

The Association of Stress and Burnout in Students: Looking at the Role of Coping

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Abstract

This study examined the relationship between perceived stress and burnout among university students, as well as subgroup differences and the moderating role of coping strategies. Guided by the Job Demands-Resources (JD-R) and Study Demands-Resources (SD-R) frameworks, perceived stress was conceptualized as a study demand and coping as a personal resource. A total of 6,610 students from Erasmus University Rotterdam completed an online survey including the *Perceived Stress Scale* (PSS-4), *Maslach Burnout Inventory-Student Survey* (MBI-SS), and *Brief-COPE*. Linear regressions, *t*-tests, ANOVAs, and hierarchical regressions were conducted. Perceived stress strongly predicted overall burnout ($R^2 = .34$) and all burnout dimensions, with the strongest association for emotional exhaustion ($R^2 = .30$), followed by cynicism ($R^2 = .18$) and reduced academic efficacy ($R^2 = .17$). Female students reported higher stress ($d = .30$) and higher burnout ($d = .08$). Students surveyed during the COVID-19 pandemic showed higher levels of both ($d = .23$). Bachelor students reported higher stress than master students ($d = .06$), whereas master students reported higher burnout ($d = .09$). Stress and burnout also differed significantly across faculties, with economic, law, social and behavioural science, and history, culture and communication students reporting the highest levels, and medical students the lowest. Coping styles explained small but significant

additional variance in burnout ($\Delta R^2 = .001$). Problem-focused coping was associated with lower burnout ($\beta = -.19$), while emotion-focused ($\beta = .05$) and avoidant-focused coping ($\beta = .15$) were associated with higher burnout. Only avoidant-focused coping significantly moderated the stress-burnout relationship, slightly weakening the association. These findings highlight the central role of perceived stress in student burnout and the need for interventions supporting vulnerable groups and promoting adaptive coping.

Studying at university is often viewed as a challenging and stressful period for young adults (Pierceall & Keim, 2007; Wing et al., 2018). Students face academic, personal, financial, and social demands (Graves et al., 2021; Skowron et al., 2004). Common stressors include academic workload, internships, part-time jobs, social relationships, pressure from parents, and feelings of loneliness when living away from home (Abouserie, 1994; Da Oliva Costa et al., 2012; Frazier & Schauben, 1994; Larson, 2006; Nelson et al., 2001; Ross et al., 1999; Skowron et al., 2004; Wing et al., 2018). El Ghoroury et al. (2012) reported that over 70% of psychology students experienced stressors that interfered with their ability to perform at their full potential, reflecting how stress is a pervasive issue in higher education.

The combination of these stressors and the increased sensitivity to stress during the transition from adolescence to adulthood (Towbes & Cohen, 1996; Zhang et al 2018a) can increase students' vulnerability to developing psychological problems (Bhugra et al., 2021; Madigan et al., 2023). It is important to note that not all stress is harmful. Moderate levels of stress can be adaptive, enhancing motivation and academic performance (Ma et al., 2022). However, high or chronic stress has consistently been associated with negative psychological, emotional, and behavioural outcomes, such as depression, loneliness, anxiety, suicidality, and sleep disturbances (Bailey & Miller, 1998; Bhugra et al., 2021; Chang, 2001; Duffy et al., 2019; Dyson & Renk, 2006; Edwards et al., 2001; Lin & Huang, 2012; Twenge et al., 2017; Zhang et al., 2018b). Moreover, stress can cause cognitive limitations, including reduced attention and concentration, and have a negative impact on academic performance (Lee et al., 2010; Özhan, 2021; Pritchard et al., 2007; Rafati et al., 2020). Together, these findings demonstrate that stress represents a significant risk factor for students' mental health and academic success.

One serious consequence of prolonged stress is burnout (Maslach & Schaufeli, 2001). Burnout is a psychological syndrome that results from longstanding stressors and demands,

without adequate resources to cope (Fiorilli et al., 2017; Maslach & Leiter, 2008; Salmela-Aro et al., 2009). Burnout was first described in human services professionals (Maslach & Jackson, 1981) as a multidimensional syndrome that develops gradually, characterized by three dimensions: emotional exhaustion, cynicism, and reduced personal efficacy (Maslach et al., 1996). Even though it was first defined as a work-related syndrome, it is also relevant to students (Schaufeli et al., 2002). Academic activities closely resemble work-related tasks, such as completing structured activities with specific performance goals. Student burnout therefore reflects a multidimensional syndrome of a depletion of energy and fatigue from academic demands, a cynical and detached attitude toward one's study, and reduced sense of academic efficacy (Salmela-Aro et al., 2009; Schaufeli et al., 2002).

The prevalence of student burnout has been mainly studied in health science students like medical or nursing students and ranges from 7 to 75% (Erschens et al., 2018). For example, Kong et al. (2022) reported a burnout prevalence of 23% among nursing students, Michael et al. (2024) reported a prevalence of 37% among medical students, and Tlili et al. (2020) reported a prevalence of 65% among health science students. These differences may reflect variations in academic pressure, clinical workload, and support systems.

The relationship between stress and burnout has been demonstrated consistently across different contexts. For example, Spaan et al. (2024) found that perceived stress at work was significantly associated with burnout among healthcare professionals, while Gao et al. (2023) showed that academic stress correlated positively with academic burnout in adolescents.

Among the three components of burnout, emotional exhaustion is considered the core and most direct response to stress (Maslach, Schaufeli & Leiter, 2001; Schaufeli & Taris, 2013). Cynicism and reduced academic efficacy are regarded as secondary outcomes that may develop as a consequence of prolonged exhaustion. Empirical findings however have showed inconsistent results. Ma et al. (2022) found positive correlations between perceived stress and

both emotional exhaustion and cynicism, and a negative correlation with efficacy. Similarly, Schaufeli et al. (2002) reported strong correlations between stress and emotional exhaustion, moderate correlations with cynicism, and weak negative correlations with academic efficacy. Lee and Ashforth (1996) found that emotional exhaustion was the first and direct reaction to stress, followed by cynicism as a coping mechanism, while the relationship between stress and efficacy was weak or nonsignificant. Taken together, these findings suggest that the link between perceived stress and academic efficacy remains unclear, with studies differing in strength of this relationship,

A widely applied theoretical framework for understanding how stress leads to burnout is the Job Demands-Resources (JD-R) model (Schaufeli & Taris, 2013). This model proposes that all aspects of work can be classified as either demands or resources. Demands are physical, cognitive or emotional aspects that require sustained effort, while resources help individuals achieve their goals and buffer the impact of these demands. Excessive demands may lead to strain and exhaustion through the health impairment process, whereas sufficient resources may stimulate engagement and motivation through the motivational process (Schaufeli & Taris, 2013). Recently, the model has been adapted to the educational context as the Study Demands-Resources (SD-R) theory (Bakker & Mostert, 2024). Similar to employees, students face various demands and possess resources such as supportive lecturers, constructive feedback, and social support from peers and family (Bakker & Mostert, 2024). Besides study resources, the SD-R theory highlights the role of personal resources, such as optimism, hope and resilience. Excessive study demands may trigger the health impairment process leading to burnout.

Both Schaufeli and Taris (2013) and Bakker and Mostert (2024) stated that demands are strongly correlated with emotional exhaustion and often also with cynicism, but that relationships with academic efficacy are less consequent. Feelings of competence and efficacy

are suggested to be more influenced by the availability of resources rather than stress itself (Bakker & Mostert, 2024; Schaufeli & Taris, 2013).

Student burnout has been linked to a range of negative outcomes, including lower academic performance, reduced engagement, and higher dropout risk (Dyrbye et al., 2009; Madigan & Curran, 2020; Özhan, 2021). It is also associated with psychological problems such as anxiety, depression, and reduced well-being (Deeb et al., 2017; Dobson et al., 2020; Dyrbye et al., 2008), as well as physical symptoms like fatigue, sleep disturbances, and long-term health risks (Hwang & Kim, 2022; Jackson et al., 2016; Naderi et al., 2021; Pacheco et al., 2017). These consequences highlight the serious personal and academic risks of burnout and emphasize the importance of understanding its underlying mechanisms for effective prevention and intervention strategies.

Several demographic and contextual factors have been associated with differences in both stress and burnout among university students. Gender differences are one of the most studied aspects and numerous studies have reported that female students experience higher levels of stress compared to males (Brougham et al., 2009; Gibbons, 2010; Graves et al., 2021; Pierceall & Keim, 2007). Similar patterns have been found for burnout (Briggs et al., 2023), specifically on the dimension emotional exhaustion (Fiorilli et al., 2022; Purvanova & Muros, 2010). These gender differences can be explained by the way women perceive and cope with stress, as well as by their social roles (Matud, 2004). Women tend to appraise situations as more threatening or stressful and often are more affected by the stress of those around them, due to their greater emotional involvement and biological factors (Kajantie & Phillips, 2005; Matud, 2004). Furthermore, women are more frequently exposed to stressful situations, as their positions at work and within their family tend to be less favourable (Matud, 2004).

Burnout has been studied primarily within health-related disciplines, such as medicine and nursing (IsHak et al., 2013). Some studies suggest that medical students are more burdened by stress-related disorders than students in the general population (Dyrbye et al., 2006; Dyrbye et al., 2014; Romani & Ashkar., 2014), while others have found higher stress and burnout levels in students from other disciplines such as law, engineering, and business (Dahlin et al., 2011; Helmers et al., 1997; Leahy et al., 2010). Direct comparisons are limited and inconsistent (Olson et al., 2025) and most studies suffer from methodological limitations and their generalizability to Western university contexts is questionable. This underscores the need for broader, methodologically robust research in an academic context.

Differences may also exist across study phases. Rico and Bunge (2020) found that third- and fourth-year psychology students reported higher levels of stress and burnout than earlier-year students, possibly due to the emphasis on clinical work and internship applications. However, Jordan et al. (2020) observed that first-year students also experience high stress and burnout levels, although they did not directly compare these outcomes across study years. According to the transactional model of stress and coping (Lazarus & Folkman, 1984), stress occurs when individuals perceive that their demands exceed their coping resources. During the beginning of university, students typically face new and demanding academic and social challenges, while still having relatively few coping resources, resulting in elevated stress levels. From the perspective of the JD-R and SD-R theories (Bakker & Mostert, 2024; Schaufeli & Taris, 2013), newer students are therefore more likely to experience an imbalance between study demands and available resources. Over time however, habituation and maturational processes may reduce stress responses (Demerouti et al., 2001). Habituation theories suggest that repeated exposure to similar stressors reduces the physiological response, compared to the stronger reactions elicited during initial exposure (Grissom & Bhatnagar, 2009), indicating that individuals may become less reactive to

recurring stressors over time. Similarly, repeated exposure to stressors may increase resilience and promote effective coping (McEwen, 1998), leading to less stress over time. However, when stress is chronic or uncontrollable, stress may lead to sensitization and maladaptation. Maturational theories further suggest that during adolescence and young adulthood, individuals develop a broader and more flexible range of coping strategies and learn to match coping efforts to the characteristics of the stressor (Compas et al., 2001; Heffer & Willoughby, 2017). Supporting this view, Wingo et al. (2014) found that adaptive coping styles increased from age 17 to 33, whereas maladaptive coping styles declined, suggesting that older students may be better equipped to cope with stress. Consequently, master students may report lower levels of subjective stress compared to bachelor students. At the same time, prolonged exposure to academic demands across multiple years may increase the risk of burnout for master students (Demerouti et al., 2001).

Contextual factors such as the COVID-19 pandemic have also influenced stress and burnout levels. Studies have reported increases during the pandemic, driven by social isolation, online learning and uncertainty (Abraham et al., 2024; Salmela-Aro et al., 2022).

As noted earlier, stress occurs when individuals perceive that their demands exceed their coping resources, and the development of coping resources may partially explain differences in stress levels across student groups. More broadly, how students deal with stress may play a crucial role in whether stress develops into burnout. Individuals differ in how they perceive stress, and as a result use different coping strategies (Dwyer & Cummings, 2001). Studies found that students use coping mechanisms like positive reappraisal, support seeking, and planning to control and reduce their stress (Freire et al., 2020). Coping can be defined as the ability to adapt in response to a range of events that are perceived stressful (Kohn et al., 1994). Coping strategies have been subdivided into various categories like adaptive and maladaptive, active and passive, positive and negative, and problem-focused and emotion-

focused (Hunt et al., 2002; Ma et al., 2022). Active, positive, or adaptive coping refers to purposeful ways to deal with problems and seek comfort and social support, like planning and the use of instrumental support (Hunt et al., 2002; Ma et al., 2022). Passive, negative, or maladaptive coping refers to straying away from support, like self-imposed social isolation, neglecting, avoidance, and denial. Folkman (2013) identified problem-focused and emotion-focused coping. Problem-focused coping strategies are behavioural activities, such as action and planning, aimed at solving the stressful situation (Brougham et al., 2009; Folkman, 2013; Kohn et al., 1994). Emotion-focused coping involves expressing emotions and changing expectations, aimed at managing the response. Some studies add a third coping mechanism to these two, namely avoidant-focused coping. This involves attempts to remove the stressful situation, like rumination and procrastination (Kohn et al., 1994). While problem-focused coping is considered an adaptive strategy, avoidant-focused coping is considered maladaptive. Emotion-focused coping may be adaptive when stressors are uncontrollable, but maladaptive when the problem is within one's control (Lazarus & Folkman, 1984).

Empirical studies have demonstrated that coping moderates the relationship between stress and burnout. Cheng et al. (2022) found that coping strategies moderated the effect of stressors on psychological well-being in nursing students, with problem-focused coping buffering negative outcomes. Similarly, Spaan et al. (2024) reported that problem-focused coping reduced the impact of high stress on burnout symptoms among healthcare professionals. Meta-analytic evidence confirms that problem-focused coping is generally negatively associated with burnout (Shin et al., 2014; Simonsen et al., 2023). In contrast, avoidant coping consistently predicts higher levels of burnout (Brougham et al., 2009; Gibbons, 2010). Emotion-focused coping shows inconsistent results, depending on which specific strategy is used (Shin et al., 2014). Personal resources conceptually related to coping,

such as academic self-efficacy, have also been found to buffer stress-burnout links, although these effects may depend on context (Gao, 2023).

According to the SD-R theory, different pro-active study behaviours have been linked to optimizing study demands and resources and could act as a buffering factor against stress and burnout (Bakker & Mostert, 2024). Active coping focused on increasing control and solving problems, which can be linked to problem-focused coping, lowered stress and burnout (Bakker & Mostert, 2024).

The JD-R and SD-R theory do not prescribe a fixed set of variables but rather provide a framework that distinguishes between demands and resources. In this framework, perceived stress can be conceptualized as a study demand, while coping strategies serve as personal resources that buffer the impact of these demands. The SD-R theory is still relatively new and requires further empirical testing, offering an opportunity to contribute to its understanding. These theories provide an integrative explanation of how prolonged exposure to stress can lead to burnout and how resources, such as coping strategies, can protect against these effects.

The transactional model of stress and coping (Lazarus & Folkman, 1984) further emphasizes the individual's appraisal of stressors and the coping strategies used in response. According to this model, stress results from the interaction between person and environment and depends on whether an event is perceived as threatening (primary appraisal) and whether sufficient coping resources are available (secondary appraisal). These findings imply that coping style may alter the extent to which stress translates into burnout. Students relying on problem-focused coping may be less vulnerable, whereas those who frequently use avoidant-focused coping may be more susceptible. This suggests that coping can moderate the relationship between stress and burnout.

Given the high prevalence of stress and burnout among university students and their negative consequences, it is essential to understand the mechanisms underlying this

relationship. Previous studies have provided important insights but have often specifically focused on medical students, or used inconsistent measures, making it difficult to generalize findings. Moreover, the moderating role of coping seems to have an important role in this relationship but remains insufficiently understood.

The present study examines the relationship between perceived stress and burnout among a broad sample of university students. Specifically, this study explores how perceived stress is associated with overall burnout as well as with the three burnout dimensions: emotional exhaustion, cynicism, and reduced academic efficacy. In addition, the study investigates whether levels of stress and burnout differ across demographic subgroups, including gender, field of study, study level, and whether students were assessed during the COVID-19 pandemic. Finally, the study examines whether coping strategies moderate the association between perceived stress and burnout.

Based on previous literature and the conceptualization of burnout, it is hypothesized that higher levels of perceived stress will be positively associated with overall burnout (Hypothesis 1a). In line with theoretical and empirical literature, the strongest relationship is expected between perceived stress and emotional exhaustion (Hypothesis 2a), followed by cynicism (Hypothesis 2b), while the association between stress and academic efficacy (Hypothesis 2c) is expected to be weaker or nonsignificant. Furthermore, consistent with prior studies, female students (Hypothesis 3a), health science students (Hypothesis 3b), and students assessed during the COVID-19 period (Hypothesis 3c) are expected to report higher levels of stress and burnout than their compared groups. Bachelor students are expected to experience higher levels of perceived stress (Hypothesis 3d), whereas master students are expected to report higher levels of burnout (Hypothesis 3e). Finally, coping style is expected to moderate the association between perceived stress and burnout (Hypothesis 4a). Specifically, a greater use of problem-focused coping is expected to be associated with a

weaker positive relationship between stress and burnout (Hypothesis 4b). A greater use of emotion-focused coping is expected to have no significant effect, since it is potentially buffering or worsening the relationship depending on how controllable the stressor is perceived to be and which specific coping strategy is used (Hypothesis 4c). In contrast, a greater use of avoidant-focused coping is expected to strengthen the positive association between perceived stress and burnout (Hypothesis 4d).

This study aims to improve our understanding of the relationship between perceived stress and burnout, examine the differences in stress and burnout across student subgroups, and research how coping strategies influence the relationship between stress and burnout. These insights can contribute to a better understanding of stress, burnout and coping mechanisms. It can also contribute to more advanced theory and the development of effective prevention and intervention strategies for stress and burnout in higher education. By analysing the demographics, the prevention and intervention strategies can be adjusted on specific demographics of students.

Method

Participants

Participants were eligible to participate if they were enrolled as students at Erasmus University Rotterdam and provided informed consent. Participants were excluded if they did not start the questionnaire, if they had duplicate entries, or if they had missing data on the key variables. In total, 12826 students participated across the four measurement waves, including returning participants. The sample included both bachelor and master, female and male, and national and international students from various faculties.

Materials

Demographic variables were assessed using self-report items included at the beginning of the questionnaire. Participants provided information on age, gender, LGBTQIA+ identification, nationality, cultural background, parental education, study level, study discipline, average grade and faculty. For the present study, only gender, study level and faculty were included in the analyses. For faculty, the standard faculties of Erasmus University Rotterdam were used, namely: Erasmus School of Economics (ESE), Erasmus School of Law (ESL), Erasmus School of History, Culture and Communication (ESHCC), Erasmus School of Social and Behavioural Sciences (ESSB), Erasmus School of Philosophy), Rotterdam School of Management (RSM), Erasmus School of Health Policy and Management (ESHPM), Erasmus Medical Centre (EMC), and Erasmus University College (EUC).

The *Maslach Burnout Inventory-Student Survey* (MBI-SS; Schaufeli et al., 2002) is a self-report questionnaire designed to measure the three core dimensions of student burnout: emotional exhaustion, cynicism, and academic efficacy. The scale consists of 15 items, each rated on a 7-point Likert scale, ranging from 0 (never) to 6 (everyday). Respondents indicate how frequently they experience the state described in each item. The scale contains three subscales. The emotional exhaustion subscale includes five items (items 1, 4, 6, 8, and 12) with scores ranging from 0 to 30. The cynicism subscale consists of four items (items 2, 9, 10, and 14), with scores between 0 and 24. The academic efficacy subscale includes six items (items 3, 5, 7, 11, 13, and 15) with scores ranging from 0 to 36. To calculate a total burnout score, the academic efficacy scale is reverse coded, so that lower academic efficacy contributes to higher burnout. The total score ranges from 0 to 90, with higher scores indicating more experienced burnout symptoms. The MBI-SS has been validated across various populations and shows good psychometric properties (Schaufeli et al., 2002). In our current sample, the total MBI-SS subscale ($\alpha = .90$), emotional exhaustion subscale ($\alpha = .91$),

cynicism subscale ($\alpha = .90$), and reduced academic efficacy subscale ($\alpha = .82$) showed good to excellent internal consistency. Although the MBI-SS was designed to measure the three core dimensions of burnout, in the present study a total burnout score was computed combining all items. Using a total score allowed us to examine burnout as a general outcome variable in relation to stress and coping, which aligns with research questions of this study. This approach is supported by the internal consistency of the total scale ($\alpha = .90$), indicating that the items together capture a coherent construct of overall burnout. Furthermore, the three subscales were moderately intercorrelated ($r = .33 - .57$), supporting the use of an overall burnout indicator in addition to the separate dimensions.

The *Perceived Stress Scale-4* (PSS-4; Cohen et al., 1983) is a self-report questionnaire that measures the degree to which situations in one's life are appraised as stressful over the last month. The scale has 4 items, rated on a 5-point Likert scale from 0 (never) to 4 (very often), with scores ranging from 0 to 16. Items 2 and 3 are reverse coded. Higher scores indicate higher levels of perceived stress. Although shorter than the PSS-10 version, the PSS-4 demonstrated acceptable reliability and validity across diverse populations (Lee, 2012; Schmalbach et al., 2025; Warttig et al., 2013). The PSS-4 ($\alpha = .77$) demonstrated acceptable internal consistency in our current sample.

The *Brief-COPE questionnaire* is a self-report questionnaire designed to measure the different coping strategies individuals use to manage stress (Carver, 1997). It consists of 28 context-free items, with responses given on a 4-point Likert scale ranging from 1 (I usually don't do this at all) to 4 (I usually do this a lot). The items are grouped into 14 subscales: (1) Active coping, (2) Use of instrumental support, (3) Positive reframing, (4) Planning, (5) Emotional support, (6) Venting, (7) Humor, (8) Acceptance, (9) Religion, (10) Self-blame, (11) Self-distraction, (12) Denial, (13) Substance use, (14) Behavioural disengagement. Every subscale consists of 2 items, and the scores can range from 0 to 8. The scale was reported both

reliable and valid, with reliability coefficients of above .50 (Carver, 1997). The subscales can be categorized into three higher order dimensions: problem-focused coping, emotion-focused coping, and avoidant-focused coping. The problem-focused coping subscale includes eight items (items 2, 7, 10, 12, 14, 17, 23, and 25) with scores ranging from 0 to 32. The emotion-focused coping subscale includes twelve items (items 5, 8, 13, 15, 18, 20, 21, 22, 24, 26, 27, and 28) with scores ranging from 0 to 48. The avoidant-focused coping subscale consists of eight items (items 1, 3, 4, 6, 8, 11, 16, and 19) with scores between 0 and 32. However, results regarding the factor structure are inconsistent (Dias et al., 2012; Hanfstingl et al., 2021; Poulus et al., 2020; Solberg et al., 2021). Dias et al. (2012) and Poulus et al. (2020) validated the three higher order structure, while other studies only support the original 14-factor structure and do not confirm additional higher-order dimensions (Hanfstingl et al., 2021). Although Carver (1997) recommends that researchers conduct their own factor analysis when using the instrument, and previous research has shown that the factor structure may vary across cultural, situational and linguistic contexts (Hanfstingl et al., 2021; Solberg et al., 2021), conducting a confirmatory factor analysis was not possible with the available software. Therefore, we relied on the established three-factor structure. In our current sample, the problem-focused coping subscale ($\alpha = .83$) demonstrated good internal consistency. The emotion-focused coping subscale and the avoidant-focused coping subscale demonstrated questionable internal consistency (both $\alpha = .65$).

Procedure

Participants were recruited through institutional email invitations distributed by Erasmus University Rotterdam and were asked to fill in a questionnaire. Students provided informed consent before accessing the questionnaire. To attract participants, respondents had the opportunity to win a 50-euro coupon. Data has been collected through an online

questionnaire administered in English. Surveys were conducted annually and all responses were collected anonymously. Participation was voluntary and students could withdraw at any time.

This study used a repeated cross-sectional design with four waves of data collection (Time 1: November – December 2020, time 2: November – December 2021, time 3: November – December 2022: time 4: November – December 2023). The first two waves took place during the COVID-19 pandemic.

Data Analyses

All analyses were conducted using IBM SPSS Statistics (version 30). Data from the four measurement waves were merged into a single dataset. If participants had completed the questionnaire more than once across different waves, only their first response was retained to avoid duplication. Participants with missing values on key variables or implausible age values (e.g. younger than 16 or older than 100) were excluded, as these were considered input errors. In addition, a binary variable indicating whether data were collected during the COVID-19 pandemic was created, where waves 1 and 2 were coded as COVID and waves 3 and 4 were coded as non-COVID. This variable was included in the analyses to account for potential differences between pandemic and non-pandemic periods.

Prior to the analyses, data were screened for both univariate and multivariate outliers. Standardized values were calculated to detect univariate outliers, while standardized residuals and Cook's distances were used to identify multivariate outliers. Descriptive statistics were calculated for all variables, and internal consistency of the scales was assessed using Cronbach's alpha.

To address the first research question, a simple linear regression was performed to test whether perceived stress predicted overall burnout. For the second research question, separate

linear regressions were conducted with perceived stress as the predictor and the three burnout dimensions as dependent variables. For the third research question, several *t*-tests and ANOVAs were conducted. To address the fourth research question, hierarchical regression analyses were conducted to test whether coping styles moderated the relationship between perceived stress and burnout. In the first step, perceived stress and the three coping styles were entered as predictors, followed by the interaction terms between stress and each coping style in the second. All continuous variables were mean centered prior to creating interaction terms. Assumptions of normality, homoscedasticity, and multicollinearity were evaluated. Statistical significance was evaluated at $p < .05$ for all analyses.

Results

Sample

Sample and Exclusions

12826 participants completed the questionnaire. Based on the inclusion and exclusion criteria, the final sample comprised 6160 participants. For the outliers, some participants had standardized values or residuals exceeding 3, but no participants had Cook's distances greater than one. All cases with outliers showed outlying values on only one variable. After further inspection, these values appeared plausible and reflected normal variability within the dataset. Therefore, no cases were excluded from the analyses based on outliers.

Descriptive Statistics

Table 1 presents the demographic characteristics of the sample. Majority of participants identified as female (70.1%), followed by male (28.8%), and other (1.1%). The average age of participants was 21.96 years ($SD = 5.60$). Most participants were bachelor students (64%), and 54.4% of participants completed the questionnaire during the COVID-19

pandemic. Participants represented a range of faculties, with the largest groups coming from the ESSB faculty (23.1%) and the RSM faculty (22.3%). Table 2 shows the means, standard deviations, and score ranges for stress, total burnout, the three burnout subscales, and the three coping subscales.

Table 1

Demographic Characteristics of the Sample

Variable	Category	N	%
Gender	Male	1775	28.8
	Female	4317	70.1
	Other	68	1.1
Study level	Bachelor	3942	64.0
	Master	2218	36.0
COVID	No COVID	2812	45.6
	COVID	3348	54.4
Faculty	Erasmus School of Economics	939	15.2
	Erasmus School of Law	549	8.9
	Erasmus School of History, Culture and communication	646	10.5
	Erasmus School of Social and Behavioural Sciences	1422	23.1
	Erasmus School of Philosophy	85	1.4
	Rotterdam School of Management	1371	22.3
	Erasmus School of Health Policy and Management	294	4.8
	Erasmus Medical Centre	705	11.4
	Erasmus University College	149	2.4

Table 2

Descriptive Statistics for Variables

Variable	M	SD	Min	Max
Age	21.9	4.0	16	67

Perceived stress	7.45	3.1	0	16
Total burnout	49.59	17.07	15	105
Emotional exhaustion	20.49	7.85	5	35
Cynicism	11.60	7.01	4	28
Reduced academic efficacy	17.51	6.45	6	42
Problem-focused coping	21.39	4.88	8	32
Emotion-focused coping	28.92	5.27	12	48
Avoidant-focused coping	14.82	3.70	8	32

Stress as a Predictor of Burnout

Before conducting regression analyses, assumptions of linearity, homoscedasticity, and normality of residuals were evaluated using histograms, scatterplots, and Q-Q plots. These assumptions were met for all variables. The cynicism subscale showed slight right-skewness, but this was not problematic given the large sample size and the robustness of linear regression analyses.

Four separate linear regressions were conducted to examine whether stress predicted burnout and its dimensions. In line with Hypothesis 1, stress significantly predicted total burnout, with the model explaining 34% of the variance in burnout scores, $F(1, 6158) = 3109.78, p < .001, R^2 = .34$. The regression coefficient was significant, $B = 3.16, SE = .057, \beta = .58, t = 55.77, p < .001$. In line with Hypothesis 2a, stress also significantly predicted emotional exhaustion, $F(1, 6158) = 2662.40, p < .001, R^2 = .30$. The regression coefficient indicated a strong association, $B = 1.38, SE = .027, \beta = .55, t = 51.60, p < .001$. Similarly, in line with Hypothesis 2b, stress significantly predicted cynicism, $F(1, 6158) = 1329.18, p < .001, R^2 = .18$ with $B = .95, SE = .03, \beta = .42, t = 36.46, p < .001$. Finally, as not expected based on Hypothesis 2c, stress significantly predicted reduced academic efficacy, $F(1, 6158) = 1219.23, p < .001, R^2 = .17$ with $B = .84, SE = .02, \beta = .41, t = 34.92, p < .001$.

Group Differences in Stress and Burnout

Several independent *t*-tests and ANOVAs were conducted, as seen in Table 3. It is important to note that the distribution of burnout scores was slightly right-skewed in all analyses. However, due to the large sample size and the robustness of both the independent-samples *t*-test and ANOVA to mild violations of normality, these tests were considered appropriate.

Table 3

t-Test Comparisons of Stress and Burnout Across Demographic Subgroups

Scale	Female		Male		<i>t</i>	<i>d</i>
	M	SD	M	SD		
Burnout	49.93	16.70	48.64	17.89	-2.61*	-.08
Perceived stress	7.70	3.10	6.78	3.09	-10.61***	-.30
	Bachelor		Master			
	M	SD	M	SD		
Burnout	49.05	16.69	50.56	17.68	-3.29***	-.09
Perceived stress	7.52	3.14	7.33	3.10	2.34*	.06
	COVID		Non-COVID			
	M	SD	M	SD		
Burnout	51.37	17.46	47.48	16.35	-9.00***	-.23
Perceived stress	7.78	3.04	7.06	3.19	-8.96***	-.23

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Gender Differences in Stress and Burnout

Gender differences in stress and burnout were examined using independent-samples *t*-tests, as seen in Table 3. For stress, the assumption of equal variances was met (Levene's test: $F(1, 6090) = .28, p = .59$), and data were normally distributed. In line with Hypothesis 3a, the results indicated that female students ($M = 7.70, SD = 3.095$) reported significantly more

stress than male students ($M = 6.78$ $SD = 3.09$), $t(6090) = -10.61$, $p < .001$, with a small to medium effect size ($d = -.30$).

For burnout, Levene's test indicated unequal variances (Levene's test: $F(1, 6090) = 15.97$, $p < .001$), so the Welch's t -test was used. Also in line with Hypothesis 3a, female students ($M = 49.93$, $SD = 16.70$) reported significantly more burnout than male students ($M = 48.64$, $SD = 17.89$), $t(3108.63) = -2.61$, $p = .01$, with a small effect size ($d = -.08$).

Differences in Study in Stress and Burnout

An analysis of variances (ANOVA) was conducted to explore differences across faculties. For stress, all assumptions were met (Levene's test: $F(8, 6151) = 1.02$, $p = .42$). A standard ANOVA with Tukey's HSD post-hoc tests showed significant differences in stress across faculties, $F(8, 6151) = 19.50$, $p < .001$. This post-hoc test accounts for multiple pairwise comparisons.

Results of post-hoc tests are shown in Table 4. Summarizing the results, students from ESE, ESL, ESHCC, and ESSB studies reported higher stress than most other faculties. Students from the RSM, ESHPM, and EMC faculties reported lower stress than most other faculties. When specifically looking at medical students, as not in line with Hypothesis 3b, they did not experience more stress than other studies. In contrast, they experienced less stress in comparison to ESE, ESL, ESHCC, and ESSB studies.

Table 4

Means and Standard Deviations of Scores by Faculty with Post-hoc Comparison P-values for Stress

Faculty	M	ESE	ESL	ESHCC	ESSB	ESPhil	RSM	ESHPM	EMC
	(SD)								

ESE	7.61 (3.03)								
ESL	7.75 (3.06)	.995							
ESHCC	8.24 (3.04)	.003*	.151						
ESSB	7.80 (3.17)	.873	1.00	.075					
ESPhil	7.15 (3.30)	.928	.776	.060	.627				
RSM	7.00 (3.16)	<.001*	<.001*	<.001*	<.001*	1.00			
ESHPM	6.46 (2.92)	<.001*	<.001*	<.001*	<.001*	.673	.140		
EMC	6.84 (3.00)	<.001*	<.001*	<.001*	<.001*	.994	.971	.702	
EUC	7.73 (3.05)	1.00	.667	.667	1.00	.912	.146	.002*	.041*

Note. ESE = Erasmus School of Economics; ESL = Erasmus School of Law; ESHCC = Erasmus School of History; Culture, and Communication; ESSB = Erasmus School of Social and Behavioural Sciences; ESPhil = Erasmus School of Philosophy; RSM = Rotterdam School of Management; ESHPM = Erasmus School of Health Policy and Management; EMC = Erasmus Medical Center; EUC = Erasmus University College. Reported values are *p*-values from Tukey's HSD post-hoc tests. **p* < .05.

For burnout, the assumption of equal variances was violated (Levene's test: (8, 6151) = 3.16, *p* < .001), so a Welch's ANOVA was used. The Welch's ANOVA showed a significant difference between the groups, $F(8, 1004.01) = 6.50$, *p* < .001. Because of the unequal variances and group sizes Games-Howell post-hoc tests were used to test which differences there were. This post-hoc test accounts for multiple pairwise comparisons.

Results of post-hoc tests are shown in Table 5. Not in line with Hypothesis 3b, medical students (EMC) did not experience higher burnout compared to other studies. They even had significantly less burnout than students from ESE, ESL, ESHCC, and ESSB. We also found

that economic (ESE) students had significantly more burnout than ESSB, RSM, ESHPM, and EMC students. Concluding, medical students reported the lowest levels of burnout, while economic students reported the highest.

Table 5

Means and Standard Deviations of Scores by Faculty with Post-hoc Comparison P-values for Burnout

Faculty	M (SD)	ESE	ESL	ESHCC	ESSB	ESPhil	RSM	ESHPM	EMC
ESE	52.23 (17.48)								
ESL	50.44 (17.94)	.626							
ESHCC	50.42 (16.73)	.484	1.00						
ESSB	49.71 (17.05)	.016*	.997	.994					
ESPhil	46.44 (17.55)	.097	.581	.563	.760				
RSM	48.89 (17.36)	<.001*	.730	.617	.940	.943			
ESHPM	46.87 (16.51)	<.001*	.092	.062	.162	1.00	.629		
EMC	47.33 (15.40)	<.001*	.034*	.013*	.033*	1.00	.485	1.00	
EUC	49.55 (15.95)	.627	1.00	1.00	1.00	.915	1.00	.777	.829

Note. ESE = Erasmus School of Economics; ESL = Erasmus School of Law; ESHCC = Erasmus School of History, Culture, and Communication; ESSB = Erasmus School of Social and Behavioural Sciences; ESPhil = Erasmus School of Philosophy; RSM = Rotterdam School of Management; ESHPM = Erasmus School of Health Policy and Management; EMC = Erasmus Medical Center; EUC = Erasmus University College. Reported values are *p*-values from Games-Howell post-hoc tests. **p* < .05.

Differences Related to COVID-19 in Stress and Burnout

Burnout and stress were also compared between students who participated during and after the COVID-19 pandemic, as seen in Table 3. Levene's test indicated unequal variances for both stress ($F(1, 6158) = 8.86, p = .003$) and burnout ($F(1, 6158) = 22.75, p < .001$), so Welch's t -tests were conducted. For stress, students who participated during the COVID-19 pandemic ($M = 7.78, SD = 3.04$) reported significantly more stress than students who participated after ($M = 7.06, SD = 3.19$), $t(5867.42) = -8.96, p < .001, d = -.23$, which is in line with Hypothesis 3c.

Similarly, in line with Hypothesis 3c, students who completed the questionnaire during COVID-19 ($M = 51.37, SD = 17.46$) reported significantly more burnout than students who participated after COVID-19 ($M = 47.48, SD = 16.35$), $t(6084.95) = -9.00, p < .001, d = -.23$.

Study Level Differences in Stress and Burnout

Differences in stress and burnout were also assessed between bachelor and master students, as seen in Table 3. For stress, bachelor students reported slightly more stress than master students, which is in line with Hypothesis 3d. All the assumptions were met (Levene's test: $F(1, 6158) = 1.10, p = .30$), and the t -test showed a significant difference, with bachelor students ($M = 7.52, SD = 3.14$) reporting higher stress than master students ($M = 7.33, SD = 3.10$), $t(6158) = 2.34, p = .019, d = .06$.

For burnout, Levene's test indicated unequal variances (Levene's test: $F(1, 6158) = 12.95, p < .001$), so a Welch's t -test was used. In contrast to stress, master students ($M = 50.56, SD = 17.68$) reported significantly higher burnout than bachelor students ($M = 49.05, SD = 16.69$), $t(4378.99) = -3.29, p < .001, d = -.09$, which is in line with Hypothesis 3e.

Moderation Analyses

The three coping styles were significantly correlated. Emotion-focused coping was positively associated with both avoidant-focused coping ($r = .237, p < .001$) and problem-focused coping ($r = .592, p < .001$). Avoidant-focused coping was negatively associated with problem-focused coping ($r = -.088, p < .001$). These findings indicate that the coping styles were not statistically independent. Therefore, to account for shared variance and avoid inflated estimates that can result from analysing moderators in isolation, all three coping styles and their interaction terms with stress were included in a hierarchical regression analysis.

Before conducting the analysis, stress and the three coping styles were centered, and interaction terms were computed. Assumptions for regression and moderation were met, and multicollinearity diagnostics indicated no issues (tolerance $> .10$, VIF < 10).

In the first step of the hierarchical regression, stress and the three coping styles were entered as predictors. This model significantly predicted burnout, $F(4, 6155) = 942.52, p < .001$, and explained 38.0% of the variance in burnout ($R^2 = .380, SE = 13.44$).

In the second step, interaction terms between stress and the three coping styles were added. This model also significantly predicted burnout, $F(7, 6152) = 540.77, p < .001$, and explained 38.1% of the variance in burnout ($R^2 = .381, SE = 13.44$). The increase in explained variance was statistically significant but small ($\Delta R^2 = .001, F \text{ change}(3, 6152) = 3.54, p = .014$), indicating that the interaction terms explained a small additional proportion of variance in burnout after accounting for the main effects. This is in line with Hypothesis 4a.

Table 6

Hierarchical Regression Results Predicting Burnout from Stress, Coping and their Interactions

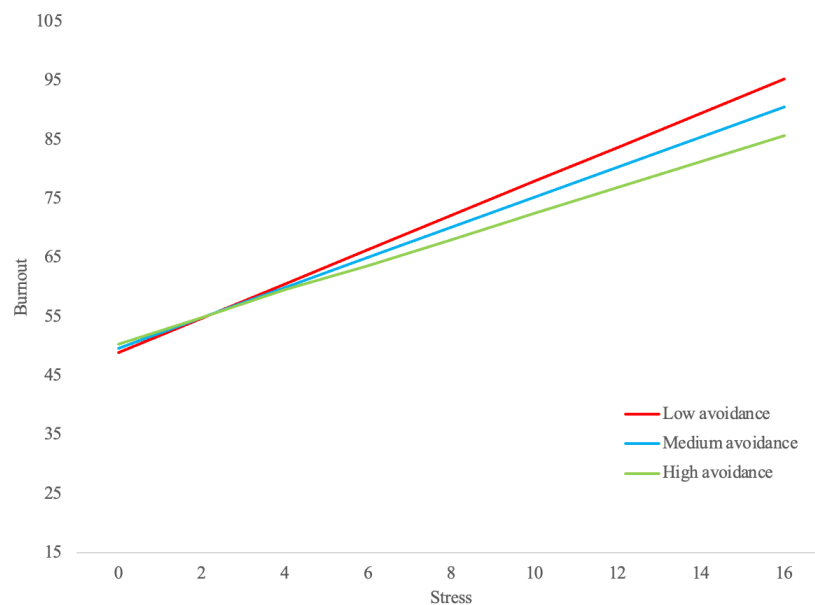
Variables	B	95% CI		SE B	β	t	R^2	ΔR^2
		B						
		LL	UL					
Step 1							.380	
Constant	49.59	49.26	49.92	.171		289.51***		
Perceived Stress	2.55	2.43	2.67	.062	.468	40.97***		
Problem-focused coping	-0.65	-0.74	-0.56	.047	-.187	-13.85***		
Emotion-focused coping	0.17	0.09	0.25	.044	.054	3.98***		
Avoidant-focused coping	0.68	0.58	0.79	.053	.148	12.92***		
Step 2								
Constant	49.70	49.37	50.03	.187		266.02***	.381	.001**
Perceived Stress	2.56	2.43	2.68	.062	.468	40.93***		
Problem-focused coping	-0.65	-0.74	-0.56	.047	-.187	-13.82***		
Emotion-focused coping	0.17	0.09	0.25	.044	.052	3.87***		
Avoidant-focused coping	0.71	0.61	0.82	.054	.154	13.12***		
Stress x PrCo	-0.02	-0.05	0.01	.014	-.018	-1.41		

Stress x	-0.01	-0.05	0.03	.013	-.003	-0.24
EmCo						
Stress x	-0.04	-0.07	-0.01	.015	-.029	-2.53*
AvCo						

Note. CI = confidence interval; LL = lower limit; UL = upper limit. * $p < .05$. ** $p < .01$, *** $p < .001$.

In the final model, all main effects were significant. Stress was positively associated with burnout ($B = 2.56$, $SE = .06$, $\beta = .468$, $t = 40.93$, $p < .001$). Problem-focused coping was negatively related to burnout ($B = -.65$, $SE = .05$, $\beta = -.187$, $t = -13.80$, $p < .001$), suggesting that individuals who engage more in problem-focused coping generally report lower levels of burnout. Emotion-focused coping ($B = .168$, $SE = .04$, $\beta = .052$, $t = 3.87$, $p < .001$) was positively associated with burnout, as was avoidant-focused coping ($B = .71$, $SE = .05$, $\beta = .154$, $t = 13.12$, $p < .001$), indicating that more emotion-focused and avoidant-focused coping are related to higher burnout levels.

Contrary to expectations, and not in line with Hypothesis 4b and 4c, of the three interaction terms, only the interaction between stress and avoidant-focused coping was statistically significant ($B = -.039$, $SE = .015$, $\beta = -.029$, $t = -2.53$, $p = .011$), suggesting a small but significant moderation effect. The interactions between stress and problem-focused coping ($B = -.019$, $SE = .014$, $\beta = -.018$, $t = -1.41$, $p = .159$), and stress and emotion-focused coping ($B = -.003$, $SE = .013$, $\beta = -.003$, $t = -.24$, $p = .81$) were not significant. Not in line with Hypothesis 4d, avoidant-focused coping did not strengthen the relationship between stress and burnout. Instead, the negative interaction term suggests a slight buffering effect. As avoidant-focused coping increased, the association between stress and burnout became weaker. Avoidant-focused coping is associated with greater burnout, as illustrated in Figure 1.

Figure 1*Moderation of avoidant-focused coping***Discussion**

The present study investigated the relationship between perceived stress and burnout in university students, focusing on the subgroup differences gender, faculty, study level, and COVID-19, and the moderating role of coping strategies. Understanding how stress develops into burnout is crucial, as burnout has been linked to numerous negative academic, psychological, and physical outcomes (Deeb et al., 2017; Dobson et al., 2020; Dyrbye et al., 2008; Dyrbye et al., 2009; Hwang & Kim, 2022; Jackson et al., 2016; Madigan & Curran, 2020; Naderi et al., 2021; Ozhan, 2021; Pacheco et al., 2017). Guided by the Job Demands-Resources (JD-R) model (Schaufeli & Taris, 2013) and the Study Demands-Resources (SD-R) theory (Bakker & Mostert, 2024), the study examined perceived stress as a study demand and coping as a personal resource that may buffer or increase burnout. By integrating these perspectives within a large and diverse student sample, the study aimed to clarify this relationship, how it differs across subgroups and whether coping functions as a moderator.

Regarding the first research question, which examined the extent to which perceived stress is associated with overall burnout among university students, the results showed a strong positive relationship. This finding is in line with the expectation that higher levels of perceived stress would be positively associated with higher levels of total burnout. This supports the assumption of the Job Demands-Resources model (Schaufeli & Taris, 2013) and the Study Demands-Resources theory (Bakker & Mostert, 2024), which state that excessive demands may lead to strain and exhaustion through a health impairment process, where prolonged exposure to stressors depletes individuals' mental and physical resources, resulting in burnout symptoms. The current finding is also consistent with previous studies showing that perceived stress strongly predicts burnout in the student context (Gao, 2023). Together, these findings provide further empirical support for the SD-R framework and underline the important role of stress in the development of burnout among students.

The second research question explored how perceived stress relates to the three dimensions of burnout: emotional exhaustion, cynicism and reduced academic efficacy. In line with expectations and prior research (Lee & Ashforth, 1996; Ma et al., 2022; Schaufeli et al., 2002), perceived stress showed the strongest positive relationship with emotional exhaustion. This result aligns with the conceptualization of emotional exhaustion as the core and most immediate response to prolonged stress (Maslach, Schaufeli & Leiter, 2001; Schaufeli & Taris, 2013). This also supports the health impairment process of the JD-R and SD-R models, in which excessive demands lead to strain and exhaustion (Bakker & Mostert, 2024; Schaufeli & Taris, 2013). Perceived stress also significantly predicted cynicism, although this effect was weaker than for emotional exhaustion. This was as expected, as cynicism often develops as a coping mechanism in response to prolonged exhaustion (Lee & Ashforth, 1996; Ma et al., 2022; Schaufeli et al., 2002). Feeling emotionally exhausted can cause students to distance themselves from their studies as a way to manage their stress,

which may lead to a more detached attitude toward their study. This helps explain the weaker relationship, as cynicism emerges indirectly through emotional exhaustion rather than as an immediate consequence of stress. Contrary to expectations, perceived stress also significantly predicted reduced academic efficacy, with an effect size comparable to that of cynicism.

Relationships with academic efficacy were often found to be weak or nonsignificant (Bakker & Mostert, 2024; Lee & Ashforth, 1996; Ma et al., 2022; Schaufeli & Taris, 2013; Schaufeli et al., 2002), and feelings of efficacy were suggested to be more influenced by the availability of resources rather than stress itself (Bakker & Mostert, 2024; Schaufeli & Taris, 2013). From a theoretical perspective however, reduced academic efficacy is considered a secondary outcome, alongside cynicism (Bakker & Mostert, 2024; Maslach, Schaufeli & Leiter, 2001; Schaufeli & Taris, 2013), which makes it plausible that stress also predicts this dimension of burnout. Thus, rather than being unaffected by stress, academic efficacy may decline as stress and exhaustion persist over time. Stress can cause cognitive limitations, such as reduced attention and concentration, and have a negative impact on academic performance (Lee et al., 2010; Özhan, 2021; Pritchard et al., 2007; Rafati et al., 2020). Consequently, students may perceive themselves as less effective in their studies. It is important to note that the empirical findings and theoretical framework of this study was primarily based on job burnout rather than student burnout, as research on student burnout is limited. It is possible that the relationship between stress and efficacy manifests differently in academic contexts.

Overall, these findings demonstrate that perceived stress is an important predictor of all dimensions of burnout, with the strongest effects on emotional exhaustion, followed by cynicism and reduced academic efficacy. These results extend previous research by showing that the negative impact of stress on students affects all dimensions of burnout. This highlights the importance of monitoring perceived stress levels in academic settings and implementing effective prevention and intervention strategies for stress and burnout.

The third research question examined whether students differed in perceived stress and burnout based on demographic and contextual variables, namely gender, faculty, study level, and the COVID-19 pandemic. Regarding gender, it was expected that female students would report higher levels of stress and burnout than male students. The results supported this hypothesis. Female students experienced significantly higher stress and burnout overall. These findings are consistent with previous studies showing that women report higher perceived stress and burnout across academic and professional settings (Briggs et al., 2023; Brougham et al., 2009; Gibbons, 2010; Graves et al., 2021; Pierceall & Keim, 2007). These gender differences may be explained by theoretical perspectives on how women perceive and cope with stress. Women tend to appraise situations as more threatening or stressful and often are more affected by the stress of those around them, due to their greater emotional involvement and biological factors (Kajantie & Phillips, 2005; Matud, 2004). Furthermore, women are more frequently exposed to stressful situations, as their social and occupational positions tend to be less favourable (Matud, 2004). The current findings confirm these theoretical perspectives and reinforce the need for gender-sensitive approaches in student wellbeing programs. Since previous studies (Fiorilli et al., 2022; Purvanova & Muros, 2010) have found gender differences across the three dimensions, future research could explore this further.

For differences across study fields, it was expected that medical students would experience higher stress and burnout than other students. Contrary to expectations, medical students in this sample reported lower levels of both stress and burnout compared to several other faculties. These findings diverge from much of the existing literature, which often highlighted medical students as particularly at risk due to high academic pressure and workload (Dyrbye et al., 2006; Dyrbye et al., 2014; Romani & Ashkar, 2014). One possible explanation is that the medical program at Erasmus University may provide stronger study

resources, buffering against the high demands. Conversely, students from economics, law, social and behavioural sciences, and history, culture and communication reported higher levels of stress and burnout. These programs may involve more demands or fewer resources, which could increase stress levels. Future studies should explore which specific study-related demands and resources contribute to these differences across disciplines and further investigate particular study programs included within each faculty.

The subgroup analyses also considered the contextual factor of the COVID-19 pandemic. In line with prior research (Abraham et al., 2024; Salmela-Aro et al., 2022), students who completed the questionnaire during the pandemic reported significantly higher stress and burnout than those who participated after. This confirms that the pandemic functioned as an external stressor that exacerbated psychological strain among students, likely due to social isolation, uncertainty and the shift to online learning. In the specific context of Erasmus University Rotterdam, these findings highlight how strongly the pandemic may have affected students' stress levels and mental wellbeing. The results emphasize the importance of attention to wellbeing, especially during periods of crisis.

Regarding study phase, it was hypothesized that bachelor students would report higher perceived stress, whereas master students would report higher burnout levels. This pattern was indeed observed. This aligns with prior findings (Jordan et al., 2020; Rico & Bunge, 2020) and can be explained through both developmental and theoretical perspectives. According to theoretical models (Bakker & Mostert, 2024; Lazarus & Folkman, 1984; Schaufeli & Taris, 2013), first-year students are confronted with new academic and social demands but have fewer coping resources. Therefore, they are more likely to experience an imbalance between study demands and available resources, leading to stress. Over time, repeated exposure to academic demands may lead to habituation and improved coping (Grissom & Bhatnagar, 2009; McEwen, 1998; Wingo et al., 2014). However, sustained

exposure to stress can accumulate into burnout among master students (Demerouti et al., 2001), consistent with the health impairment process of the JD-R and SD-R models (Bakker & Mostert, 2024; Schaufeli & Taris, 2013). Thus, stress appears to peak during the bachelor's phase, while burnout is most common in the master's phase. Taken together, these results show that stress and burnout are not uniformly distributed among student but vary according to gender, academic level, study field, and contextual factors such as the COVID-19 pandemic. These findings underscore the importance of targeted prevention and intervention efforts that consider both individual and contextual vulnerabilities. Universities could offer more personalized support programs and strengthen available resources in highly demanding faculties to help reduce the risk of burnout.

The fourth research question examined whether different coping styles moderated the relationship between perceived stress and burnout among university students. Based on the transactional model of stress and coping (Lazarus & Folkman, 1984) and previous research (Cheng et al., 2022), it was hypothesized that coping would influence the strength of this relationship. The transactional model assumes that coping processes dynamically influence how stress translates into psychological outcomes, implying that coping can buffer or amplify the effects of stress on psychological well-being. To test this hypothesis, a moderation-analysis was conducted in which perceived stress, three coping styles, and their interaction terms were entered into a hierarchical regression model. The overall moderation model revealed a small but statistically significant increase in explained variance when the interaction terms were added. This indicates that coping influenced the strength of the stress-burnout relationship, although the effect was small. This result suggests that coping plays a significant, but practically small, moderating role in the relationship between stress and burnout.

Regarding the specific coping styles, it was hypothesized that problem-focused coping would weaken the relationship between stress and burnout, as this strategy involves active attempts to manage or resolve stressors and is generally considered adaptive. Prior studies have shown that problem-focused coping reduces the negative impact of stress and is generally associated with lower burnout levels (Bakker & Mostert, 2024; Shin et al., 2014; Simonsen et al., 2023; Spaan et al., 2024). Contrary to expectations, the interaction between stress and problem-focused coping was not significant. While students who used more problem-focused coping reported lower burnout overall, this coping style did not alter the strength of the stress-burnout relationship.

Regarding emotion-focused coping no clear directional hypothesis was formulated due to inconsistent findings in prior research (Shin et al., 2014). Emotion-focused coping may be adaptive when stressors are uncontrollable but maladaptive when they can be changed (Lazarus & Folkman, 1984). In the present study, the interaction between stress and emotion-focused coping was not significant. However, this coping style was positively related to burnout, suggesting that emotion-focused strategies were not effective in reducing stress in this context. These findings may reflect that most academic stressors are at least partially controllable, making emotion-focused responses less adaptive. Students who rely primarily on emotion-focused coping, rather than addressing the source of stress, may therefore remain vulnerable to burnout. This interpretation aligns with Shin et al. (2014) who also found a positive association between emotion-focused coping and burnout. However, it is important to note that Shin et al. (2014) emphasized that the adaptiveness of emotion-focused coping depends on the specific strategy used within this coping style. For example, seeking social support, reappraisal and religious coping were negatively related to burnout, whereas acceptance was positively associated with burnout. Future research should therefore examine

these strategies separately rather than relying on the broader construct of emotion-focused coping.

Avoidant-focused coping was expected to strengthen the relationship between stress and burnout. Previous research consistently shows that avoidant-focused coping is a strong predictor of burnout (Brougham et al., 2009; Gibbons, 2010). Unexpectedly, the interaction between stress and avoidant-focused coping did not strengthen the relationship between stress and burnout. Instead, the small negative interaction term indicated a slight buffering effect. As avoidant-focused coping increased, the stress-burnout relationship became weaker. However, this does not imply avoidant-focused coping is adaptive. In fact, students who engage more in this coping style reported higher overall levels of burnout, even at low levels of stress. These findings may suggest that avoidance may temporarily reduce the immediate emotional impact of stress, offering short-term relief, while simultaneously contributing to long-term exhaustion and disengagement. Similar results were found by Bakker and Mostert (2024), who showed that procrastination, conceptually related to avoidance, was associated with lower short-term stress but higher long-term strain and exhaustion. This adds an important nuance to earlier research, which has generally characterized avoidant as purely maladaptive (Brougham et al., 2009; Gibbons, 2010; Shin et al., 2014), by suggesting that its impact may depend on timeframe and context. Earlier studies have primarily examined direct associations between avoidance coping and burnout, consistently finding positive relationships between the two. However, no studies have tested whether avoidance coping moderates the relationship between stress and burnout. Future longitudinal studies should therefore examine how short- and long-term consequences of avoidant-focused coping unfold over time.

Taken together, the findings suggest that coping styles played a small but statistically significant moderating role in the relationship between stress and burnout, driven primarily by avoidant-focused coping. Problem- and emotion-focused coping did not alter the strength of

the relationship, although they were directly related to burnout levels. These results suggest that coping is an important determinant of student well-being, but its moderating role in the stress-burnout process is limited. Coping strategies primarily influenced burnout directly rather than moderating the link between stress and burnout. While problem-focused coping appears to serve a protective role, emotion- and specifically avoidant-focused coping are associated with higher burnout levels. One possible explanation for the weak moderation effects is methodological. The transactional model (Lazarus & Folkman, 1984) conceptualizes coping as a process, where coping is dependent of how someone appraises stress. Carver and Connor-Smith (2009) however, view coping as a more stable tendency that is not dependent of the situation. The conceptualization of coping in the Brief-COPE questionnaire is more in line with Carver and Connor-Smith (2009). As a result, coping may operate more as a direct predictor of burnout than as a moderator of the stress-burnout relationship. Another possible explanation is that stress and coping itself are such strong predictors of burnout, that there is little variance left to be accounted for by interaction effects. Interventions promoting adaptive coping may reduce burnout in general but may not substantially change how stress translates into burnout.

Several limitations should be acknowledged. First, due to the cross-sectional design, no causal conclusions can be drawn. Longitudinal research is needed to clarify whether stress leads to burnout over time and how coping functions within this process. Second, burnout is theorised as a response to long-term and chronic stress (Maslach & Leiter, 2008), whereas the PSS-4 measures stress appraisal over the past four weeks. This means our findings may reflect short-term fluctuations rather than the prolonged and chronic stress assumed to cause burnout. Moreover, the PSS-4 measures general perceived stress rather than academic stress specifically, which may limit the extent to which our results capture stress directly related to academic demands. Future studies should therefore include longitudinal measures of chronic

and academic-specific stress to better align with the theoretical definition of student burnout. The third limitation concerns the measurement instruments. The study relied entirely on self-report questionnaires, which may be influenced by response biases such as social desirability, mood effects or subjective interpretation of items. For example, students under acute stress may overestimate their burnout symptoms, whereas others may underreport them due to stigma. Incorporating multiple methods such as behavioural data, physiological indicators of stress or informant reports could provide a more reliable result. Furthermore, the questionnaires used assessed symptoms and characteristics of stress and burnout, and do not provide a clinical classification. It should also be noted that the use of total burnout score is debated, as the MBI-SS was originally designed to measure three separate dimensions. However, the high internal consistency found in the present data and the moderate correlations between the subscales support the interpretation of burnout as a unidimensional construct for the purposes of this study. Fourth, in several group comparisons, Levene's test indicated unequal variances. To account for this, Welch's *t*-tests and ANOVAs were applied. While they are robust against heterogeneity of variance and large sample sizes increase the reliability, the Welch's *t*-test has an inflated type I error, meaning it can cause inflated false positive rates. Replication in other samples is therefore needed to confirm these findings. The fifth limitation concerns the internal consistency of some coping subscales. Although most scales demonstrated acceptable to excellent reliability, the emotion-focused and avoidant-focused coping dimensions of the Brief-COPE showed questionable reliability. This suggests that the items may not fully capture a single coherent construct. This issue has also been noted in previous research using the Brief-COPE, suggesting that further validation of its higher-order factor structure is needed. Finally, the study was conducted at a single university, which may limit generalizability to other cultural or institutional contexts.

Despite these limitations, this study has several important strengths and contributions. It draws on a large student sample across multiple faculties, extending beyond the commonly studied medical populations and increasing the generalizability and representativeness of the findings within the university context. The use of validated instruments for stress and burnout further enhances the reliability of the results. By examining multiple coping strategies and subgroup differences, the study provides a more nuanced understanding of how individual factors shape the stress-burnout relationship. The unexpected moderation effect of avoidant coping offers a new insight into its potentially complex role, which requires additional research. From a practical perspective, the findings highlight the urgent need for universities to monitor and address stress and burnout among students. Preventive interventions could encourage the use of problem-focused coping while discouraging avoidant and emotion-focused coping. In addition, targeted support may be necessary for groups at elevated risk, such as female students, bachelor students for stress, master students for burnout, and those studying in disciplines with heavier demands and less resources.

Future research could explore coping processes longitudinally and across cultures, test interventions aimed at strengthening adaptive coping, and examine the mechanisms that explain why certain subgroups show greater vulnerability. Additionally, qualitative methods could provide deeper insight into how students experience and interpret stress, burnout and coping. Overall, this study shows that perceived stress is a key predictor of student burnout, while coping strategies, although not strong moderators, play an important role in burnout levels. These insights emphasize the need for universities to promote stress management and adaptive coping early in students' academic careers to protect their mental health and academic well-being, and focusing on the subgroups more at risk

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