

Stress Adaptation Profiles in Higher Education Students: Relationship with Coping and Burnout



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Abstract This study sought to understand whether different stress and cognitive appraisal profiles corresponded to differences in students' coping and burnout. The sample included 547 students from four university courses aged 17–52 years ($M = 20.6$; $SD = 4.4$). The assessment protocol included: the Stress Questionnaire for Students, the Primary and Secondary Cognitive Appraisal Scale, the Reduced Coping Inventory, and the Shirom-Melamed Burnout Measure. The results showed that work overload and academic evaluation were the main sources of stress, and there was a higher use of adaptive coping strategies to cope with stress. Students with a higher stress profile and moderately positive cognitive appraisal profile used less adaptive coping strategies and showed higher levels of burnout. In summary, these findings may be used to develop intervention strategies focusing on students' ability to manage stress and how they appraise their academic activity.

Keywords Cognitive appraisal · Burnout · Coping · University students · Stress

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1 Introduction

Stress is intrinsic to several life contexts and affects people of different age groups [1], being understood as a condition that combines physiological and psychological elements and results from a deficit in the individual's perception of their resources to cope with the situation to which they are exposed [23]. In other words, when people feel that they do not have sufficient skills and resources to cope with the demands of the situation, dysfunctions in human functioning may arise [20]. The same happens with higher education students, considering that their entry into this education cycle represents an essential step in their life cycle and may be associated with situations capable of generating stress [30]. Specifically, starting a Higher Education course requires an adaptation to a new life stage, which may affect students' personal, affective, cognitive, social, and professional development [23]. Therefore, it can generate stress and anxiety, and depending on how the student copes with the situation, it may interfere with academic performance [3, 27].

To better understand the reactions to stressful events, it is essential to know the role of cognitive appraisal [12]. Cognitive appraisal represents how individuals evaluate or judge the personal meaning of a stressful event and its importance for their well-being [22], and it encompasses two different processes: the primary and the secondary cognitive appraisal. The primary cognitive appraisal refers to how the individual evaluates the situation and the importance they attach to it, in other words, primary cognitive appraisal indicates the extent to which the stressful situation is evaluated as challenging or threatening [4, 15]. On the other hand, secondary cognitive appraisal focuses on the individual's coping resources to deal with the stressful event [4, 11].

In this study, we draw on this transactional perspective of adaptation to stress to understand how university students are exposed to occupational stress, how they evaluate academic stressors (primary and secondary cognitive appraisals), the specific strategies they use to cope with these stressors (coping strategies), and the type of burnout reactions they may experience in their activity. In general, the literature on stress in university students has shown that students are exposed to heightened levels of pressure and stress and, therefore, may evidence various adverse reactions at the physical and psychological levels [8, 29].

Studying these relationships is important because it may provide relevant information about how students assess, cope with, and react to stress in the academic environment. However, there is still not much evidence about the possible combination of stress and cognitive appraisal, namely that they may correspond to differences in how students cope with stress (coping strategies) and the type of reactions they manifest to stress, such as their experience of burnout. In this sense, this study started by defining profiles of lower and higher stress perception and profiles of worse or better cognitive appraisal of the student activity to explore possible differences in coping strategies and burnout experience. More simply, do different ways of assessing stress and student activity correspond to differences in how students deal with stress and how they feel daily?

Given these aspects, this study examined whether different stress and cognitive appraisal profiles correspond to differences in students' coping strategies and burnout experience. Based on this objective, the following hypotheses were defined:

Hypothesis 1: Higher stress profiles in student activity correspond to the use of less functional coping strategies and higher burnout levels when compared to lower stress profiles;

Hypothesis 2: Less positive cognitive appraisal profiles of student activity correspond to using less functional coping strategies and higher burnout levels when compared to more positive cognitive appraisal profiles.

2 Materials and Methods

2.1 Participants

A total of 556 students participated in this study; however, the total sample consisted of 547 students. Regarding students' courses, 267 were in Psychology (48.8%), 62 in Law (11.3%), 82 in Economics and Management (15%), 86 in Nursing (15.7%), and 50 in Physiotherapy (9.1%). The students identified the gender with which they identified, being included 451 female students (82.4%), 92 males (16.8%), and four students who did not disclose their gender (0.7%). The students' age ranged from 17 to 52 years old, with only one student having more than 50 years old ($M = 20.6$; $SD = 4.4$). Regarding the type of institution, 234 students attended private education (42.8%) and 313 public education (57.2%). Considering the year of the course curriculum, 216 were 1st-year undergraduates (39.5%), 88 2nd-year undergraduates (16.1%), 162 3rd-year undergraduates (29.6%), 23 4th-year undergraduates (4.2%), two 5th-year undergraduates (0.4%), 37 1st-year masters (6.8%), and 19 2nd-year masters (3.5%).

2.2 Measures

The evaluation protocol included the instruments described below. We tested each instrument's psychometric properties regarding construct reliability and construct validity. We used Cronbach's alpha measure of internal consistency (α) for reliability, for which values below 0.6 are unacceptable [24]. Construct validity was conducted through confirmatory factor analysis (CFA) to test the instrument's latent structure. To estimate the model fit, we used the following indicators: the chisquare goodness-of-fit statistics (χ^2) and the absolute index (χ^2/df), the Steiger-Lind Root Mean Square Error of Approximation (RMSEA), its 90% confidence interval and p -value for H_0 : $RMSEA \leq 0.05$, the standardized root-mean-square residual (SRMR); the Comparative Fit Index (CFI) and its p -value; and the Tucker-Lewis Index (TLI)

[24]. The cut-off measures followed the most acceptable criteria described in the literature [19]. The chi-square goodness-of-fit statistics, testing for the significance of the discrepancy function, indicated the best fit of the global model to data for a lower statistical test value and probability higher than 0.05 [19]. Values of RMSEA in the range [0.05, 0.08] constituted an acceptable fit, and inferior to 0.05 indicated an excellent fit. SRMR of 0.05 and 0.10 is considered good and adequate fits, and inferior to 0.05 indicated an excellent fit. Values of CFI and TLI in the range [0.90, 0.95] indicated a good adjustment, and values higher than 0.95 an excellent adjustment [24].

2.2.1 Stress Questionnaire for Students (SQS; [16])

This instrument includes 28 items related to possible sources of stress associated with the student activity, organized into seven subscales: (1) academic performance: stress arising from the possibility of the student's underachievement (four items; α for this study = 0.88); (2) academic evaluation: stress resulting from the evaluation moments foreseen in the teaching-learning process (four items; α for this study = 0.75); (3) motivation: stress arising from low motivation to engage in study activities (four items; α for this study = 0.82); (4) learning: stress arising from the difficulty in following the teaching-learning process (four items; α for this study = 0.90); (5) work overload: stress arising from too many activities and school tasks (four items; α for this study = 0.91); (6) future expectations: stress arising from the student's disbelief about the usefulness and interest of studies for their future (four items; α for this study = 0.81); and (7) financial problems: stress arising from the infeasibility of continuing one's studies due to monetary difficulties (four items; α for this study = 0.89). 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, χ^2 (324) = 898.360, χ^2/df = 2.773, p < 0.001; RMSEA = 0.057, 90% CI [0.052; 0.061], p = 0.008; SRMR = 0.0534; CFI = 0.943; PCFI = 0.808; TLI = 0.933.

2.2.2 Primary and Secondary Cognitive Appraisal Scale (PSCAS; [17])

Evaluates primary and secondary cognitive appraisal with a total of five scales: (1) importance perception: where the participant evaluates the personal significance of the student activity (three items; α for this study = 0.87); (2) threat perception: where the participant evaluates the disruptive and harmful potential of the student activity (three items; α for this study = 0.83); (3) challenge perception: where the participant evaluates the stimulating and exciting potential of the student activity (three items; α for this study = 0.69); (4) coping perception: where the participant assesses the personal resources they believe they have to cope with the demands of their schooling (three items; α for this study = 0.84); and (5) control perception: where the participant evaluates the decision power they believe they have over their

school path (three items α for this study = 0.69). Items are answered in a 7-point Likert scale with higher values indicating higher levels of cognitive appraisal in each dimension. Instructions to fulfill the instrument were adapted to academic activity, meaning that participants answered the questions thinking about their student activity. CFA revealed good psychometric properties for this instrument χ^2 (80) = 254.38, χ^2/df = 3.18, $p < 0.001$; RMSEA = 0.062, 90% C.I. [0.054; 0.071], $p = 0.009$; SRMR = 0.0578; CFI = 0.957; PCFI = 0.729; TLI = 0.943.

2.2.3 Reduced Coping Inventory (Coping-R; Developed by Gomes [13], from the Work of Carver et al. [6], Carver and Scheier [5])

This questionnaire assesses students' coping strategies to deal with stress in their academic activities. It is composed of 16 items answered on a 5-point Likert-type scale, 1 (Never used it) to 5 (Used it often), assessing four domains of coping: (a) active coping: direct actions taken by the person to solve the problem at hand (four items; α in this study = 0.78); (b) humor: use of jokes or anecdotes designed to remove the negative charge of the problem (four items; α in this study = 0.94); (c) denial: use of thoughts designed to deny the occurrence of the problem or its potential negative consequences (four items; α in this study = 0.82); and (d) emotional support: talking and sharing the problem with others to get emotional help (four items; α in this study = 0.93). The proposed instrument showed good psychometric properties in this study, χ^2 (96) = 252.998, χ^2/df = 2.635, $p < 0.001$; RMSEA = 0.054, 90% CI [0.046; 0.062], $p = 0.186$; SRMR = 0.0425; CFI = 0.974; PCFI = 0.779; TLI = 0.967.

2.2.4 Shirom-Melamed Burnout Scale (SMBS; Shirom and Melamed 2006; Adaptation [33])

Evaluates three dimensions of burnout: (1) physical fatigue: feelings of physical tiredness in the face of work, translating into a decrease in physical energy (six items; α for this study = 0.94); (2) cognitive weariness: feelings of cognitive weariness in the face of work, translating into decreased thinking and concentration capacity (five items; α for this study = 0.93); and (3) emotional exhaustion: feelings of emotional fatigue when dealing with others, which is translated by decreased cordiality and sensitivity to other people's needs (three items; α for this study = 0.85). Items are answered in a 7-point Likert scale (1 = Never or almost never; 7 = Always or almost always). CFA revealed good psychometric properties for this instrument χ^2 (70) = 162.39, χ^2/df = 2.320, $p < 0.001$; RMSEA = 0.049, 90% C.I. [0.039; 0.059], $p = 0.567$; SRMR = 0.0385; CFI = 0.986; PCFI = 0.758; TLI = 0.982.

2.3 Procedure

This research began with the request for approval from the Ethics Committee for Research in Social Sciences and Humanities of the first authors' University. After a favorable response from the committee (CEICSH 034/2019), we started the execution of the work plan. The first step consisted of entering the instruments into an electronic platform (Qualtrics) that generated an online link for participants to complete the evaluation protocol. We collected the data in the middle of the first semester of the academic year—2021/2022. By accessing the electronic platform, students had information about the objectives, the voluntary and anonymous nature of their participation in this study, and the informed consent for those who decided to participate.

3 Results

3.1 Data Analyses Strategy and Preliminary Analyses

Using the G*Power, we calculate the sample size for the study. This analysis revealed that a minimum of 190 participants was needed, given a mean effect size of 0.30, alpha of 0.05, and statistical power of 0.80. We should recall that 556 students participated in this study, of which we removed nine because they presented values lower than or equal to two points on the “importance” subscale of the PSCAS, following the “cut-off point” indications suggested in the literature (see [14]).

After these procedures, we performed a set of analyses using IBM® SPSS® (version 28.0) and AMOS (version 28.0). The first one consisted of a cluster analysis, using the K-means approach, to create two distinct groups of profiles regarding the student's experience of academic stress (i.e., considering all the stress factors assessed by the SQS) and two distinct groups of profiles regarding the student's cognitive appraisal (i.e., considering the four factors assessed by the PSCAS: threat, challenge, coping, and control perceptions). Thus, for stress, we formed two groups, designated the group of students that experience a “lower level of stress” ($n = 237$) and the group of students that experience a “higher level of stress” ($n = 310$). Regarding the cognitive appraisal profiles, we also formed two groups of students—with a “moderately positive profile” of appraising the academic activity ($n = 253$) and with a “very positive profile” of appraising the academic activity ($n = 294$). Next, we analyzed whether the stress and cognitive appraisal profiles differentiated the groups in their respective dimensions (SQS and PSCAS subscales) using the t-test for independent samples. Afterward, we performed a chi-square test to understand if some variables, such as the type of course, year in the curriculum, type of institution, and gender, had a similar distribution across the distinct groups of students created according to the stress and cognitive appraisal profiles mentioned. The results of this test revealed detectable differences only regarding gender, with the proportion

of males and females being different in each group of stress profile; specifically, we found a higher proportion of female students in the group with a higher stress level profile and a higher proportion of male students in the group with a lower stress level profile [$\chi^2(2) = 23.74, p < 0.001$]. Subsequently, we controlled for this variable in the factorial MANCOVA analyses.

Finally, a factorial MANCOVA was performed to analyze the differences between the groups – two stress and two cognitive appraisal profiles. The stress and cognitive appraisal profiles were the independent variables, and the Coping-R and Burnout dimensions were the dependent variables. These analyses aimed to understand whether students who perceived their academic activity as more or less stressful and with a more or less positive cognitive appraisal profile had different coping strategies and levels of burnout.

3.2 Differences in Coping and Burnout as a Function of Stress and Cognitive Appraisal

This analysis sought to verify whether students with different stress and cognitive appraisal profiles had different perceptions of coping strategies and burnout in student activity. We began by using a t-test for independent samples to verify whether the profiles created differentiated the groups in the respective stress and cognitive appraisal dimensions. For the dimensions of stress, the results indicated statistically significant differences in academic performance, academic evaluation, motivation, learning, work overload, future expectations, and financial problems. Considering the mean values of these variables, we found that students with a higher stress level profile showed higher mean values in all dimensions of this questionnaire (see Table 1). Concerning cognitive appraisal, the results showed statistically significant differences between students with a moderately positive profile and a very positive profile in the perception of threat, challenge, coping, and control. For threat perception, students with a moderately positive profile of appraising their academic activity showed higher mean scores than students with a very positive profile, who perceived their academic activity as less threatening. For challenge perception, coping, and control perceptions, students with a moderately positive profile of appraising their academic activity had lower mean scores than students with a very positive profile, who perceived their academic activity as more challenging, revealing higher coping and control perceptions (see Table 1). These results indicated that the selected profiles differentiated the groups from one another, so we proceeded with the following analyses.

We performed a factorial MANCOVA (see Table 2) to investigate whether there were statistically significant differences in burnout levels and coping strategies among students with different profiles of stress (i.e., lower and higher levels of stress), and different cognitive appraisal profiles (i.e., moderately positive and very positive), controlling for gender. The results showed that the effect of the interaction

Table 1 Differences in stress and cognitive appraisal dimensions as a function of stress profiles and cognitive appraisal profiles

Stress profiles			
Stress dimensions (SQS)	Lower level of stress ($n = 237$) $M (SD)$	Higher level of stress ($n = 310$) $M (SD)$	t -test
Academic performance	2.4 (0.8)	3.3 (0.6)	$t (411) = -14.33, p < 0.001$
Academic evaluation	2.4 (0.8)	3.4 (0.5)	$t (373) = -17.15, p < 0.001$
Motivation	1.9 (0.8)	2.9 (0.7)	$t (458) = -15.88, p < 0.001$
Learning	2.2 (0.8)	3.3 (0.6)	$t (392) = -17.57, p < 0.001$
Work overload	2.7 (0.8)	3.6 (0.6)	$t (406) = -15.03, p < 0.001$
Future expectations	1.8 (0.9)	3.0 (0.8)	$t (545) = -16.64, p < 0.001$
Financial problems	1.3 (1.0)	2.5 (1.0)	$t (545) = -13.36, p < 0.001$
Cognitive appraisal profiles			
Cognitive appraisal dimensions (PSCAS)	Moderately positive ($n = 253$) $M (SD)$	Very positive ($n = 294$) $M (SD)$	t -test
Threat	3.5 (0.9)	1.2 (0.9)	$t (545) = -31.49, p < 0.001$
Challenge	4.0 (1.0)	4.8 (0.8)	$t (545) = 10.19, p < 0.001$
Coping	3.5 (0.9)	4.4 (0.8)	$t (545) = 12.04, p < 0.001$
Control	4.0 (1.0)	4.7 (0.8)	$t (484) = 9.49, p < 0.001$

between stress and cognitive appraisal was not statistically significant for burnout [Wilks' $\lambda = 0.99$, $F (3, 540) = 2.05$, $p = 0.106$, $\eta p^2 = 0.01$] nor for coping strategies [Wilks' $\lambda = 0.96$, $F (4, 539) = 0.65$, $p = 0.627$, $\eta p^2 = 0.01$]. Based on these results, we further investigated the simple main effects.

Regarding the differences according to stress profiles, the main effect result was significant for coping strategies [Wilks' $\lambda = 0.98$, $F (4, 539) = 2.20$, $p = 0.067$, $\eta p^2 = 0.02$]. There was a significant effect on the denial strategy, showing that students with a lower stress level profile had a lower mean value of denial compared to students with a higher stress level profile. In the case of burnout, the main effect result was also significant [Wilks' $\lambda = 0.87$, $F (3, 540) = 26.93$, $p \leq 0.001$, $\eta p^2 = 0.13$], with a significant effect on physical fatigue, cognitive weariness, and emotional exhaustion.

Table 2 Differences in coping and burnout as a function of stress and cognitive appraisal profiles

Dimensions		Stress profiles				Cognitive appraisal profiles				Interaction (<i>stress</i> × <i>PSCAS</i>)					
		Lower level of stress <i>M</i> (<i>SD</i>)	Higher level of stress <i>M</i> (<i>SD</i>)	<i>F</i> (1,542)	<i>p</i>	<i>ηp2</i>	Moderately positive <i>M</i> (<i>SD</i>)	Very positive <i>M</i> (<i>SD</i>)	<i>F</i> (1,542)	<i>p</i>	<i>ηp2</i>	<i>F</i> (1,542)	<i>p</i>	<i>ηp2</i>	
<i>Coping-R</i>															
Active coping		3.3 (0.1)	3.2 (0.0)	0.39	0.531	0.00	3.1 (0.1)	3.4 (0.0)	24.31	<0.001	0.04	0.18	0.669	0.00	
Denial		2.3 (0.1)	2.5 (0.1)	8.67	0.003	0.02	2.5 (0.1)	2.3 (0.1)	1.65	0.200	0.00	0.18	0.671	0.00	
Humor		3.2 (0.1)	3.3 (0.1)	1.67	0.197	0.00	3.4 (0.1)	3.1 (0.1)	3.87	0.050	0.01	0.02	0.900	0.00	
Emotional support		3.5 (0.1)	3.4 (0.1)	1.02	0.314	0.00	3.3 (0.1)	3.5 (0.1)	3.78	0.052	0.01	2.48	0.116	0.01	
<i>SMBS</i>															
Physical fatigue		4.7 (0.1)	5.4 (0.1)	48.54	<0.001	0.08	5.4 (0.1)	4.6 (0.1)	62.77	<0.001	0.10	0.34	0.563	0.00	
Cognitive weariness		4.1 (0.1)	5.0 (0.1)	74.31	<0.001	0.12	4.9 (0.1)	4.2 (0.1)	47.46	<0.001	0.08	3.10	0.079	0.01	
Emotional exhaustion		1.9 (0.1)	2.3 (0.1)	11.78	<0.001	0.02	2.4 (0.1)	1.9 (0.1)	24.63	<0.001	0.04	1.04	0.309	0.00	

Considering the mean values of these variables, we found that students with the lower stress profile perceived lower levels of physical fatigue, cognitive weariness, and emotional exhaustion compared to students with the higher stress level profile. For the cognitive appraisal profiles, the main effect result was significant for coping strategies [Wilks' $\lambda = 0.95$, $F(4, 539) = 7.04$, $p \leq 0.001$, $\eta^2 = 0.05$], showing a significant effect on the active coping strategy, where students with a moderately positive profile show a lower average value of active coping compared to students with a very positive profile, who show higher resources of active coping. In the case of burnout, the main effect result was also significant [Wilks' $\lambda = 0.87$, $F(3, 540) = 25.91$, $p < 0.001$, $\eta^2 = 0.13$], showing a significant effect on physical fatigue, cognitive weariness, and emotional exhaustion. The results showed that students with a moderately positive profile had higher levels of physical fatigue, cognitive weariness, and emotional exhaustion than those with a very positive profile.

4 Discussion

The results obtained in this study highlighted some interesting aspects. First, the stress and cognitive appraisal profiles found in this sample differentiated groups of students from each other regarding their experience of academic stress and cognitive appraisal of their academic activity. Concerning stress profiles, university students in the higher stress level group perceived more significant stress associated with academic performance, academic evaluation, motivation, learning, future expectations, financial problems, and work overload. In cognitive appraisal profiles, the perceived threat is highest in students with a moderately positive profile of appraising academic activity. Conversely, students with a very positive profile of appraising academic activity had a higher perception of challenge, coping, and control perceptions.

Another highlighted aspect is the differences in coping strategies according to stress profiles. In this case, the results indicated that students with a higher stress level profile used more denial strategies to cope with academic stressors than those with a lower stress level profile. Research has shown that problem-solving and emotion-centered coping strategies make people better cope with occupational stress [2]. In a study conducted in a university setting, the authors found that participants experienced specific organizational and professional stressors that gave rise to distressing emotions. Still, participants also used adaptive coping strategies (e.g., emotional support, humor) and proved effective in coping with stressors [28]. Also, regarding the stress profiles in this study, the differences in the students' experience of burnout were analyzed. In this case, we found that students with a higher stress profile had a higher perception of physical fatigue, cognitive weariness, and emotional exhaustion.

Given that burnout syndrome results from an affective reaction to chronic stress, where there is a gradual decrease in intrinsic personal resources [25, 31, 32], we expected that students with higher levels of stress would experience more significant physical fatigue, cognitive weariness, and emotional exhaustion. In a study of medical students, the authors found that higher levels of burnout were significantly associated

with fear of failure, lack of belief in what they were doing, lack of help or supportive resources, and uncertain future, that is, students experienced stressors related to academic achievement, motivation, learning, and future experiences [26]. In sum, these results allow us to confirm the first hypothesis of this study, which highlighted that profiles of higher stress concerning students' academic activity would correspond to the use of less functional coping strategies and higher burnout levels compared to those with profiles of lower stress levels.

This study showed that students with a very positive cognitive appraisal profile, compared to their peers with a moderately positive cognitive appraisal profile, used more active coping as a strategy to face the academic activity. Thus, the students in this sample who evaluated academic activity with a more positive cognitive profile tended to use a coping strategy based on active coping, assuming a greater ability to deal directly with academic stress. This pattern of results is in line with scientific research, which highlights the role of cognitive appraisal in coping strategies used to deal with stress [7]. The relationship between cognitive appraisal profiles and burnout is also noteworthy, with students who presented a moderately positive cognitive profile showing higher levels of physical fatigue, cognitive weariness, and emotional exhaustion. These results are in line with the theory in this area [12, 21] because if people interpret stressful situations more negatively, they tend to be less effective in managing the stress situation and, eventually, may end up experiencing more significant symptoms of burnout [9, 10, 18]. In sum, these results allow us to confirm the second hypothesis of this study, in which less positive cognitive appraisal profiles of student activity corresponded to the use of less functional coping strategies and higher levels of burnout compared to more positive cognitive appraisal profiles. All in all, the results of our study reinforced the need to develop intervention practices based on scientific evidence, allowing students to both learn stress control strategies and construct positive cognitive appraisals of academic activity in order to increase their ability to cope with the demands of university education and, consequently, increase their levels of mental health.

This study has some limitations to address in future studies. The results do not include students from all areas of university education, with a higher representation of students from the Psychology course and lower percentages of students from the remaining courses, and this also resulted in more female than male participants in our study because this course includes a majority of female students. Besides this aspect, there may be other variables capable of influencing the perception of stress and burnout, namely the characteristics of the course, the semester when data were collected, and the socioeconomic level. In future studies, a more consistent sample regarding gender and year in the curriculum would be desirable. In conclusion, this study shows the importance of analyzing how students experience their academic activity, reinforcing the importance of stress and cognitive appraisal profiles in coping strategies and the experience of burnout associated with student activity.

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