

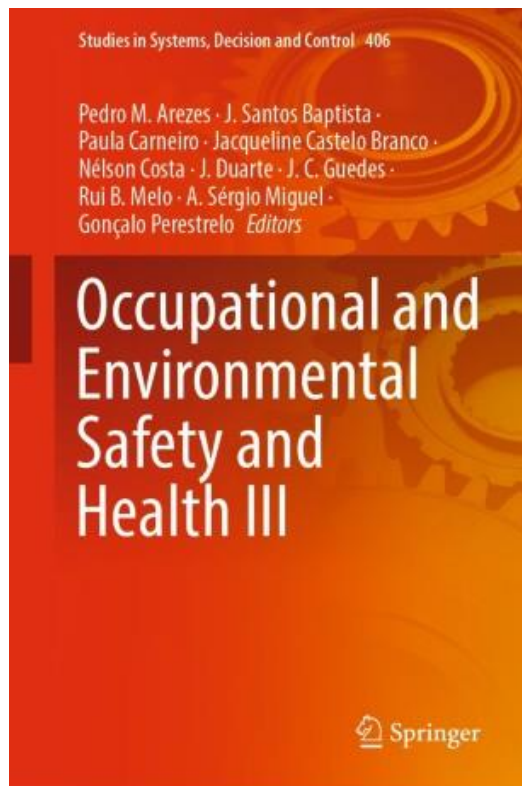
Working chapter

Citation of this chapter:

Gomes, A.R., Simões, C., Morais, C., & Couto, A. (2022). Occupational stress and cognitive appraisal profiles as predictors of students' burnout. In P.M. Arezes et al. (Eds), *Occupational and environmental safety and health III: Studies in systems, decision and control* (vol. 406, pp. 505-520). Springer, Cham. https://doi.org/10.1007/978-3-030-89617-1_45

Versão original:

https://link.springer.com/chapter/10.1007%2F978-3-030-89617-1_45#citeas



Occupational Stress and Cognitive Appraisal Profiles as Predictors of Students' Burnout

A. Rui Gomes¹, Clara Simões², Catarina Morais³, and Adriana Couto⁴

¹Psychology Research Centre, School of Psychology, University of Minho, Braga, Portugal. rgomes@psi.uminho.pt <https://orcid.org/0000-0002-6390-9866>

²Health Sciences Research Unit: Nursing (UICISA:E/ESEnfC), School of Nursing, University of Minho, Braga, Portugal. csimaes@ese.uminho.pt <https://orcid.org/0000-0001-9856-2295>

³Research Centre for Human Development, Faculty of Education and Psychology, Universidade Católica Portuguesa, Porto, Portugal. cmorais@porto.ucp.pt <https://orcid.org/0000-0002-9881-3514>

⁴Adriana Couto, Adaptation, Performance, and Human Development Research Group, School of Psychology, University of Minho, Braga, Portugal. a81847@alunos.uminho.pt

Biographies

A. Rui Gomes, Psychology Research Centre, School of Psychology, University of Minho, Braga, Portugal, PhD (2005).

Clara Simões, Health Sciences Research Unit: Nursing (UICISA: E/ESEnfC), School of Nursing, University of Minho, Braga, Portugal, PhD (2012).

Catarina Morais, Research Centre for Human Development, Faculty of Education and Psychology, Universidade Católica Portuguesa, Porto, Portugal, PhD (2018).

Adriana Couto, Adaptation, Performance, and Human Development Research Group, School of Psychology, University of Minho, Braga, Portugal, Bachelor (2019).

Occupational Stress and Cognitive Appraisal Profiles as Predictors of Students' Burnout

Abstract

Objective: Analyze if different patterns of occupational stress experienced by students (lower versus higher) and different cognitive appraisal profiles assumed by students (positive evaluation of academic activity versus negative evaluation of academic activity) affect their experience of burnout over time. **Background:** The interactive and transactional perspective of adaptation to stress was adopted to analyze how university students evaluate their activity and related academic stress, and how they feel in terms of burnout. **Method:** Longitudinal study design, with three moments of data collection, with a sample of 175 psychology students, from a Portuguese university. The investigation protocol included the Stress Questionnaire for Students, the Primary and Secondary Cognitive Appraisal Scale, and the Shirom-Melamed Burnout Scale. **Results:** The results showed that students who experienced higher levels of stress and a negative evaluation of their academic activity also reported higher levels of burnout when compared to students who experienced lower levels of stress and positive evaluation of academic activity. Moreover, a pattern of high stress in M1 increases in 443% the probability to experience moderate to high burnout in M2. A profile of negative evaluation of the academic activity in M1 increases in 594% the probability to experience high burnout in M2. Students exposed to high levels of burnout at M2 are over nine times more likely to experience moderate levels of burnout at M3, and over 300 times more likely to experience high levels of burnout at M3. **Conclusion:** Students who experience higher academic stress and those who evaluate their academic activity more negatively have a higher tendency to experience burnout. Although, the experience of burnout in a specific data point is the main predictor of experiencing burnout in a later moment, highlighting the chronic effects of this syndrome on human wellbeing. **Application:** This study provides specific indications of how much stress and cognitive appraisal can affect burnout, alerting also for the chronic nature of burnout feelings, which must be considered in safety and occupational health interventions.

Keywords: Stress patterns, cognitive appraisal profiles, university students, burnout.

Introduction

Occupational stress represents a major topic in society and academic research has consistently show evidence that levels of stress increased in the last decades, producing several negative effects on individuals, families, organizations, and countries (World Health Organization, 2007). The same scenario can be applied to students, particularly the ones included in higher education contexts, where evidence demonstrates that academic stress is related to several negative effects, such as anxiety, depression, and lower self-esteem (Hudd et al., 2000; Larson & Luthans, 2006), alcohol and drug abuse (Böke et al., 2019), sleep disturbances (Wallace, Boynton, & Lytle, 2017), and lower academic success and even academic withdrawal (Britt, et al., 2017; Frazier et al., 2018). Thus, it becomes important to determine the impact produced by stress on the well-being of students. In this study, the interactive and transactional perspective of adaptation to stress (Blascovich & Mendes, 2000; Gomes, 2014; Lazarus, 1991) was adopted to analyze how university students evaluate their activity and related academic stress, and how they feel in terms of burnout.

Interactive and transactional perspectives of stress not only reinforce the value of stressors on explaining adaptation to work, but also give particular value to cognitive appraisal on the way people respond to work conditions (i.e., how individuals evaluate their activities). Cognitive appraisal includes the dimensions of threat perception (evaluating the work activity as disturbing and negative for personal well-being), challenge perception (evaluating the work activity as stimulating and exciting for personal well-being), coping potential (evaluating the personal resources to cope with the demands of the work activity as sufficient or nor sufficient), and control perception (evaluating the

decision making process of work activity as depending of personal control) (Gomes, 2014; Lazarus, 1991). Stress and cognitive appraisal may represent important variables to comprehend why some individuals seem more able to deal with stressor conditions at work, than others do. Research demonstrates that high levels of stress at work can diminish individuals' ability to cope with work demands (Niedhammer, 2020; Rugulies et al, 2020), but also point out to dimensions of cognitive appraisal as determinants of functional and dysfunctional adaptation to work conditions (Gomes et al., 2013; Kim & Beehr, 2020; Paškvan et al., 2016).

Despite the interest of these findings, there is almost no evidence about the possibility of some personal patterns of evaluating the stress and the work activity exacerbate or decrease the risk to negative reactions at work. This is to say, is there a personal tendency of evaluating the sources of stress and the professional activity that can put individuals at more or less risk to dysfunctional reactions at work? In the present research, this question was addressed by analyzing if students that evaluate academic stress differently (i.e., tendency to evaluate their activity as generating lower or higher levels of stress) would respond to their academic activity with different levels of burnout, i.e., with feelings of physical, emotional and cognitive exhaustion) (Shirom & Melamed, 2006). In addition, it was also tested whether students that evaluate their academic activity differently (i.e., tendency to considerate student activity more positively or negatively) would respond to their academic activity with different levels of burnout. These questions intend to determine if evaluating the academic activity differently by the students will correspond to distinct reactions to burnout. Put in simple words, is there a

more negative or positive pattern of evaluating the academic activity that can influence students' feelings of burnout?

In order to answer to these questions, a longitudinal methodology was adopted to comprehend how stress evaluation and cognitive appraisal corresponded to different levels of burnout across time. The use of longitudinal methodology is more appropriate to capture the psychological fluctuations that occur in human adaptation to stress (Gomes, 2014; Lazarus, 1991) and that are not captured by the typical use of cross-sectional studies (Podsakoff et al., 2012). Thus, this study started by collecting the indicators of stress and of cognitive appraisal (four to six weeks after the beginning of the academic semester of university students, corresponding to Moment 1 of data collection); then the burnout responses of students (at the middle of the semester, corresponding to Moment 2 of data collection); and finally, the burnout responses of students was collected again (at the end of the semester, corresponding to Moment 3 of data collection). Figure 1 presents the methodology of data collection. The contribution of stress and cognitive appraisal profiles on burnout was tested these controlling for personal (i.e., gender, age) and academic variables (i.e., course-year and grade-point average) of students because previous research has pointed out their influence on how they evaluate and deal with stress (Hill et al., 2018; Shaw et al., 2017; Mussi et al., 2019).

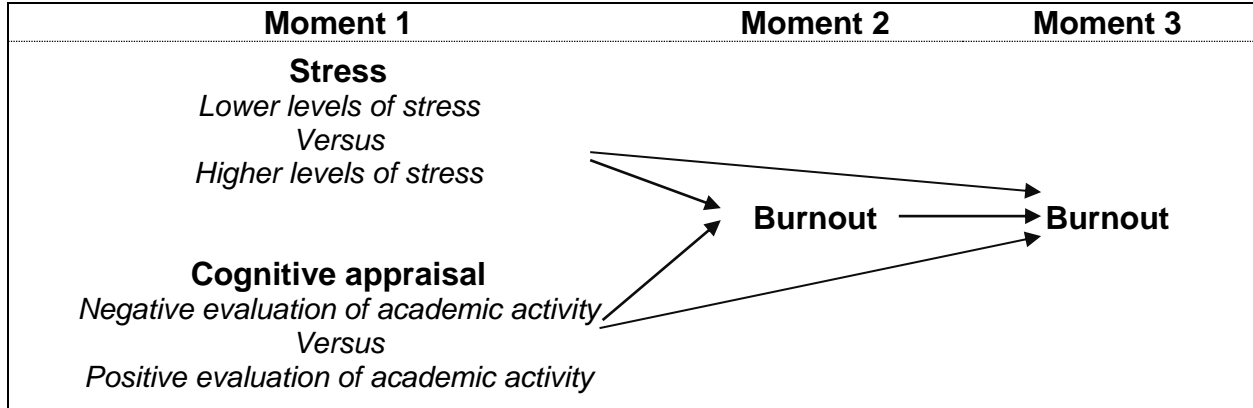


Figure 1. Methodology of data collection.

Considering these aspects, we defined the following goals for the study:

- (a) Analyze if different patterns of stress experienced by students (lower versus higher profile) corresponded to different levels of burnout over time.
- (b) Analyze if different patterns of cognitive appraisal assumed by students (lower threat and higher challenge, coping potential, and control versus higher threat and lower challenge, coping potential, and control) corresponded to different levels of burnout over time.
- (c) Analyze if different patterns of stress experienced by students (lower versus higher profile) and different patterns of cognitive appraisal assumed by students (lower threat and higher challenge, coping potential, and control versus higher threat and lower challenge, coping potential, and control) predicted burnout over time.

Material and Methods

Participants

The population used for this study was the students of a psychology course from a university in the north of Portugal. The final sample consisted of 175 students, with 155 (89%) females, 18 (10%) males, and two (1%) that did not provide information about gender. Students presented a mean age of 21.19 years old ($SD = 3.95$) ranging from 17 to 42 years. Regarding the year of the course, 40 (23%) students were in the first year, 24 (14%) were in the second year, 36 (21%) were third-year students, 29 (17%) were fourth-year students, and 46 (26%) students were in the last year of the course. The majority of the students ($n = 149$, 85%) chose psychology as their first option in the university application. Their grade point average was 15.18 ($SD = 1.70$), ranging from 6.6 to 19.30 (in a scale of 20 values). All participants ($N = 175$) took part in the three moments of data collection.

Measures

Stress Questionnaire for Students (SQS; Gomes, 2019). It evaluates seven sources of stress in the academic activity of students: (1) academic performance (four items; α for this study = .90); (2) academic evaluation (four items; α for this study = .76); (3) motivation (four items; α for this study = .87); (4) learning (four items; α for this study = .89); (5) work overload (four items; α for this study = .92); (6) future expectations (four items; α for this study = .82); and (7) financial problems (four items; α for this study = .76). Items are answered in a 5-point Likert-type scale (0 = *No stress at all*; 4 = *Very high stress*) with higher values indicating higher levels of stress in each dimension.

Confirmatory factorial analysis (CFA) revealed good psychometric properties for this instrument [$\chi^2(327) = 696.82, p < .001$; CMIN/DF = 2.13; RMSEA = .074, 90% CI [0.07; 0.08]; CFI = .913; TLI = .900].

Primary and Secondary Cognitive Appraisal Scale (PSCA, Gomes & Teixeira, 2016). Evaluates primary and secondary cognitive appraisal with a total of five scales: (1) importance perception (three items; α for this study = .86); (2) threat perception (three items; α for this study = .88); (3) challenge perception (three items; α for this study = .61); (4) coping perception (three items; α for this study = .91); and (5) control perception (three items α for this study = .69). Items are answered in a 7-point Likert scale with higher values indicating higher levels of cognitive appraisal in each dimension. Instructions to fulfil the instrument were adapted to academic activity, meaning that participants answered the questions thinking about their student activity. Confirmatory factorial analysis (CFA) revealed good psychometric properties for this instrument [$\chi^2(80) = 146.97, p < .001$; CMIN/DF = 1.84; RMSEA = .063, 90% CI [0.05; 0.08]; CFI = .955; TLI = .941].

Shirom-Melamed Burnout Scale (SMBS, Shirom & Melamed, 2006; Adaptation Simões et al., 2021). Evaluates three dimensions of burnout: (1) physical fatigue (six items; α M1 for this study = .93; α M2 for this study = .94); (2) cognitive weariness (five items; α M1 for this study = .95; α M2 for this study = .94); and (3) emotional exhaustion (three items; α M1 for this study = .89; α M2 for this study = .83). Items are answered in a 7-point Likert scale (1 = Never or almost never; 7 = *Always or almost always*). Confirmatory factorial analysis (CFA) for M1 revealed good psychometric properties for this instrument [$\chi^2(74) = 133.16, p < .001$; CMIN/DF = 1.80; RMSEA = .064, 90% CI [0.05;

0.08]; CFI = .977; TLI = .971] and also for M2 [$\chi^2(70) = 143.04, p < 001$; CMIN/DF = 2.04; RMSEA = .077, 90% CI [0.06; 0.10]; CFI = .967; TLI = .957].

Procedure

The study was approved by the Ethics Committee of the first author's university (CEICSH 034/2019), while being in accordance with the National and European regulations on research with humans and personal data protection. After the approval, a meeting was set up with the directors of the course of psychology, clarifying the goals of the study and the proceedings for data collection. Students were invited to participate in the study by accessing an online questionnaire, in an electronic platform (Qualtrics). The link was made available through each student's institutional email. When accessing the electronic platform, students had to sign a voluntary written informed consent, which contained the main goals of the study and the information that guaranteed the confidentiality of the data. Regarding the anonymous character of the data, participants were invited to provide an identification code, not able to reproduce their identities, allowing only the match of the data across the three moments of data collection.

Data analysis

The analyses were performed using IBM SPSS Statistics (v. 27) and AMOS (v.27; SPSS Inc. Chicago, IL. USA). First, a data screening was performed by using the PSCA importance perception to select students that attributed a minimum level of importance to the academic activity, as suggested by Gomes and Teixeira (2016). Thus, from the 185 participants that completed the data collection in M1, two were removed from the analysis.

Out of the remaining 183, only 175 participants completed the data collection in M2 and M3. Second, regarding the goals of this study, in order to analyze if different patterns of stress experienced by students corresponded to different levels of burnout over time (first goal), and to analyze if different patterns of cognitive appraisal assumed by students corresponded to different levels of burnout over time (second goal) a two-step strategy was used. In the first step, patterns of stress and cognitive appraisal experienced in M1 were explored by using the cluster analysis, with the K-means approach. In the second step, to analyze the main effect of these patterns on burnout, a Mixed ANCOVA (controlling for the effect of students' personal and academic characteristics) was conducted.

To analyze if different patterns of stress and different patterns of cognitive appraisal predicted burnout over time (third goal) a two-step approach was also used. First, the patterns of burnout experienced in M2 and M3 were explored by using cluster analysis, with the K-means approach. Second, a multinomial logistic regression analysis was conducted. An adjusted odds ratio (OR) with a 95% confidence interval (CI) was considered to determine the strength of association between the patterns of burnout and its predictor. As potential confounders, students' personal and academic characteristics, hypothesised to influence the experience of burnout, were considered. Data analyses were accomplished considering a p -value of $<.05$ as statistically detectable.

Results

Constituting the groups: Patterns of stress and cognitive appraisal

Cluster analysis was conducted to create two groups based on stress. Thus, the K-means approach was found the most suitable considering the sample size. Two different patterns of stress emerged: higher vs. lower levels of stress. Table 1 summarizes each group's characteristics.

Table 1. *Means (Standard Deviations) for the two different stress patterns*

Sources of stress	Group: Higher levels of stress	Group: Lower levels of stress
Academic performance	3.22(0.63)	2.38(0.67)
Academic evaluation	3.39(0.57)	2.55(0.78)
Motivation	3.00(0.66)	1.87(0.88)
learning	3.25(0.66)	2.24(0.82)
Work overload	3.36(0.62)	2.60(0.93)
Future expectations	3.05(0.63)	1.78(0.86)
Financial problems	2.25(1.04)	0.75(0.67)

The same procedure was executed to create two different clusters. Using the K-means approach, the following patterns of cognitive appraisal arose (cf. Table 2).

As expected, students who assumed a positive evaluation of their academic activity, perceived lower levels of stress, and higher levels of challenge, coping potential and control than their colleagues who showed a negative profile of cognitive appraisal (negative evaluation of academic activity).

Table 2. Means (Standard Deviations) for the two different cognitive appraisal patterns

Cognitive appraisal	Positive	Negative
	evaluation of academic activity	evaluation of academic activity
Threat	2.46(0.98)	4.82(0.79)
Challenge	4.45(1.01)	3.69(0.81)
Coping potential	4.26(0.82)	2.98(0.89)
Control	4.57(0.76)	4.11(0.98)

Influence of stress and cognitive appraisal on burnout over time

It was expected that students who showed higher levels of stress and a negative evaluation of academic activity would experience stronger levels of burnout over time. A 2 (Stress: High vs. Low) x 2 (Cognitive appraisal: Positive vs. Negative evaluation) x 2 (Time: Burnout M2 vs. Burnout M3) Mixed ANCOVA was conducted in order to test the three goals of this study. Participants' gender, age, course-year and grade-point average (GPA) were included as covariates.

The results showed a main effect of stress, $F(1,167) = 17.17, p < .001, \eta^2 = 0.09$. As expected, students who experienced higher levels of stress also reported higher levels of burnout ($M = 3.82, SD = 1.01$) when compared to students who experienced lower levels of stress ($M = 3.17, SD = 1.01$). A main effect of cognitive appraisal was also found, $F(1, 167) = 6.17, p = .014, \eta^2 = .04$. Students with a positive evaluation of academic activity reported lower levels of burnout ($M = 3.31, SD = 1.01$) than students who evaluated their academic activity negatively ($M = 3.76, SD = 1.05$). This main effect was qualified by the Cognitive Appraisal x Time interaction, which was found marginally significant, $F(1,167) = 3.05, p = .083, \eta^2 = .02$.

Independent-sample *t*-tests and Paired sample *t*-tests were conducted to follow-up the interaction. The results showed that students who displayed a positive evaluation of their academic activity presented lower levels of burnout in M2 ($M = 3.27$, $SD = 0.97$) than students who evaluated this experience negatively ($M = 3.92$, $SD = 1.07$), $t(173) = 4.15$, $p < .001$. Even though a similar pattern was found for M3, the difference in the levels of burnout reported by students who evaluated their academic experience positively ($M = 3.35$, $SD = 1.05$) or negatively ($M = 3.61$, $SD = 1.02$) was not significant, $t(173) = 1.63$, $p = .104$.

Interestingly, for students who evaluated their academic activity positively, their levels of burnout did not significantly change between M2 and M3, $t(77) = 0.85$, $p = .401$. However, participants who negatively evaluated their academic activity displayed higher levels of burnout on M2 ($M = 3.92$, $SD = 1.07$) than on M3 ($M = 3.61$, $SD = 1.02$), $t(96) = 3.08$, $p = .003$. The main effect of time (Burnout M2 vs. Burnout M3) was not significant, meaning that students' levels of burnout did not change over time if Stress and Cognitive Appraisal are taken out of the equation, $F(1,167) = 0.50$, $p = .479$. The remaining interactions were also found nonsignificant (all $F_s < 0.66$, $p > .418$).

Patterns of burnout over time

Cluster analysis was conducted to create three groups based on the global score of burnout in M2 and M3. Thus, the K-means approach was found the most suitable considering the sample size. Three different patterns of burnout emerged: low vs. moderate vs. high levels of burnout. Table 3 summarizes each group's characteristics.

Table 3. Means (Standard Deviations) of Physical and Cognitive Fatigue, and Emotional exhaustion on M2 and M3 for Low, Moderate and High levels of burnout groups.

	Low levels of burnout	Moderate levels of burnout	High levels of burnout
Burnout M2	<i>n</i> = 52	<i>n</i> = 83	<i>n</i> = 40
Burnout (SMBS) global score	2.41(0.55)	3.69(0.36)	5.08(0.66)
Burnout M3	<i>n</i> = 35	<i>n</i> = 103	<i>n</i> = 37
Burnout (SMBS) global score	2.01(0.49)	3.49(0.42)	4.92(0.49)

Predictors of burnout experience over time

It was expected that different patterns of stress experienced by students and different patterns of cognitive appraisal assumed by students, predicted different patterns of burnout over time (M2 and M3). A multinomial logistic regression analysis was conducted to estimate the probability of each pattern of burnout on M2 and on M3 (low, moderate and high), regarding the effect of the stress experience (low vs. high) and the cognitive appraisal profile (negative vs. positive), controlling for gender, age, course-year and grade-point average. The coefficients estimates of the two models tested in M2 and M3, for the patterns of moderate and high burnout (regarding the reference class - low burnout) are in Table 4.

Regarding Model 1, the odds ratio of experiencing moderate burnout in M2, compared to low burnout, is of 1.74 for each year of the course and of 1.35 for each value of increase in the grade-point average. Nevertheless, the odds ratio of experiencing high burnout in M2, compared to low burnout, is of 1.59 for each year of the course. Regarding goal three, as expected, the odds ratio of an individual with low levels of stress in M1 experience moderate or high burnout in M2, compared to low burnout, is of 0.18 times

lower than of an individual with high levels of stress in M1. Additionally, confirming goal three, the odds ratio of an individual with a negative evaluation of the academic activity in M1 experience high burnout in M2, compared to low burnout, is of 6.94 times higher than of an individual with a positive evaluation of the academic activity in M1. Thus, different patterns of stress experience and cognitive appraisal in M1 predicted different patterns of burnout in M2.

Table 4. *Statistics and Coefficients for the Multinomial Logistic Regression*

		B	SE	Wald	p	OR	95% CI for Exp(B)
Model 1 (df = 1)							
Moderate vs. Low	Gender [0 = male]	-0.21	0.62	0.11	.742	0.82	[0.24, 2.75]
	Age	-0.02	0.06	0.07	.786	0.99	[0.88, 1.10]
	Course year	0.55	0.18	9.47	.002	1.74	[1.22, 2.47]
	Course GPA	0.30	0.15	3.99	.046	1.35	[1.01, 1.82]
	Stress [0 = low]	-1.69	0.42	16.65	< .001	0.18	[0.08, 0.42]
	Evaluation of academic activity [0 = negative]	0.25	0.43	0.35	.555	1.29	[0.56, 2.98]
High vs Low	Gender [0 = male]	-0.68	0.93	0.53	.465	0.51	[0.08, 3.15]
	Age	0.04	0.06	0.40	.527	1.04	[0.93, 1.16]
	Course year	0.47	0.21	4.87	.027	1.59	[1.05, 2.41]
	Course GPA	0.12	0.17	0.46	.497	1.12	[0.81, 1.56]
	Stress [0 = low]	-1.72	0.54	10.35	.001	0.18	[0.06, 0.51]
	Evaluation of academic activity [0 = negative]	1.94	0.59	10.73	.001	6.94	[2.18, 22.11]
Model 2 (df = 1)							
Moderate vs. Low	Gender [0 = male]	1.38	0.82	2.84	.092	3.99	[0.80, 19.97]
	Age	0.02	0.06	0.08	.773	0.98	[0.88, 1.10]
	Course year	0.31	0.19	2.51	.113	1.36	[0.93, 1.99]
	Course GPA	0.23	0.16	2.20	.138	1.26	[0.93, 1.72]
	Stress [0 = low]	-0.38	0.47	0.65	.419	0.69	[0.27, 1.71]
	Evaluation of academic activity [0 = negative]	-0.17	0.46	0.14	.712	0.85	[0.34, 2.07]
	Burnout on M2 [1 = moderate]	0.71	0.47	2.29	.130	2.04	[0.81, 5.14]
Burnout on M2 [2 = high]	2.39	1.10	4.33	.037	9.95	[1.14, 86.68]	
High vs Low	Gender [0 = male]	-0.29	1.38	0.04	.836	0.75	[0.05, 11.13]
	Age	-0.01	0.08	0.01	.968	1.00	[0.86, 1.16]
	Course year	0.49	0.27	3.36	.067	1.63	[0.97, 2.73]
	Course GPA	0.12	0.23	0.26	.608	1.12	[0.72, 1.76]
	Stress [0 = low]	-1.01	0.68	2.25	.134	0.37	[0.10, 1.37]
	Evaluation of academic activity [0 = negative]	-0.05	0.65	0.01	.935	0.95	[0.27, 3.38]
	Burnout on M2 [1 = moderate]	2.40	1.13	4.48	.034	11.00	[1.20, 101.20]
Burnout on M2 [2 = high]	5.71	1.49	14.73	<.001	300.24	[16.30, 5529.43]	

Note. Model 1 $R^2 = .27$ (Cox-Snell), $.30$ (Nagelkerke). Model 1 $\chi^2(12) = 53.53$, $p < .001$. Model 2 $R^2 = .32$ (Cox-Snell), $.38$ (Nagelkerke). Model 2 $\chi^2(16) = 66.89$, $p < .001$.

Regarding Model 2, individuals exposed to moderate levels of burnout at M2, compared to those exposed at low levels, have an odds ratio of 11.00 times higher of experiencing high levels of burnout at M3 than low burnout. More, individuals exposed to high levels of burnout at M2, compared to those exposed at low levels, have an odds ratio of 9.95 times higher of experiencing moderate burnout at M3 and an odds ratio of 300.24 times higher of experiencing high burnout at M3 than low burnout. Thus, controlling for the effect of burnout in M2, different patterns of stress experience and cognitive appraisal in M1 did not predict different patterns of burnout in M3. However, regarding our third goal, we tested a third and intermediate model, testing only for the effects of stress and cognitive appraisal (in M1) – leaving out the effect of burnout M2. This third model, showed that when the effect of burnout in M2 is not accounted for, the odds ratio of an individual with low stress in M1 experience high burnout in M3, compared to low burnout, is of 0.21 times lower than of an individual with high levels of stress in M1. That is to say, an individual with high stress in M1 has 367% higher probabilities ($OR = 4.67$) of experiencing high burnout in M3, compared to low burnout, than an individual with low stress in M1.

Discussion

Adaptation to occupational stress represents a major topic on social sciences, particularly the ones interested in human factors at work, as is the case of work psychology and sociology, human safety and engineering, and others. This study addresses the question of knowing how stress and cognitive appraisal can put individuals (i.e., university students) at risk of suffering burnout. Research has already demonstrated

that these factors are related - mainly the relation between stress and burnout – and that increases of occupational stress can put individuals at more risk for extreme negative reactions of burnout. The present study aligns these suggestions by offering indications of how lower versus higher tendency to feel stress and to positively or negatively evaluating the occupational activity can correspond to the burnout experience. Our goal was not to analyze the relations between stress, cognitive appraisal, and burnout (topic already analyzed in literature) but to analyze the magnitude of trajectories between these variables.

The first goal was to test if different patterns of stress experienced by students (lower versus higher profile) corresponded to different levels of burnout over time. The conclusion is affirmative, being observed that students who experienced higher levels of stress also reported higher levels of burnout, when compared to students who experienced lower levels of stress. Our data confirms research indicating that stress can affect the health and wellbeing of students (Chowdhury et al., 2017; Leppink et al., 2016; Wahed & Hassan, 2017), but introduces new insights about how much stress can impact the feelings of burnout which may be pertinent for researchers and practitioners interested in comprehending and intervene on occupational stress.

The second goal was to test if different patterns of cognitive appraisal assumed by students (lower threat and higher challenge, coping potential, and control versus higher threat and lower challenge, coping potential, and control) corresponded to different levels of burnout over time. Indeed, it was observed that students with a positive evaluation of academic activity reported lower levels of burnout than students who evaluated their academic activity negatively. Quite interesting is the fact that these differences seem

more evident on M2 of burnout than on M3 of burnout, although in both cases the pattern was the same (i.e., students with a positive evaluation of their academic activity assumed lower levels of burnout than students who evaluated their activity more negatively). Previous research indicates the role of cognitive appraisal on distinct dimensions of human functioning, as is the case of burnout (Gomes et al., 2013); however, this study established a positive and negative pattern of cognitive appraisal and tested the relations with burnout, turning evident that combining primary (threat and challenge perceptions) and secondary (coping perception and control perception) appraisals can, indeed, best capture the relations with adaptation to stress. To the best of our knowledge, this is a novel finding that deserves to be analyzed in future studies.

The third goal was to test if different patterns of stress experienced by students (lower versus higher profile) and different patterns of cognitive appraisal assumed by students (lower threat and higher challenge, coping potential, and control versus higher threat and lower challenge, coping potential, and control) predicted burnout over time. The conclusion is affirmative regarding the predictor value of stress and cognitive appraisal in predicting burnout on M2; however, on the last moment of data collection, the main predictor of burnout on M3 was burnout on M2. Specifically, a pattern of high stress in M1 increases in 443% the probability to experience moderate to high burnout in M2, compared to low burnout. In addition, a pattern of negative evaluation of the academic activity in M1 increases in 594% the probability to experience high burnout in M2, compared to low burnout. Regarding burnout in M3, a pattern of high stress in M1 increases in 367% the probability to experience high burnout in M3. However, when burnout in M2 entered the equation, the effect of stress in M1 was suppressed and the

patterns of moderate and high burnout in M2 became the main predictors. In fact, high burnout in M2 increases in 895% the probability of experiencing moderate burnout in M3, and in 29924% the probability of experiencing high burnout in M3. That is, participants exposed to moderate levels of burnout at M2 are over 10 times more likely to experience high levels of burnout at M3, when compared to those who experienced low levels of burnout at M2. Also, participants exposed to high levels of burnout at M2 are over nine times more likely to experience moderate levels of burnout at M3 and over 300 times more likely to experience high levels of burnout at M3, when compared to those who experienced low levels of burnout at M2. Thus, it can be concluded that starting the academic year with moderate and higher levels of burnout can put students at a higher risk of experiencing negative feelings of burnout across time. This finding is more relevant if we consider that research demonstrated that burnout is growing among students (López-Alegría et al., 2020) due to their feelings of pressure to accomplish academic goals and be succeed (Schaufeli et al., 2002). Moreover, there is evidence that stress is a main predictor of burnout (Lin & Huang, 2014) and that cognitive appraisal interferes in this relation (Gibbons, 2010). The present research extends these findings by providing specific indications of how much stress and cognitive appraisal can impact burnout, alerting also for the chronic nature of burnout feelings.

Limitations

Although the benefits of collecting data in three different moments to capture the process of human adaptation to burnout, future research may benefit of increasing the number of data collections in order to better detect the evolution of stress, cognitive

appraisal, and burnout over time. In addition, it can be interesting to collect these three indicators in all data collections points in order to clarify if burnout in early stages remain the main predictor of burnout in latter stages.

In future works, it would also be important to evaluate the accumulation of student activity with another professional activity (i.e., including in the analysis the worker-student variable) and to diverse the sample in order to replicate these findings with different groups of participants (e.g., psychology students from different universities; students from other undergraduate courses; workers sample).

Conclusions

Three main conclusions resulted from this study. First, students who have a tendency to experience higher academic stress also have a higher tendency to experience burnout. Second, the same conclusion can be assumed for cognitive appraisal, as students who evaluate their academic activity more negatively have a higher tendency to experience burnout. Third, both stress and cognitive appraisal predict burnout; however, when multiple time points of burnout are analyzed, it can also be concluded that experiencing burnout in a specific data point is the main predictor of experiencing burnout in a later moment, reinforcing the chronic effects of this syndrome on human wellbeing. So, intervention guidelines with students should focus mainly on the reduction of the experience of chronic academic stress reinforcing the need of implementing life skills training program (Gomes et al., 2019) that can help students to cope with academic sources of stress and to be able to evaluate their activity as more challenging. Additionally, it would be important to include the organizational level in the

intervention in order to develop positive policies that promote occupational health and safety in the academic context.

Acknowledgements

This study was conducted at the Psychology Research Centre (CIPsi/UM) School of Psychology, University of Minho, supported by the Foundation for Science and Technology (FCT) through the Portuguese State Budget (UIDB/01662/2020).

References

- Blascovich, J., & Mendes, W. B. (2000). Challenge and threat appraisals: The role of affective cues. In J. P. Forgas (Ed.), *Feeling and thinking: The role of affect in social cognition* (pp. 59-82). Paris: Cambridge University Press.
- Böke, B. N., Mills, D. J., Mettler, J., & Heath, N. L. (2019). Stress and coping patterns of university students. *Journal of College Student Development, 60*(1), 85–103. doi: 10.1353/csd.2019.0005
- Britt, S. L., Ammerman, D. A., Barrett, S. F., & Jones, S. (2017). Student loans, financial stress, and college student retention. *Journal of Student Financial Aid, 47*(1), 25–37. <http://publications.nasfaa.org/jsfa/vol47/iss1/3>
- Chowdhury, R., Mukherjee, A., Mitra, K., Naskar, S., Karmakar, P. R., & Lahiri, S. K. (2017). Perceived psychological stress among undergraduate medical students: Role of academic factors. *Indian Journal of Public Health, 61*(1), 55–57. doi: 10.4103/0019-557X.200253

- Frazier, P., Gabriel, A., Merians, A., & Lust, K. (2018). Understanding stress as an impediment to academic performance. *Journal of American College Health*, 67(6), 562–570. doi: 10.1080/07448481.2018.1499649
- Gibbons, C. (2010). Stress, coping and burn-out in nursing students. *International Journal of Nursing Studies*, 47(10), 1299–1309. doi: 10.1016/j.ijnurstu.2010.02.015
- Gomes, A. R. (2014). Positive human functioning in stress situations: An interactive proposal. In A. R. Gomes, R. Resende, & A. Albuquerque (Eds.), *Positive human functioning from a multidimensional perspective: Promoting stress adaptation* (Vol. 1, pp. 165-194). New York, NY: Nova Science.
- Gomes, A. R. (2019). *Stress Questionnaire for Students (SQS)*. Unpublished technical report. Braga: Escola de Psicologia, Universidade do Minho.
- Gomes, A. R., Faria, S., & Gonçalves, A. M. (2013). Cognitive appraisal as a mediator in the relationship between stress and burnout. *Work & Stress*, 27(4), 351-367. doi:10.1080/02678373.2013.840341
- Gomes, A.R., Fontes, L., Maciel, T., Simões, C., & Resende, R. (2019). Treino de competências de vida: Uma proposta teórica e desafios futuros [Life skills training: A theoretical proposal and challenges for the future]. In A. Aroni, A. Fernandes, F. Ferreira, & L. Bortolai (Eds), *Pensando a Educação na atualidade: Olhares múltiplos* (pp. 137-152). Itapetininga: Edições Hipótese.
- Gomes, A. R., & Teixeira, P. (2016). Stress, cognitive appraisal, and psychological health: Testing instruments for health professionals. *Stress and Health*, 32, 167-172. <https://doi.org/10.1002/smi.2583>

- Hill, M. R., Goicochea, S., & Merlo, L. J. (2018). In their own words: Stressors facing medical students in the millennial generation. *Medical Education Online*, 23(1), 1–10. doi: 10.1080/10872981.2018.1530558
- Hudd, S., Dumlao, J., Erdmann-Sager, D., Murray, D. Phan, E., Soukas, N., & Yokozuka, N. (2000). Stress at college: Effects on health habits, health status and self-esteem. *College Student Journal*, 34(2), 217–227.
- Kim, M., & Beehr, T. A. (2020). Thriving on demand: Challenging work results in employee flourishing through appraisals and resources. *International Journal of Stress Management*, 27(2), 111–125. <http://dx.doi.org/10.1037/str0000135>
- Larson, M., & Luthans, F. (2006). Potential added value of psychological capital in predicting work attitudes. *Journal of Leadership & Organizational Studies*, 13(2), 75–92. <https://doi.org/10.1177/10717919070130020601>
- Lazarus, R. S. (1991). *Emotion and adaptation*. New York: Oxford University Press.
- Leppink, E. W., Odlaug, B. L., Lust, K., Christenson, G., & Grant, J. E. (2016). The young and the stressed. *Journal of Nervous and Mental Disease*, 204(12), 931–938. doi: 10.1097/NMD.0000000000000586
- Lin, S.-H., & Huang, Y.-C. (2014). Life stress and academic burnout. *Active Learning in Higher Education*, 15(1), 77–90. doi: 10.1177/1469787413514651
- López-Alegría, F., Oyanedel, J. C., & Rivera-López, G. (2020). Burnout syndrome in Chilean midwifery students. *SAGE Open*, 10(1). doi: 10.1177/2158244020902090
- Mussi, F. C., Pires, C. G. da S., Carneiro, L. S., Costa, A. L. S., Ribeiro, F. M. S. E. S., & Santos, A. F. (2019). Comparison of stress in freshman and senior nursing students.

Revista da Escola de Enfermagem, 53(e03431), 1–7. doi: 10.1590/S1980-220X2017023503431

Niedhammer, I., Milner, A., Geoffroy-Perez, B., Coutrot, T., LaMontagne, A. D., & Chastang, J. F. (2020). Psychosocial work exposures of the job strain model and cardiovascular mortality in France: results from the STRESSJEM prospective study. *Scandinavian Journal of Work, Environment & Health*, 46(5), 542-551. doi: 10.5271/sjweh.3902.

Paškvan, M., Kubicek, B., Prem, R., & Korunka, C. (2016). Cognitive appraisal of work intensification. *International Journal of Stress Management*, 23, 124-146. doi:10.1037/a0039689

Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology*, 63, 539–569. <http://dx.doi.org/10.1146/annurev-psych-120710-100452>

Rugulies, R., Framke, E., Sørensen, J. K., Svane-Petersen, A. C., Alexanderson, K., Bonde, J. P., Farrants, K., Flachs, E. M., Magnusson Hanson, L. L., Nyberg, S. T., Kivimäki, M., & Madsen, I. E. (2020). Persistent and changing job strain and risk of coronary heart disease: A population-based cohort study of 1.6 million employees in Denmark. *Scandinavian Journal of Work, Environment & Health*, 46(5), 498-507. doi:10.5271/sjweh.3891

Schaufeli, W. B., Martínez, I. M., Pinto, A. M., Salanova, M., & Barker, A. B. (2002). Burnout and engagement in university students a cross-national study. *Journal of Cross-Cultural Psychology*, 33(5), 464–481. doi: 10.1177/0022022102033005003

- Shaw, M. P., Peart, D. J., & Fairhead, O. J. W. (2017). Perceived stress in university students studying in a further education college. *Research in Post-Compulsory Education*, 22(3), 442–452. doi: 10.1080/13596748.2017.1362534
- Shirom, A., & Melamed, S. (2006). A comparison of the construct validity of two burnout measures in two groups of professionals. *International Journal of Stress Management*, 13(2), 176–200. doi: <http://dx.doi.org/10.1037/1072-5245.13.2.176>
- Simões, C., Rodrigues, J., Gonçalves, A. M., Faria, S., & Gomes, A. R. (2021). Work-family conflicts, cognitive appraisal, and burnout: Testing the mediation effect with structural equation modelling. *British Journal of Educational Psychology*. doi: 10.1111/BJEP.12420
- Wallace, D. D., Boynton, M. H., & Lytle, L. A. (2017). Multilevel analysis exploring the links between stress, depression, and sleep problems among two-year college students. *Journal of American College Health*, 65(3), 187–196. doi: 10.1016/j.physbeh.2017.03.040
- Wahed, W. Y. A., & Hassan, S. K. (2017). Prevalence and associated factors of stress, anxiety and depression among medical fayoum university students. *Alexandria Journal of Medicine*, 53(1), 77–84. doi: 10.1016/j.ajme.2016.01.005
- WHO, World Health Organization (2007). Raising awareness of stress at work in developing countries. A modern hazard in a traditional working environment. [Consultado em Janeiro de 2011]. Disponível em www.who.int/occupational_health/publications/stress/en/