2021; Lee et al., 2021; Woolston, 2020a).

The effects of academic burnout during the COVID-19 pandemic can be significant and long-lasting. Studies have been reporting a decline in academic performance, reduced motivation, reduced research productivity, diminished career prospects, and mental health problems. Moreover, other studies reported that the student's mental health problems were directly related to pursuing PhD, as well as a worse experience than expected. The pandemic's disruptions have also resulted in increased financial stressors for graduate students by losing research or teaching positions or experienced funding cuts. Additionally, the pandemic's social isolation measures have limited the social support available to graduate students, exacerbating the effects of burnout (Byrom, 2020; Levine & Rathmell, 2020; Naumann et al., 2022; Sharma et al., 2020; Woolston, 2022).

1.9 Additional Contributing Factors between the COVID-19 Pandemic and Graduate Student Burnout

Social support is a vital aspect and the element that most contributes to academic burnout, particularly during the COVID-19. Social support refers to the overall impressions of others regarding their availability and effective help when is in need. Different forms of social support involve listening and comforting, providing practical help, offering guidance, and providing constructive feedback. The main social support predictors of academic burnout include insufficient support from supervisor/research community, lack of institutional support, low participation in extra-curricular activities, and lack of leisure (Bagci, 2018; Boone et al., 2022; Cornér et al., 2017; Pappa et al., 2020; Peltonen et al., 2017; Singh et al., 2020; Woolston, 2022; Ye et al., 2021).

Furthermore, social support can foster a sense of belonging and purpose, which is especially crucial during uncertain times. Amidst being part of a supportive academic community can provide students with a sense of purpose and motivation to continue their academic pursuits, the uncertainty brought about by the pandemic, students had to face the challenge to remain motivated and engaged in their studies (Byrom, 2020; Camacho et al., 2021; Maluenda-Albornoz et al., 2023; Reilly & Fitzpatrick, 2009; Saefudin et al., 2021).

Studies have been showing that social interactions are usually decreased in graduate students due the academic demands. This seems to be negatively associated with academic burnout and correlated with low academic engagement and loneliness, even before the COVID-19 pandemic. These factors were worse during the COVID-19 pandemic, when the social isolation force the loneliness became more frequent since the support from friends and the academic community shifted predominantly to online chats and meetings (Caesens et al., 2014; Galdino et al., 2016; Gewin, 2021; Naumann et al., 2022; Peltonen et al., 2017; Singh et al., 2020; Yukhymenko-Lescroart, 2022).

The family function within the social network has a significant impact on academic burnout. Family functionality refers to the extent to which a family is able to meet the needs of its members and maintain a positive family environment. In this sense, there are functional and dysfunctional family systems. A functional family group is one that reacts to challenging and conflicting situations with emotional balance and strives for effective

solutions. The members of the group are able to coexist harmoniously, while also safeguarding the integrity of the system as a whole and allowing each part to function independently. On the other hand, a dysfunctional family group is characterized by a lack of concern for maintaining the system's dynamics and coherence. In such families, individual interests take precedence over the group's well-being, and members neglect their responsibilities, resulting in disharmony within the family system (Barreto Andrade et al., 2020; Perracini et al., 2011).

Research has shown that family functionality is an important factor in protecting against academic burnout. Students who come from families with high functionality are more likely to experience lower levels of stress and greater academic success. However, the COVID-19 pandemic has created new challenges for families, and it is still unclear how these changes may affect family functionality and academic burnout. However, it is noticeable that COVID-19 forced families to adapt to new routines, manage multiple stressors, and deal with uncertainty. In some cases, the pandemic has led to increased stress within families due to financial, health, or social challenges. In other cases, families have become closer as they spend more time together and find ways to support each other (Deng et al., 2022; Hou & Liang, 2018; Humphries et al., 2021; Zis et al., 2021).

During the pandemic, social support has been critical in helping students cope with academic burnout. The family function is still unclear, but was one of the factors that mostly contributes to academic burnout in studies before COVID-19. The social isolation and loneliness that arise during remote learning can be mitigated by effective social support and coping strategies. Virtual meetings with peers and supervisors, as well as access to online study groups, tutoring services, and mental health counselling, is showing to help students develop the skills they need to overcome future challenges by building coping mechanisms, and further alleviating academic stress (Camacho et al., 2021; da Nóbrega Lucena Pinho et al., 2021; Gewin, 2021; Humphries et al., 2021; Kee, 2021; Reverté-Villarroya et al., 2021).

Coping refers to the cognitive and behavioural techniques used to deal with stressful situations. If coping strategies are effective, they can lessen the negative effects of stress on both physical and mental health, which can help protect against academic burnout. On the other hand, if unhealthy or inadequate coping mechanisms are used, stress

levels can increase, leading to higher levels of burnout (Shao et al., 2020; Shoua-Desmarais et al., 2020; Thoits, 1995).

Coping with academic burnout during COVID-19 requires a multifaceted approach that combines strategies to address the physical, emotional, and psychological aspects of burnout. Graduate students can improve their overall well-being and academic performance by prioritize their mental and physical health during these challenging times and seek out the support they need to succeed (Gewin, 2021; Humphries et al., 2021; D. Li, 2020; Reverté-Villarroya et al., 2021; Salgado & Au-Yong-Oliveira, 2021).

1.10 PROBLEM STATEMENT/RESEARCH QUESTION

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. To test the hypothesis and to guide this the present study some questions emerged:

- What are the effects of Burnout Syndrome among graduate students during the COVID-19 pandemic?
- Which factors inside and outside the academia are associated with Burnout Syndrome among graduate students during the COVID-19 pandemic?
- What is the influence of the social support and coping in Burnout Syndrome among graduate students during the COVID-19 pandemic?

- Is there any influence of the family functionality in Burnout Syndrome among graduate students during the COVID-19 pandemic?

1.11 RESEARCH OBJECTIVES

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

1.11.1 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.

1.12 THESIS OUTLINE

The current thesis is composed of six chapters. Chapter one is an introductory chapter that introduces the etiology of Burnout Syndrome, concept of Academic Burnout, including its factors associated, implications and consequences, as well as the impact of COVID-19 among graduate students. Then, the chapter goes narrower to present the background of our research problem, the knowledge gap, the problem statement, and the research objectives. Chapter two presents the first part of the current research, which is a systematic review of the COVID-19 pandemic on the academic burnout. Chapter three displays the second part of this research, which is assessing the family functionality, perceived social support, and coping with burnout syndrome among graduate students during the COVID-19 pandemic. Chapter four explore the factors associated with burnout syndrome among graduate students during the COVID-19 pandemic. Chapter five presents the novel findings of our research, including the recommendations, and implications for practice and research. Finally, chapter six shows the list of publications related to the current thesis and other topics.

CHAPTER 2

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

2.1 Introduction

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 and practice online. The impact repercussion of academic life on university students is already well documented (Pasic et al., 2020), but with the COVID-19 pandemic, new demands have arisen that directly interfere with students' mental health (Sahu, 2020), such as academic burnout.

Despite the Burnout Syndrome has been mostly focused on occupation field studies, is increasingly gaining attention in human services such education research among students. The academic burnout is development by an excessive and prolonged stress caused by piling school work and academic demands combined with drained of energy, reduced enthusiasm toward academic tasks, lack of positive attitudes and low academic achievement (Charkhabi et al., 2013; Rahmati, 2015).

Burnout is described as a psychological disorder emerged as a response to chronic emotional and interpersonal stressors in the working environment, composed of emotional exhaustion, depersonalization and reduced personal accomplishment (Christina Maslach & Jackson, 1981). Emotional exhaustion refers to depletion of emotional resources by feeling emotionally overextended, exhausted and drained. Depersonalization is often referring to cynicism, and includes negative attitudes toward other people, such as colleagues, patients, or clients. A reduction in personal accomplishment refers to decreased job satisfaction and decline feeling of competence and successful achievement (Koutsimani et al., 2019).

In addition to all of the academic pressure, the university students are leading with the unprecedented COVID-19 pandemic, experiencing curfews, social distancing, and quarantines, increasing in this way, levels of academic burnout. In the context of the above, we aimed to analyze the impact of the COVID-19 pandemic on the university student's burnout.

2.2 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. This research was carried out according to methodological recommendations of the PRISMA statement for systematic review (Liberati et al., 2009) and the steps of the literature search and the final selection of 8 studies are shown in the PRISMA flow diagram Figure 2.

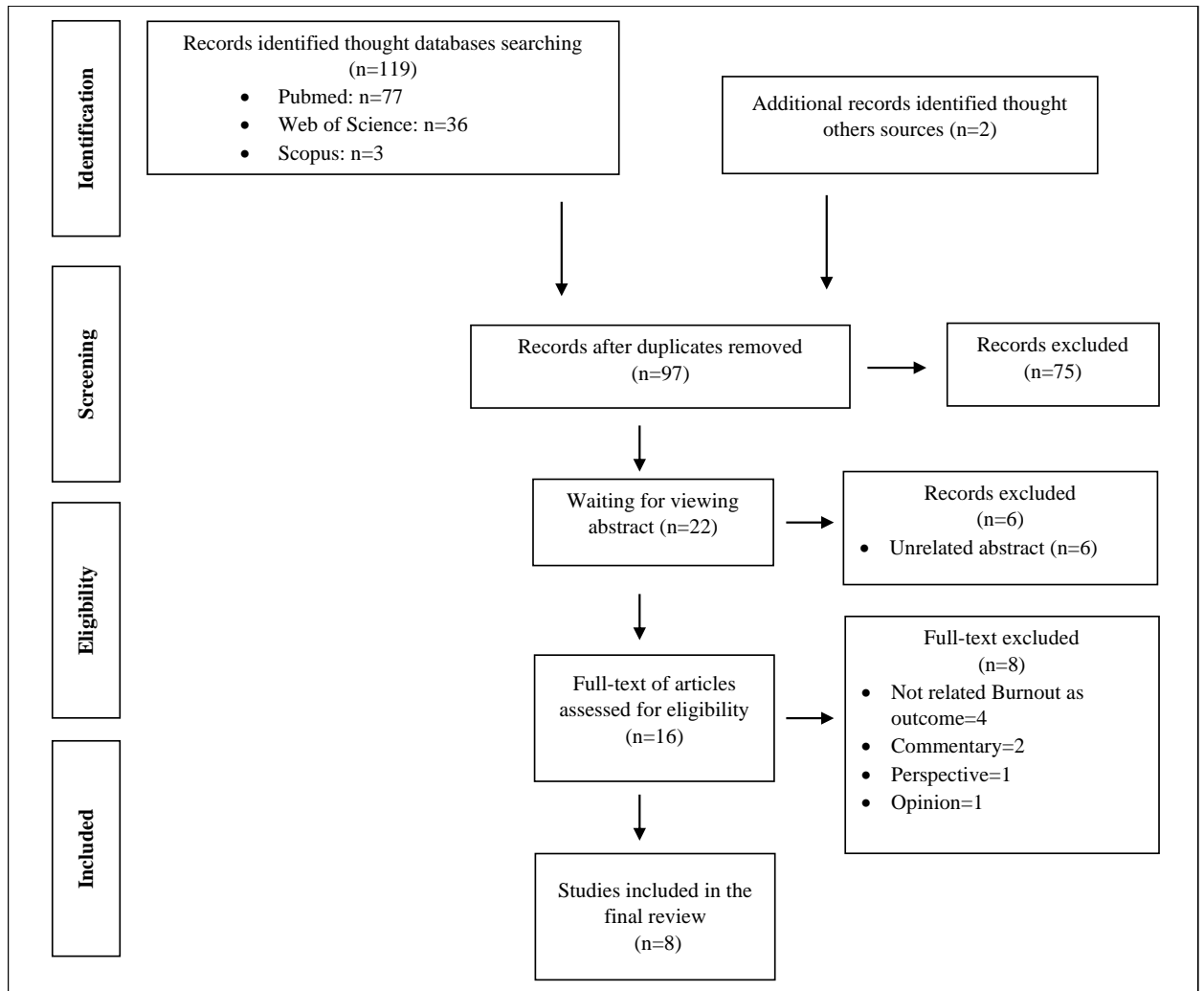


Figure 2. PRISMA flow diagram

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). The SIC value with the corresponding number of studies assessing this estimated relationship for each outcome and the strength of evidence are shown in table 1.

Table 1. Strength of evidence for the relationships studied.

Number of studies	SIC value				
	-1.00 - -.60	-0.59 - -.30	-0.29 - 0.29	0.30 - 0.59	0.60 - 1.00
	Strength of evidence	Strength of evidence	Strength of evidence	Strength of evidence	Strength of evidence
1-2	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
3-5	--	-	0	+	++
≥6	---	--	0	++	+++

Note. 0=inconsistent evidence; -/+ =limited evidence for negative/positive relationship; - -/+ +=moderately strong evidence for negative/positive relationship; - - -/+ +=strong evidence for negative/positive relationship

2.3 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. The main methodological characteristics of the selected studies are shown in Table 2 and 3.

Table 2. Author(s), year of publication, country and objectives of the studies included.

Author, year	Country	Aim(s)
Aebischer <i>et al.</i> , 2020	Switzerland	to compare the physical and psychological health of Swiss medical students involved in the COVID-19 response with their non-involved peers.
Bolatov <i>et al.</i> , 2020	Spain	to compare the indicators of the mental state of medical students (burnout syndrome, depression, and anxiety) during Traditional Learning and Online Learning.
Harries <i>et al.</i> , 2021	USA	to evaluate students' perceptions of COVID-19's impact on medical education; ethical obligations during a pandemic; infection risk; anxiety and burnout; willingness and needed preparations to return to clinical rotations.
Jiang, 2021	China	to examine the possible mediating role of psychological capital and the moderating role of academic burnout in the relationship between problematic social media usage and anxiety among university students during COVID-19.
Moreno-Fernandez <i>et al.</i> , 2020	Spain	to establish the effect of the current confinement on the academic burnout and engagement, together with the impact of the application of emotional intelligence on university students.
Reverté-Villarroya <i>et al.</i> , 2021	Spain	to analyze whether the current pandemic has affected the mental well-being of final-year nursing students.
Zhang <i>et al.</i> , 2021	China	to evaluate the association between learning burnout and social support in Chinese medical students.
Zis <i>et al.</i> , 2021	Cyprus	to investigate what the impact was of digital learning, which was implemented because of the COVID-19 pandemic, on the burnout and overall mental health of medical students at the University of Cyprus.

Table 3. Design, sample, participants and instruments used in the included studies.

Author, year	Design	Sample, participants	Measure of Burnout/Exhaustion
Aebischer <i>et al.</i> , 2020	Cross-sectional	777 medical students and residents	Maslach Burnout Inventory (MBI)
Bolatov <i>et al.</i> , 2020	Cross-sectional	619 (TL 2019); 798 (OL 2020) medical students	Copenhagen Burnout Inventory (CBI-S)
Harries <i>et al.</i> , 2021	Cross-sectional	741 medical students	Authors survey
Jiang, 2021	Cross-sectional	3.123 undergraduate students	Maslach Burnout Inventory-Student Survey (MBI-SS)
Moreno-Fernandez <i>et al.</i> , 2020	Experimental	47 Pharmacy students	Maslach Burnout Inventory-Student Survey (MBI-SS)
Reverté-Villarroya <i>et al.</i> , 2021	Transversal	305 nursing students (No COVID-19= 146; During COVID-19= 159)	Emotional Exhaustion Scale
Zhang <i>et al.</i> , 2021	Cross-sectional	684 medical students	Maslach Burnout Inventory (MBI)
Zis <i>et al.</i> , 2021	Ecological	154 medical students	Maslach Burnout Inventory-Student Survey (MBI-SS)

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 (table 4). 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.

Table 4. Synthesis of significant results with strength of the evidence for the relationship between academic burnout and COVID-19 main factors.

	Overall Burnout	Emotional exhaustion	Cynicism	Self-efficacy
Mental health (Total: 5 articles)	Insufficient evidence (Jiang, 2021)[-]	0 (inconsistence evidence) (Harries et al., 2021) [+](Reverté-Villarroya et al., 2021)[-]	No/insufficient evidence	No/insufficient evidence
Academic performance in online teaching (Total: 3 articles)	– (limited evidence for negative relationship)(Moreno-Fernandez et al., 2020)[-];(Jiang, 2021)[-];(Bolatov et al., 2020)[+]	No/insufficient evidence	Insufficient evidence (Bolatov et al., 2020)[+]	No/insufficient evidence
Social support (Total: 1 article)	Insufficient evidence(Zhang et al., 2021)	No/insufficient evidence	No/insufficient evidence	No/insufficient evidence

2.4 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 their 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.

Self-efficacy was not found as a significant association on the included studies, with an exception with lower efficacy on medical students from 4th academic year during the COVID-19 than pre-COVID-19 period mentioned by Zis et al. (2021). And as well a related improving academic engagement found by Moreno-Fernandez et al. (2020) after an intervention that was also notice a reduce of academic burnout once presented the Emotional Intelligence concepts to pharmacy students. Showing in this way, the Emotional Intelligence workshops and seminars as a useful coping and intervention to help the general wellbeing and to achieve good academic results on university students, since the Emotional Intelligence facilitates the management of feelings, capacity for resilience, motivation, empathy, communication and mental agility in social situations and conflicts. Before the intervention 63.5% of the students presented high and medium high

levels academic burnout, experiencing exhaustion, ineffective in academic performance and cynical attitude. After the intervention the pharmacy students felt less academic burnout, only 31.1%, and more engaged in their academic activities.

Consequences on academic performance by COVID-19 pandemic was also noted by Jiang (2021), which was found the effect of problematic social media usage and psychological capital on anxiety were moderated by academic burnout, with positive and negative correlation, respectively. It was explained that due the quarantine at home, the online system for teaching was adopted and all communication and updates about the pandemic was accessed mostly by social media usage. Moreover, the overuse can trigger off emotional problems such predicting levels of anxiety. And in this specific research, the problematic social media usage and consequently more anxiety was found in university students with high levels of academic burnout than those with low levels. So, the social media overuse was noted as an escape from academic tasks. And in those students who perceived no effect from the pandemic in their academic performance had lower levels of academic burnout and a relative weak correlation between problematic social media usage and mental health condition.

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.

2.5 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.

CHAPTER 3

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

3.1 Introduction

Academic burnout can be defined as an exhaustion resulting from the excessive and prolonged stress experienced in academia (Schaufeli et al., 2002). The development of burnout in students is directly related to academic overload with numerous deadlines and assignments, and it is associated with drained energy, reduced enthusiasm toward academic tasks, lack of positive attitudes, and low academic achievements (Chang et al., 2016; Fiorilli et al., 2017; Rahmati, 2015; Salgado & Au-Yong-Oliveira, 2021). Burnout in students has been shown to harm the mental health of students and it is increasing at a pandemic-like scale among graduate students (Gewin, 2021; Liu et al., 2022; K. Powell, 2017).

Graduate students are additionally dealing with another pandemic, the unpredictable COVID-19. Governments worldwide imposed restrictive measures to prevent the spread of SARS-CoV-2 virus. Hygiene measures (i.e., masks, hand disinfection), and social distancing (i.e., lockdown, physical distancing, quarantines) were adopted (World Health Organization, 2022). Higher education institutions were forced to quickly adapt from conventional learning to online learning, and students have had to deal with online learning challenges (Marinoni et al., 2020). Online learning indeed helps prevent the spread of COVID-19, but also contributes to worsening the effects on mental health in graduate students (Kee, 2021; N. Yusuf, 2021). Conducting research, studying, and dealing with other academic demands in these stressful environments can result in long-term psychological consequences and trigger academic burnout. Studies have shown that graduate students are more affected by mental health issues and are more likely to present increased stress levels compared to undergraduate students and the general population during COVID-19 (Lee et al., 2021; Salari et al., 2020).

The COVID-19 pandemic negatively impacted the mental health of students, and studies have been demonstrating increased distress and detrimental burnout symptoms

among graduate students during the lockdown. Associations with low engagement, low motivation, poor work-life balance, and academic dissatisfaction were found among graduate students who scored with moderate to high levels of academic burnout. Numerous factors were cited by the participants, such as increased workload, uncertainty about the future, fewer learning/job opportunities, research prolongation, funding/grant discontinuation, lack of respect and understanding from supervisors, inadequate mentoring, reduction of concentration in online learning, and fatigue (Al Mamun et al., 2021; Kusrkar et al., 2021; Sahu, 2020; Suart et al., 2021).

Although burnout is known as a work environmental syndrome, factors outside academia may also influence burnout. Within the literature, social support is one of the concepts that contributes the most to academic burnout. Perceived social support is how individuals perceive they are cared for by friends, family members, and others, especially during times of need. Perceived social support has important benefits in mental health since it is a significant predictor of life satisfaction and well-being (Cobo-Rendón et al., 2020; Ioannou et al., 2019).

The absence of social support increases chronic stress (i.e., a burnout predictor), and its presence decreases academic burnout (Kim et al., 2018; Ye et al., 2021). A supportive network can help the student in developing effective coping strategies. Coping can be defined as cognitive and behavioral strategies used in response to stressful events (Folkman, 2013). Effective coping might reduce the impact of stressful situations on physical and mental health by building strategies to shield against academic burnout (Freire et al., 2020; Lee et al., 2021; Shoua-Desmarais et al., 2020). Otherwise, unhealthy or poor coping strategies can result in higher levels of stress and increased burnout (Fares et al., 2016; Vizoso et al., 2019).

Within the social network, family plays an important role in academic burnout, as cited by previous studies. The family relationship is a role of co-responsibility among the members and constitutes an important source of care and affection and the development of values, behaviors, and other life skills for the stress management of each family member (Dias, 2011; G Smilkstein et al., 1982). Significant associations between burnout and family relationships have been reported by previous studies, and a difficult family environment can lead to academic burnout, including increased stress due to decreased

family functionality and work/family management (Deng et al., 2022; Sharififard et al., 2020; Szwako, 2013).

The influence of multiple factors, such as family, social support, coping, and the usual academic environment can create pressure on students and play important mediating roles in academic burnout. Specifically, studies have found that students who reported higher levels of social and family support were more likely to use active coping strategies, such as seeking social support and problem-solving, which in turn was associated with lower levels of academic burnout (Deng et al., 2022; Shoua-Desmarais et al., 2020; Ye et al., 2021)

In the context of graduate students, this pressure eventually depletes emotional and mental resources, resulting in the detriment of mental health and academic burnout. Based on these findings, it is clear that burnout is a serious problem and may negatively impact the meaning and value of the respective degree for the graduate student, with consequent mental health issues. This study addresses a critical research gap concerning mental health and academic burnout among graduate students by relating it to family functionality, perceived social support and coping during the recent COVID-19 pandemic.

Considering that the physical environment of academia itself it is restrained due to curfews, quarantines, restrictions on social interaction, and the switch to online learning, we questioned the influence of family functionality, social support and coping among graduate students with regard to burnout syndrome during the COVID-19 pandemic. We hypothesize that graduate students experienced greatly worsened burnout during the COVID-19 pandemic when dysfunctional families, low perceived social support and poor coping strategies were present. We aim to address the mental health issue in graduate students by relating it to family functionality, perceived social support, and coping with academic burnout during the COVID-19 pandemic.

3.2 Methods

Study Design and Data Collection

This is a cross-sectional analytical study. Data was collected through an online questionnaire between September 2021 and March 2022. The questionnaire was

distributed virtually through the Google Forms platform, in close cooperation with international associations of graduate students and university departments. Participants were recruited through emails, social media channels of communities for graduate students, and through referrals from eligible participants. On the welcome page of the online questionnaire, participants were informed about the research and the informed consent was obtained from all those agreeing to answer the survey by clicking the ‘I consent’ button at the bottom of this same page. It was displayed that the survey would take approximately 15 min to complete.

Participation was anonymous and voluntary throughout the entire study period, and participants were informed about the research and its goal before giving their consent. We were unable to assess how many people viewed the online invitation, and therefore we could not determine participation rate of the study. Altogether, 542 students participated in the study. After eliminating incomplete answers, the final sample consisted of 519 graduate students which yielded a 95.75% completion rate.

The inclusion criteria were being a graduate student at master’s or PhD/DLA level, fluent in English, and voluntarily participation. Exclusion criteria were incomplete questionnaires and those who did not wish to participate in the research. Incomplete questionnaires with missing responses were excluded from the study.

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.

3.3 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. Characteristics of the study population are shown in Table 5.

Table 5. Characterization of evaluated graduate students.

	N	%
Gender		
Male	154	29.7
Female	365	70.3
Marital Status		
Single	287	55.3
Married	123	23.7
Other	109	21.0
Housing Member		
Family	187	36.0
Partner	144	27.7
Friends/flatmates	77	14.8
Alone	109	21.0
Other	2	0.4
Students' country of origin		
Hungary	183	35.3
European Countries	111	21.4
Non-European Countries	225	43.4
Current level of education		
PhD/DLA degree	292	56.3
Master's degree	227	43.7

The structural model proposed below (Figure 3) shows the totality of the proposed relationships. The standardized effects are presented in Table 6. 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 6).

Table 6. 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 3) 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.

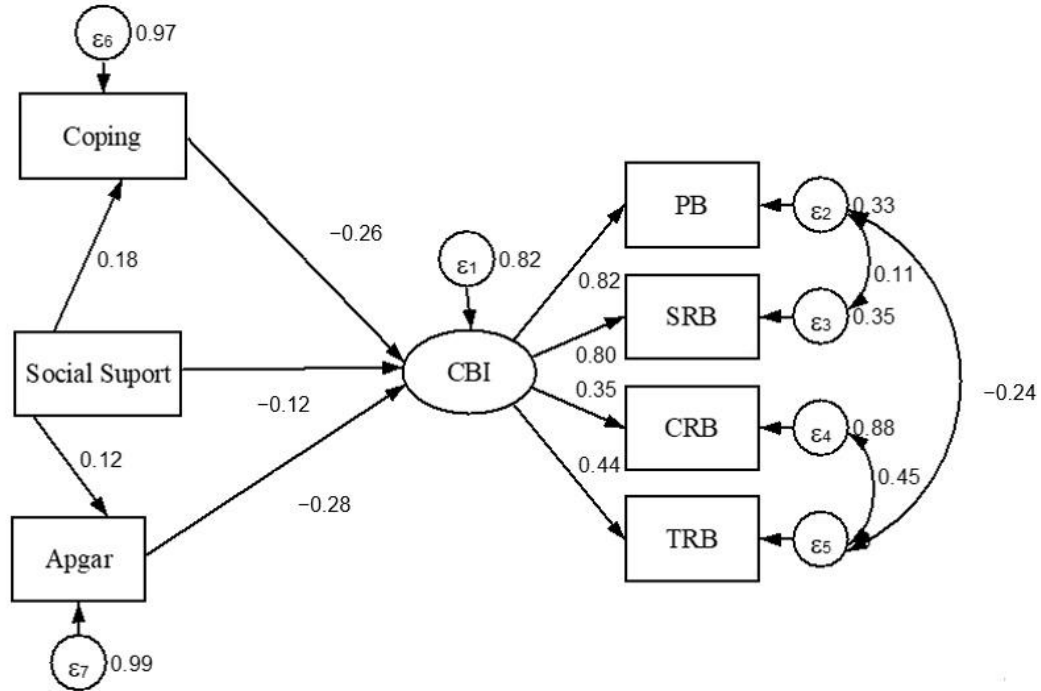


Figure 3. Visual representation of the structural model. CBI: Copenhagen Burnout Inventory-Student; PB: Personal Burnout; SRB: Studies-related Burnout; CRB: Colleague-related Burnout; TRB: Teacher-related Burnout.

3.4 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.

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.

3.4 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.

CHAPTER 4

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

4.1 Introduction

The COVID-19 pandemic has forced universities worldwide to adopt strong measures through compulsory confinement and social isolation. As a result, a negative impact on many students' mental health was observed, such as the development of academic burnout (Kaparounaki et al., 2020; Meda et al., 2021; Sahu, 2020).

Studies has shown that graduate students are more affected by mental health issues and more likely to present higher levels of stress than undergraduate students and the general population during COVID-19 (Lee et al., 2021; Salari et al., 2020). With the COVID-19 pandemic, new demands have arisen that directly interfere on students' mental health, such as interruption of learning, uncertainty about prolongation of research duration, laboratory closures, losing part-time teaching job, expiring visas for foreign students, uncertain of funding/grant discontinuation, inadequate mentoring, lack of concentration at home and performing more household chores (Al Mamun et al., 2021; Sahu, 2020; Stuart et al., 2021).

These academic disruptions combined with significant apprehension about the completion and quality of the work, career concerns, usual high workload even at home, colleagues' competition, inadequate university support, insufficient supervision, financial issues, low autonomy, emotional suffering, academic dissatisfaction, are examples of factors that predispose to a chronic stress and result in academic burnout (Ashton & Pintor-Escobar, 2020; Cornér et al., 2017; K Devine & Hunter, 2017; Kusrkar et al., 2021; S. H. Lin & Huang, 2014; Mackie & Bates, 2019; Mota et al., 2017; Nagy et al., 2019; Naylor, 2022).

Burnout is described as a psychological disorder emerged as a response to chronic emotional and interpersonal stressors in the working environment, composed of emotional exhaustion, depersonalization and reduced personal accomplishment (Christina Maslach et al., 2001). Emotional exhaustion refers to depletion of emotional resources by feeling emotionally overextended, exhausted and drained. Depersonalization is often referring to

cynicism, and includes negative attitudes toward other people, like colleagues, patients, or clients. A reduction in personal accomplishment refers to decreased satisfaction and declined feeling of competence and successful achievement (Koutsimani et al., 2019).

The development of burnout in students is directly related to excessive and prolonged stress caused by piling school work and academic demands combined with drained energy, reduced enthusiasm toward academic tasks, lack of positive attitudes and low academic achievements (Charkhabi et al., 2013; Rahmati, 2015).

In addition to all of the academic pressure, graduate students also have had to deal with the COVID-19 outbreak, experiencing curfews, social isolation, and quarantines. In these stressful circumstances, studying and conducting research can have a wide range of effects on mental health, which can lead to academic burnout (Ashton & Pintor-Escobar, 2020; da Nóbrega Lucena Pinho et al., 2021; Gewin, 2021; Naumann et al., 2022).

The study of this issue may be of special international interest, considering the recent COVID-19 pandemic, that by itself addresses a critical and unique gap in research concerning the mental status in regard to academic burnout among graduate students in Hungary and some European countries. We aim to address the issue of mental health in graduate students by relating it to the factors associated with burnout syndrome during the COVID-19 pandemic.

4.2 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) (Appendix A).

Participation was anonymous and voluntary throughout the entire study period, and they were informed about the research and goal before giving their consent. We were unable to assess how many people viewed the online invitation, and therefore we could not determine the response rate of the study. Altogether, 542 students participated in the study. After eliminating incomplete answers, the final sample consisted of 519 graduate students which yielded a 95.75% completion rate.

Inclusion criteria were graduate students at master or Ph.D./DLA level by voluntary participation. Exclusion criteria were incomplete questionnaires and those who did not wish to participate in the research. The pilot test data and incomplete questionnaires with missing responses were excluded from the study.

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%.

4.3 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 (Table 7).

Table 7. Sociodemographic characteristics of 519 evaluated graduate students.

	N	%
Sex		
Male	154	29,7
Female	365	70,3
Marital Status		
Single	287	55,3
Married	123	23,7
Other	109	21,0
Origin Country		
Hungary	183	35,3
European countries	111	21,4
Non-European countries	225	43,4
University		
University of Pécs	255	49,1
University of Szeged	44	8,5
ELTE	50	9,6
University of Debrecen	35	6,7
University of Miskolc	30	5,8
Others	105	20,2
Currently level of education		
PhD/DLA degree	292	56,3
Master's degree	227	43,7

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, $p < 0.01$) (Table 8).

Table 8. Comparison of the mean of the CBI dimensions according to sociodemographic characteristics.

	PB Mean (SD)	p	SRB Mean (SD)	p	CRB Mean (SD)	p	TRB Mean (SD)	p
Sex^a		0.09		0.36		<0.01		0.36
Male	54.05 (16.76)		49.69 (19.41)		37.20 (22.17)		34.31 (26.14)	
Female	57.11 (19.75)		51.57 (21.09)		30.67 (21.45)		32.10 (24.74)	
Marital Status^b		0.04		<0.01		0.02		<0.01
Single	57.97 (18.99)		53.29 (20.34)		34.32 (21.03)		35.34 (25.49)	
Married	52.81 (18.24)		44.16 (20.89)		27.84 (22.29)		26.22 (23.99)	
Other	55.39 (19.21)		52.56 (19.47)		33.48 (22.88)		33.33 (24.47)	

Footnote: ^at-test; ^bANOVA.

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 (Table 9).

Table 9. Comparison of the average of the CBI dimensions according to academic characteristics.

	PB	p	SRB	p	CRB	p	TRB	p
	Mean		Mean		Mean		Mean	
	(SD)		(SD)		(SD)		(SD)	
How often do you think about quitting your course? ^b		<0.01		<0.01		<0.01		<0.01
Frequently	65.77 (20.48)		60.71 (21.32)		42.11 (23.97)		47.63 (27.45)	
Sometimes	58.72 (16.35)		56.77 (17.80)		37.70 (21.32)		35.23 (22.93)	
Never	52.23 (19.15)		44.77 (20.22)		26.93 (20.04)		27.54 (24.42)	
I am satisfied how my university is dealing with the pandemic ^b		0.13		0.01		<0.01		<0.01
Strongly Disagree	63.33 (22.96)		61.78 (24.55)		51.04 (25.79)		48.33 (28.97)	
Disagree	57.73 (16.53)		53.61 (19.19)		37.31 (20.42)		39.26 (25.00)	
Neutral	54.88 (20.91)		51.56 (19.78)		34.40 (21.69)		37.89 (27.08)	
Agree	57.37 (17.13)		51.35 (20.38)		33.79 (20.91)		32.97 (22.97)	
Strongly Agree	53.56 (20.25)		46.51 (21.15)		23.49 (20.23)		21.41 (21.68)	
I feel supported by my university during the COVID pandemic ^b		<0.01		<0.01		<0.01		<0.01
Strongly Disagree	65.13 (18.33)		61.10 (21.60)		40.76 (24.77)		47.28 (28.18)	
Disagree	52.82 (15.78)		50.29 (16.99)		39.89 (19.88)		40.04 (23.88)	
Neutral	58.06 (19.30)		54.66 (22.11)		33.02 (20.91)		32.97 (24.29)	
Agree	55.09 (18.51)		49.07 (19.60)		32.74 (22.25)		31.99 (23.49)	
Strongly Agree	55.11 (20.64)		46.91 (21.14)		23.59 (19.13)		22.65 (23.72)	

Footnote: ^bANOVA.

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, $p < 0.01$) (Table 10).

Table 10. Comparison of the mean of the CBI dimensions according to health and life habits characteristics.

	PB Mean (SD)	p	SRB Mean (SD)	p	CRB Mean (SD)	p	TRB Mean (SD)	p
Alcohol Consumption^b		0.89		0.61		<0.01		0.11
Excessively	56.25 (12.03)		41.07 (2.06)		62.50 (14.43)		56.25 (2.40)	
Moderately	56.49 (18.95)		51.19 (20.22)		33.56 (22.19)		31.83 (25.03)	
No consumption	55.65 (19.15)		50.78 (21.58)		30.05 (20.71)		34.03 (25.45)	
Antidepressant medications^a		0.36		0.17		<0.01		0.04
Yes	59.07 (18.89)		55.67 (21.36)		42.89 (23.38)		41.29 (29.91)	
No	56.00 (18.96)		50.65 (20.54)		31.89 (21.58)		32.16 (24.72)	
Sleep Quality^b		<0.01		<0.01		0.37		0.44
Poor	66.78 (22.21)		60.42 (23.63)		38.08 (24.98)		33.68 (25.24)	
Regular	59.44 (17.55)		53.51 (19.37)		33.33 (21.69)		35.07 (24.73)	
Good	53.75 (18.03)		49.09 (20.75)		31.67 (21.71)		31.02 (24.25)	
Very Good	51.06 (20.62)		46.21 (19.49)		31.22 (20.95)		32.59 (29.24)	

Footnote: ^at-test; ^bANOVA.

4.4 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.

CHAPTER 5

Summary of Novel Findings

1. Chapter 2 (A systematic review of the COVID-19 pandemic on academic burnout):
 - a. Our study was one of the first to review the COVID-19 pandemic on academic burnout since it was still initializing the investigations worldwide. A systematic review was conducted following the PRISMA guidelines to be able to select the main predictors and protective factors to burnout during the pandemic. A total of only 119 articles were first screened, and 6 articles were included in the qualitative synthesis. All of them were studies conducted with university students and none were found with graduate students.
 - b. We found a limited evidence for a negative relationship between overall burnout and academic performance in online teaching. Although the other 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 our systematic review suggests that COVID-19 pandemic impacted the academic burnout, it is necessary more articles to establish more positive or negative strength relationship, since we believe those factors that might contribute to a poor mental health in university students.
2. Chapter 3 (Academic Burnout, Family Functionality, Perceived Social Support and Coping among Graduate Students during the COVID-19 Pandemic):
 - a. A cross-sectional study was conducted with 519 graduate students across universities in Hungary and other European countries. 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.
 - 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. The association between academic burnout and family functionality are limited in literature and besides our study added evidence, to the best of our knowledge, is the first to explore this relationship among graduate students during COVID-19.
- d. 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. Chapter 4 (Academic Burnout among master and doctoral students during the COVID-19 pandemic):

- a. A cross-sectional study was conducted with 519 graduate students across universities in Hungary and other European countries. Our findings disclose the influence that the COVID-19 pandemic has had on the mental health of graduate students by analyzing the factors associated with Burnout Syndrome.
- b. We analyzed 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.
- c. 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.

- d. 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.
- e. 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.
- f. 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.

CHAPTER 6

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 ÍJS. 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 cardiarrspiratory clinical parameters in sepsis patients]. *Revista de enfermagem da ufsm*. 2018;8(2):399-409. <https://doi.org/10.5902/2179769224668>

ABSTRACTS RELATED TO THE THESIS

Andrade D, Ribeiro IJS, Maté O. Academic Burnout during the COVID-19 Pandemic
In: Kajos, Luca Fanni; Bali, Cintia; Puskás, Tamás; Horváth-Polgár, Petra Ibolya; Glázer-Kniesz, Adrienn; Tislér, Ádám; Kovács, Eszter (eds.) XI. Interdiszciplináris Doktorandusz Konferencia 2022. november 25-26 = 11th Interdisciplinary Doctoral Conference 25-26th of November 2022: absztraktkötet = Book of Abstracts
Pécs, Hungary: Doctoral Student Association of the University of Pécs (2022) 253 p. p. 182

Andrade D, Bencze N, Borodina D, Maté O. Recognizing and preventing Burnout Syndrome: a workshop experience report among PH.D. candidates.
In: Molnár, Dániel; Molnár, Dóra (eds.) XXV. Tavaszi Szél Konferencia 2022. Absztraktkötet
Bp, Hungary: Association of Hungarian PHD and DLA Students (2022) 799 p. p. 587

Andrade D, Ribeiro IJS, Marx F, Maté O. Academic Burnout at university: what it means.
In: Kajos, Luca Fanni; Bali, Cintia; Preisz, Zsolt; Polgár, Petra; Glázer-Kniesz, Adrienn; Tislér, Ádám; Szabó, Rebeka (eds.) 10th Jubilee Interdisciplinary Doctoral Conference: Book of Abstracts = 10. Jubileumi Interdiszciplináris Doktorandusz Konferencia: Absztraktkötet

Pécs, Hungary: Doctoral Student Association of the University of Pécs (2021) 347 p. pp. 154-154., 1 p.

Andrade D, Ribeiro IJS, Maté O. The Impact of Virtual online Teaching Due to the COVID-19 Pandemic on the Academic Burnout.

In: Maltepe University International Student Congress E-MUISC 20-21 Covid-19 & Health. Medical Sciences and Nursing (MEDNS): Book of Abstracts.

Istanbul, Turkey: Maltepe University (2021) 114 p. p. 104-105.

ADDITIONAL ABSTRACTS RELATED TO “HEALTH SCIENCES”

Andrade D, Marx Andrade F, Maté O. Burnout Syndrome among health professional on coronavirus outbreaks.

In: Csiszár, Beáta; Hankó, Csilla; Kajos, Luca Fanni; Mező, Emerencia (eds.) Medical Conference for PhD Students and Experts of Clinical Sciences 2021: Book of Abstracts

Pécs, Hungary: Doctoral Student Association of the University of Pécs (2021) 128 p. pp. 96-96., 1 p.

Marx F, **Andrade D**, Rétfalvi D. Overview of Hospital Design and the Impact of the Covid-19 Outbreak.

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Pécs, Hungary: Doctoral Student Association of the University of Pécs, pp 89-89 (2021)

Barreto Andrade DM, Maté O. Burnout Syndrome in geriatric nurses

In: Barna, Boglárka Johanna; Kovács, Petra; Molnár, Dóra; Pató, Viktória Lilla (eds.) XXIII. Tavaszi Szél Konferencia 2020. Absztraktkötet: MI és a tudomány jövője

Bp, Hungary: Association of Hungarian PHD and DLA Students (2020) 600 p. pp. 432-432., 1 p.

Barreto Andrade DM, Ribeiro IJS, Marx Andrade F, Maté O. Esgotamento profissional da enfermagem geriátrica no ambiente de trabalho [Geriatric Nursing Burnout in their workplace].

In: II Encontro de Geriatria e Gerontologia do Triângulo Mineiro [II Meeting of Geriatrics and Gerontology of the Triângulo Mineiro].

Minas Gerais, Brasil (2020):
<http://seer.uftm.edu.br/anaisuftm/index.php/eggtem/issue/view/134>.

Marx F, **Andrade D**, Rétfalvi D. Inclusão de idosos com demência como participantes ativos em estudos relacionados ao ambiente construído [Inclusion of elderly with dementia as active participants in studies related to the constructed environment].

In: II Encontro de Geriatria e Gerontologia do Triângulo Mineiro [II Meeting of Geriatrics and Gerontology of the Triângulo Mineiro].

Minas Gerais, Brasil (2020):
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Marx F, **Andrade D**, Rétfalvi D. Dealing with Early Dementia Symptoms in Studies related to the Environment.

In: Csiszár Beáta; Hankó Csilla; Kajos Luca Fanni; Mező (eds.). Medical Conference for PhD Students and Experts of Clinical Sciences: Book of Abstracts

Pécs, Hungary: Doctoral Student Association of the University of Pécs, p. 28. (2020)

Andrade D, Onchonga D, Prémusz V, Maté O. Burnout syndrome and depressive symptoms in nurses.

In: Csiszár, Beáta; Bódog, Ferenc (eds.) Medical Conference for PhD Students and Experts of Clinical Sciences: Book of abstracts

Pécs, Hungary: Doctoral Student Association of the University of Pécs (2019) 87 p. p. 38, 1 p.

Barreto Andrade DM, Marx Andrade F, Marta BN, Laís SS, Maté O. Alzheimer's disease and the elderly institutionalization

In: Bódog, Ferenc; Csiszár, Beáta (eds.) VIII. Interdiszciplináris Doktorandusz Konferencia 2019: absztraktkötet=8th Interdisciplinary Doctoral Conference 2019: Book of Abstracts

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Andrade D, Neves Pereira R, Maté O. Occupational risks and burnout syndrome in nursing professionals.

In: Németh, Katalin (eds.) Tavaszi Szél 2019 Konferencia. Nemzetközi Multidiszciplináris Konferencia: Absztraktkötet

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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>

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APPENDIX A

CHERRIES-Checklist for reporting results of Internet-E-Surveys.

Reference: Eysenbach G. (2004) Improving the quality of Web surveys: the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) J Med Internet Res 6(3):e34 doi:10.2196/jmir.6.3.e34

Item Category	Checklist Item	Explanation
Design	Describe survey design	The target population was master's and Ph.D./DLA students. The study involved a convenience sample. Inclusion criteria were graduate students at the master or Ph.D./DLA level by voluntary participation. The exclusion criteria were incomplete questionnaires.
IRB	IRB approval	Yes. The study protocol was approved by the ethics committee of University of Pécs.
	Informed consent	On the welcome page of the online survey, participants were informed about the research and the informed consent was obtained from all those agreeing to answer the survey. It was displayed that the survey would take approximately 15 minutes to complete, that all responses were confidential and anonymous. Consent was indicated when respondents clicked the 'I consent' button at the bottom of this same page.
	Data protection	No personal information was collected (Random IDs were given to participants in case they wished to withdraw their data).
Development and pretesting	Development and testing	The survey was designed using input from earlier research. The survey was pre-tested by a pilot study, adapted and approved by the research team.
Recruitment process and description of the sample having access to the questionnaire	Open survey versus closed survey	Open survey
	Contact mode	The form was disseminated through emails and social media channels from communities for graduate students including an invitation to participate. We also asked consented participants to pass along the survey link to other eligible participants.

	Advertising the survey	Email invitation was sent to several coordinators of various graduate groups and organizations with the link of the survey to be disseminate to their listservs. Also, a message was posted on the social media channels such Facebook and Instagram of graduate student’s pages inviting eligible participants to complete the survey
Survey administration	Web/E-mail	Web-based survey, hosted by the Google Forms platform. Data was entered automatically when participants responded to the questions.
	Context	Google Form platform.
	Mandatory/ Voluntary	Voluntary
	Incentives	None
	Time/Date	September 2021 to March 2022
	Randomization of items or questionnaires	No randomization of items was used.
	Adaptive questioning	Adaptive questioning was used.
	Number of items	2 to 9
	Number of screens (pages)	6 screens
	Completeness check	In case of incomplete answers, there was an alert before leaving the survey page on which the item was contained. Most items, except screener items and those items required for adaptive questioning included a “I don’t know” or “I prefer not to say” option.
	Review step	Participants were able to change their responses by using a “Back” button at the bottom of each screen.
Response rates	Unique site visitor	Only participants or visitors completing at least the first page and proceeding to the next page were counted. Thus, calculation of views or participation

		rates were not possible.
	Completion rate	Of the 542 respondents who started the survey, 519 completed it, giving a completion rate of 95.75%.
Preventing multiple entries from the same individual	Cookies used	Cookies were not used.
	IP check	Not used to maintain anonymity.
	Log file analysis	The study did not include a log file analysis.
	Registration	No registration required.
Analysis	Handling of incomplete questionnaires	Only completed questionnaires were included in the analysis.
	Questionnaires submitted with an atypical timestamp	Average time of access was recorded, but no respondents were removed from the survey for a minimal time answer.
	Statistical correction	No statistical correction was performed.

DATA AVAILABILITY STATEMENT

The datasets, questionnaires and informed consent used in this research are available from the author upon reasonable request.

ETHICAL APPROVAL



PÉCSI TUDOMÁNYEGYETEM
KLINIKAI KÖZPONT
Regionális Kutatásetikai Bizottság

Certificate

Pécs, 25. August 2023.

To Whom It May Concern,

Record number: 8471 – PTE 2023.

Vizgálatvezető/Principal Investigator: Diego Andrade PhD student
Témavezető/Supervisor: dr. Máté Orsolya PTE ETK Doktori Iskola Faculty of Health Sciences University of Pécs, Hungary, Doctoral School of Health Sciences

Cím/Title: Burnout Syndrome Among Graduate Students During the COVID-19 Pandemic – Burnout-szindróma a graduális képzésben résztvevő hallgatók körében a COVID-19 pandémia alatt.

Sponsor/sponsor: self-initiated examination by questionnaires for collection of data for writing a Thesis - saját kezdeményezésű kérdőíves felmérés tézis írás céljából

Mellékletek: a vizgálatvezető benyújtotta a 8471 – PTE 2020. számú vizsgálat módosítási kérelmét, mert a pandémia miatt az idők otthonában nem tudott adatokat gyűjteni. A módosított vizsgálatban a graduális képzésben levő hallgatókat kívánja tesztelni, a következő dokumentumokat adta be: (1.) kérelem; (2.) tudományos és irodalmi háttér; (2.) protokoll: kérdőíves felmérés angol, magyar nyelven; (3.) résztvevők tájékoztatója magyar és angol nyelven; (4.) támogató nyilatkozat a témavezető és a Doktori Iskola titkárá részéről;

Supplements: the PI sent a letter about modification of 8471 – PTE 2020. permission as during of the pandemic he could not collect data in the nursing home. After modification he plans to test the students in graduated programme.

- (1.) letter to the Head of Regional and Institutional Research Ethical Committee;
- (2.) Scientific and literal background;
- (3.) Questionnaires for data collection about burn syndrome among graduate students. Questions in original English and translated into Hungarian language
- (4.) Participant's Information Sheet; (5.) Informed Consent Form;
- (6.) Recommendation letter from the supervisor and the Secretary of the Doctoral School of Health Sciences, Faculty of Health Sciences, University of Pécs, Hungary

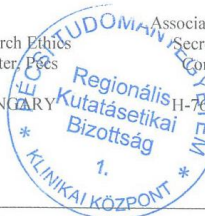
Döntés: a PTE KK RKEB a **2023. augusztus 25.-ei ülésén kialakított szakmai és etikai vélemény alapján tudomásul vette** a vizsgálat módosított protokoll szerinti kivitelezését. Egyúttal felkérjük a tisztelt vizsgálat vezetőt, hogy a vizsgálatok lezárulása után **összefoglaló jelentést** nyújtson be Bizottságunknak.

Decision: The Regional Research Ethic Committee as the Institutional Review Board **discussed** your modified application on its meeting held on 25th of August 2023. and **we endorse** the investigation according to its modified protocol. At last we ask the principal investigator to send a summary of results for our Committee after he finished the investigation.

Yours sincerely

Samuél Komoly
Professor of Neurology
Chairman of the Regional Research Ethics
Committee of the Medical Center, Pécs
Institutional Review Board
H-7623 Rákóczi str. 2. Pécs/HUNGARY
phone 00-36-72-536302
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Béla Kocsis
Associate professor of Clinical Microbiology
Secretary of the Regional Research Ethics
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**SUBMISSION OF THE DOCTORAL DISSERTATION AND
DECLARATION OF THE ORIGINALITY OF THE DISSERTATION**

**Submission of the doctoral dissertation and declaration of the
originality of the dissertation**

The undersigned,
Name: Diego Micael Barreto Andrade
Maiden name: Diego Micael Barreto Andrade
Mother's maiden name: Hildenice Barreto Andrade
Place and time of birth: Irece-Brazil, 1989.11.30

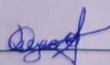
on this day submitted my doctoral dissertation entitled: The Effect of Burnout Syndrome on Graduate Students during the COVID-19 Pandemic

to the
PR- 1. Frontiers of Health Sciences Programme
of the Doctoral School of Health Sciences, Faculty of Health Sciences, University of Pécs.
Names of the supervisor: Dr. habil Orsolya Máté

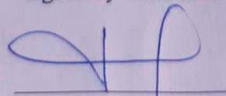
At the same time, I declare that
- I have not submitted my doctoral dissertation to any other Doctoral School (neither in this country nor abroad),
- my application for degree earning has not been rejected in the past two years,
- in the past two years I have not had unsuccessful doctoral procedures,
- my doctoral degree has not been withdrawn in the past five years,
- my dissertation is independent work, I have not presented others' intellectual work as mine, the references are definite and full, on preparation of the dissertation I have not used false or falsified data.

Furthermore, I declare that I contribute to the request of DOI identification of my doctoral dissertation.

Dated: 2023.11.10



signed by Candidate



Supervisor