Mental health in young adults (18-30):

the role of motivation, academic stress and coping strategies

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Abstract

Worrying rates of depression and anxiety have been reported in Chinese college students (e.g., Song et al., 2008). The current study aimed to study the mechanisms that may influence symptoms of depression and anxiety of students by testing a moderated mediation model. A mediation effect of academic stress in the relationship between academic motivation and psychopathological symptoms, as well as moderation effects of coping strategies in the relationship between academic stress and psychopathological symptoms were investigated. 291 adult students (aged 18 to 30) were recruited from universities and vocational schools in mainland China. An online questionnaire was distributed and path analyses were performed with R. Measurement instruments included Academic Motivation Scale, Law Student Perceived Stress Scale, Patient Health Questionnaire, Generalized Anxiety Disorder screener, Cognitive Emotion Regulation Questionnaire, Behavioral Emotion Regulation Questionnaire and life events checklist. Results showed that academic stress significantly correlated with symptoms of depression and anxiety. Lack of motivation and motivation for only external rewards and demands had indirect effects on these symptoms through academic stress. Rumination, seeking distraction and ignoring moderated the relationship between stress and the psychopathological symptoms. Seeking distraction still moderated this relationship when motivation was taken into consideration. It is suggested that intervention programs aiming to improve the emotional well-being of students in China could consider reducing academic stress and incorporating components targeting academic motivation and coping strategies. Future researchers are suggested to investigate these findings in male-dominant samples and to further explore the role of potentially adaptive strategies.

1. Introduction

Mental health is a concern for young adults in the academic setting all around the world. Alarming rates of anxiety and depression has been reported among college students in many countries (Regehr, Glancy, & Pitts, 2013). In China, it was reported that 25-44% of college students exhibited depressive symptoms (Song et al., 2008), 41% experienced anxiety (Wong, Cheung, Chan, Ma, & Tang, 2006) and around 20% reported suicide ideation (Zhang, Wang, Xia, Liu, & Jung, 2012). It is important to investigate the constructs that are linked with these emotional problems in the academic setting as well as the potential mechanisms with which we might be able to change these links.

1.1 Academic stress

The relatively high rate of emotional problems may suggest that college students can be experiencing stresses related to the academic environment. It has been proposed that students may have sources of stress from different categories: academic demands, career pressure, social isolation and study/life imbalance (Bergin & Pakenham, 2015). All four aspects of academic stress have been shown to positively correlate with symptoms of depression and anxiety (Bergin & Pakenham, 2015).

According to the Transactional Theory of Stress and Coping, there are two cognitive processes involved before stressors in the environment affect one's emotional well-being, namely cognitive appraisal and coping (Lazarus & Folkman, 1987). Lazarus and Folkman argue that appraisal involves interpreting whether the event is important to the person and whether he/she is capable of dealing with it. According to them, this appraisal determines how much the events or stressors in the environment affect one's level of perceived stress. Once a person experiences stress, he/she would engage in coping, and the coping strategies chosen by the person would further influence how much the perceived stress affects one's psychological well-being (Lazarus & Folkman, 1987). Perceived stress is thus considered as "an intervening

variable with antecedent causes and behavioral consequences" (Motowidlo, Packard, & Manning, 1986). Many factors have been proposed to play a role as antecedent causes of stress, for example, neuroticism (Grant, 2011), fear of negative evaluation (Motowidlo et al., 1986), and Type A behavior pattern, referring to competitiveness, impatience and aggressiveness (Ivancevich & Matteson, 1984).

1.2 Academic motivations

The investigators of the current study propose that motivation might also be a factor that affects a person's perceived stress by influencing the process of cognitive appraisal. According to self-determination theory (Ryan & Deci, 2000), a person may experience an array of motivations varying in their degrees of self-determination. The authors argued that on this continuum lies intrinsic motivation, extrinsic motivation and amotivation, of which intrinsic motivation comes with the highest level of self-determination. They suggested that when one's fundamental needs for competence, relatedness and autonomy are satisfied, one feels free to initiate and control his/her activities. The activity is then carried out for its inherent satisfaction. According to the authors, extrinsic motivation refers to carrying out an activity in order to reach some other outcomes or when someone feels obliged to do it. The activity is thus not performed for its own sake. Lastly, amotivation refers to not having the drive to do something, and may be due to the fact that one feels incompetent, sees little value in an activity or has low expectation for a desired outcome (Ryan & Deci, 2000).

Research suggested that academic motivation is likely to associate with perceived stress and psychological well-being (Baker, 2004; Huang, Lv, & Wu, 2016; Park et al., 2012). Amotivation has been reported to link with more perceived stress (Baker, 2004), while intrinsic motivation seemed to associate with less stress (Baker, 2004; Huang et al., 2016). Regarding to psychological well-being, amotivation was associated with poorer psychological adjustment for university students (Baker, 2004; Miquelon, Vallerand, Grouzet, & Cardinal, 2005) and less satisfaction with their life (Lachapelle et al., 2005). Motivation to compete and to be rewarded

for academic performances, which may be considered a kind of extrinsic motivation, seemed to contribute to symptoms of anxiety experienced by adolescents in Hong Kong (Essau, Leung, Conradt, Cheng, & Wong, 2008). Students with intrinsic academic motivation, however, reported less social dysfunction and anxiety (Miquelon et al., 2005) and experienced less depression (Huang et al., 2016). It has also been demonstrated that after priming intrinsic self-regulation, the psychological well-being of the students improved regardless of their perceived academic performance (Burton, Lydon, D'alessandro, & Koestner, 2006). A longitudinal study has suggested that after change in intrinsic motivation, the perceived academic competence of students also changed (Guay, Boggiano, & Vallerand, 2001).

The investigators of the current study propose that academic stress may act as a mediator between academic motivation and symptoms of depression and anxiety. That is, the type of the academic motivation may take a part in the cognitive appraisal process which determines the student's susceptibility to certain types of stressors, thus they might experience more stress and further develop symptoms of depression and anxiety. The perceived competence, for example, might play a role in the interpretation of whether the student is capable of dealing with the stressor. Such indirect effect has not yet been tested to the knowledge of the author.

1.3 Cognitive and behavioral coping strategies

According to the Transactional Model of Stress and Coping (Lazarus & Folkman, 1987), once the students experience stress from academic stressors, how they deal with it may have an impact on their level of emotional well-being. It has been confirmed by other researchers that facing stressful situations, people may adopt cognitive and behavioral coping strategies to regulate their emotions and such strategies vary in their effectiveness. (Garnefski, Kraaij, & Spinhoven, 2002; Kraaij & Garnefski, 2019).

The cognitive coping strategies are proposed to include the following nine types: self-blame, other-blame, rumination, catastrophizing, putting into perspective, positive refocusing, positive reappraisal, acceptance and planning (Garnefski et al., 2002). It has been shown that

people implement different cognitive coping strategies depending on their culture (Pothoff et al., 2016; Zhu, Luo, Yao, Auerbach, & Abela, 2007), age (Garnefski & Kraaij, 2006), gender (Garnefski, Teerds, Kraaij, Legerstee, & Van den Kommer, 2004; Xiao et al., 2009; Zlomke & Hahn, 2010) and the type of stress they are facing (Garnefski, Boon, & Kraaij, 2003; Garnefski & Kraaij, 2009; Martin & Dahlen, 2005; Schroevers, Kraaij, & Garnefski, 2007). When comparing Chinese and American college students, Chinese men were reported to implement more self-blame and positive reappraisal, while Chinese women used more self-blame and other-blame (Zhu et al., 2007). Still, certain strategies, namely self-blame, rumination and catastrophizing were found to be consistently linked with symptoms of anxiety and depression in different age groups, while positive reappraisal has been found to consistently negatively correlate with such symptoms (Garnefski et al., 2003; Garnefski & Kraaij, 2007; Garnefski & Kraaij, 2009; Pothoff et al., 2016). It has been reported that strategies which are supposed to be adaptive have less strong correlations with psychopathological symptoms compared with maladaptive strategies (Aldao & Nolen-Hoeksema, 2010), and that the use of adaptive strategies had more variations across situations (Aldao & Nolen-Hoeksema, 2012).

As for the behavioral coping strategies, five approaches have been identified, namely seeking distraction, withdrawal, actively approaching, seeking social support and ignoring (Kraaij & Garnefski, 2019). Among them, withdrawal and ignoring were reported to correlate with more symptoms of anxiety and depression, while the other three strategies associated with fewer psychopathological symptoms (Kraaij & Garnefski, 2019). Other research using similar constructs did not typically make distinctions between behavioral and cognitive strategies. Some showed similar results, namely distraction (Broderick, 2005), active coping and seeking social support being positively correlated with well-being (Kato, 2015), while behavioral disengagement (Joormann & Stanton, 2016), avoidance and suppression (Aldao, Nolen-Hoeksema, & Schweizer, 2010) showing the opposite correlation. However, some other research suggested that the effectiveness of the coping strategies depend on the type and level of stressors. Active coping has been demonstrated to relate to fewer externalizing problems when used with controllable stressors compared with uncontrollable stressors (Clarke, 2006).

Avoidant coping associated with higher level of depression with low level of stress, while at higher levels of stress, the relationship seemed to reverse (Gonzales, Tein, Sandler, & Friedman, 2001).

Cognitive and behavioral coping strategies have been reported to moderate the relationship between stressful events and mental well-being. Cognitive coping strategies such as self-blame, rumination and positive reappraisal have been shown to moderate the relationship between negative life events and symptoms of depression (Kraaij et al., 2003). In a study on women with experience of violence in an intimate relationship, the use of self-blame was related to a stronger relationship between violence and poor psychological adjustment (O'NEILL & Kerig, 2000). Rumination showed the same moderation effect between negative life events and depression (Abela & Hankin, 2011; Vanderhasselt, Brose, Koster, & De Raedt, 2016). Positive reappraisal seemed to buffer the influence of stress on internalizing symptoms (Suldo, Shaunessy, & Hardesty, 2008) such as depression (Troy, Wilhelm, Shallcross, & Mauss, 2010) and short-term affect (Rood, Roelofs, Bögels, & Arntz, 2012). Some researchers suggested that such moderating effect of positive reappraisal may only apply to "growth-inducing stressors" but not to other types of stressors (Siegel & Schrimshaw, 2007).

The case for behavioral coping strategies is less clear. Engagement coping (e.g., problem-solving, distraction) has been indicated to attenuate the relationship between social stress with symptoms of anxiety and depression, while disengagement coping (e.g., avoidance, denial) accentuated this relationship (Connor-Smith & Compas, 2002). While in another study, avoidant coping seemed to augment the link between daily hassles and internalizing problems for girls, but buffered the link between stress and externalizing problems for boys (Grant et al., 2000). Seeking social support also seemed to have the same effect for girls as avoidant coping according to Grant and colleagues (2000).

Based on the literature described above, it seems reasonable to expect that certain cognitive and behavioral coping strategies would also play a moderating role between stress induced by academic stressors and symptoms of anxiety and depression. In an attempt to clarify

the role of behavioral coping strategies, a newly developed Behavioral Emotion Regulation Questionnaire (Kraaij & Garnefski, 2019) is used in the current study, where five specific coping strategies are tested instead of broad categories of disengagement / engagement coping.

1.4 Aim and hypotheses

The aim of this study is to form a comprehensive model to understand the factors that may influence symptoms of anxiety and depression in academic settings in China. The results may shed light on how stress, motivation, coping strategies and the psychopathological symptoms relate to each other and this may provide insights for designing intervention programs aiming to improve mental health of students.

A model is formed based on the Transactional Theory of Stress and Coping (Lazarus & Folkman, 1987), where academic motivation influences the process of cognitive appraisal which determines how much stress is perceived by the person, while coping strategies influences the effectiveness to cope with the perceived stress. Specifically, an indirect effect from academic motivation through academic stress to symptoms of anxiety and depression was expected. Cognitive and behavioral coping strategies are expected to moderate the relationship between academic stress and symptoms of anxiety and depression. Since negative life events which are not directly linked with the academic setting have been reported to precede depression (Kendler, Kuhn, & Prescott, 2004) and anxiety (Kendler et al., 2003), it is used as a control variable in this study. The model is illustrated in Figure 1. Research questions and hypotheses are described below :

Q1: How do academic motivation, academic stress, coping strategies and symptoms of anxiety and depression correlate with each other for Chinese college students?

H1: For Chinese college students, intrinsic motivation is expected to negatively correlate with academic stress and symptoms of anxiety and depression, while extrinsic

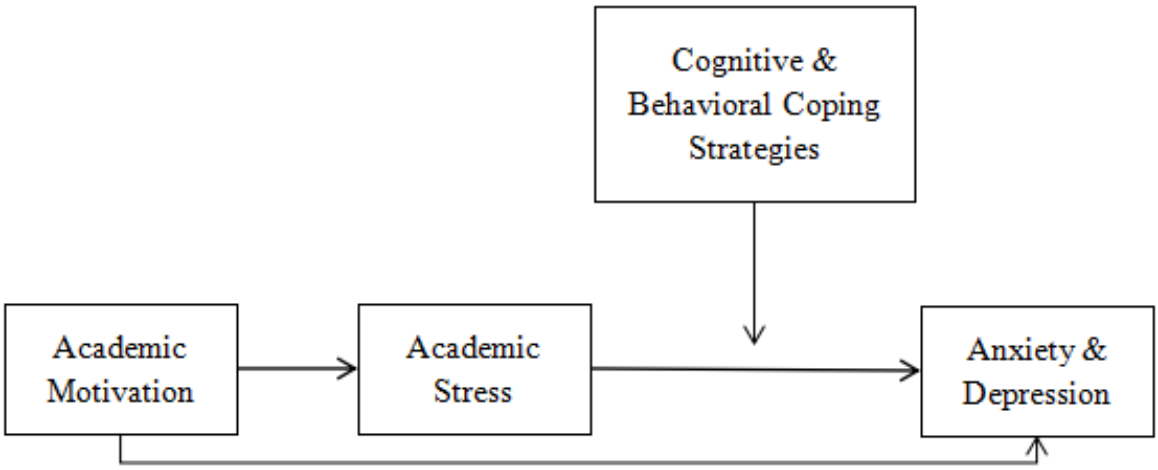

Figure 1. Moderated mediation model

motivation and amotivation are expected to positively correlate with academic stress and symptoms of anxiety and depression. Academic stress is expected to positively correlate with symptoms of depression and anxiety. Self-blame, rumination, catastrophizing withdrawal and ignoring are expected to positively correlate with the emotional symptoms while positive reappraisal, seeking distraction, actively approaching and seeking social support are expected to negatively correlate with these symptoms.

Q2: Does academic stress mediate the relationship between academic motivation and symptoms of anxiety and depression?

H2: Academic stress mediates the relationship between academic motivation and symptoms of anxiety and depression.

Q3: Does the use of cognitive and behavioral strategies moderate the relationship between academic stress and symptoms of anxiety and depression?

H3: Cognitive and behavioral strategies, namely self-blame, rumination, positive reappraisal, seeking distraction, seeking social support, actively approaching, withdrawal and ignoring are expected to moderate the relationship between academic stress and symptoms of anxiety and depression. Specifically, self-blame, rumination, withdrawal and ignoring are expected to strengthen this relationship, while positive reappraisal, seeking distraction, seeking

social support and actively approaching are expected to weaken this relationship. The effect is also expected in the context of academic motivation, as illustrated in Figure 1.

2. Methods

2.1 Participants

The sample consisted of 291 adult students from universities and vocational schools in mainland China. The universities were spread in 19 provinces, but the majority were situated in Shanghai and Xi'an. All of the participants had a Chinese nationality. The age ranged from 18 to 30, with a mean of 20.30 years (N = 272, SD = 2.04). 73.9% of them were female (N = 291, same for the following statistics). The majority of them (95.2%) studied full-time. 6.9% were doing a double major. 70.5% studied in the second to fourth year of university or vocational school, 16.8% were in the first year, 10.7% were doings their masters and 2.1% were PhD candidates. 32.3% majored in an alpha subject (i.e., humanities), 44.0% majored in a beta subject (i.e., natural sciences), and 23.7% majored in a gamma subject (i.e., social sciences). The education of their parents ranged from never attended school to doctor's degree (mothers/primary caretaker: 15.8% primary education, 52.9% secondary education, 28.2% tertiary education, 0.7% no primary caretaker; fathers/secondary caretaker: 12.37% primary education, 54.3% secondary vocational school, 31.6% tertiary education, 1.03% no secondary caretaker).

Participants younger than 18 years and older than 30 (six of them were 17 years old and one was 37) or those who were not attending universities in mainland China (seven studied in the U.S., Hong Kong or Singapore) were eliminated from the sample. Some of the participants gave invariable response (e.g., choosing the first answer for all the questions) to all or part of the questionnaire. 36 participants were eliminated because more than 80% of their response were invariable. For another 22 participants, who began to give invariable response only later in the questionnaire, the part of invariable response was deleted and imputed with k-nearest

neighbor imputation with the package DMwR in R. There were further no missing data.

2.2 Procedure

The participants were approached through course coordinators, tutors, friends and online platforms of the local universities. A link of a self-report online questionnaire was provided in Chinese. Participants filled in a consent form at the beginning of the questionnaire. The questionnaire took around 20 minutes to complete and there was a debriefing and lottery when the participant finished all questions. Anonymity was guaranteed. Most of the data was collected in early November, 2018. The study was approved by the ethical committee of department of clinical psychology, Leiden University (CEP18-0417/215) as well as the university committee on human research protection of East China Normal University (HR 155-2018).

2.3 Instruments

The questionnaire covered demographics, academic motivations, academic stressors, symptoms of depression and anxiety, cognitive coping, behavioral coping and life events.

2.3.1 Academic motivation

The Academic Motivation Scale (Vallerand et al., 1992) was used to assess the levels of different types of academic motivations of the participants. The scale has 28 items and is divided into seven categories: three intrinsic motivations (to know, to accomplish things and to experience stimulation), three extrinsic motivations (external, introjected and identified regulation) and amotivation. Each item was rated on a 7-point Likert scale from 1 (does not correspond at all) to 7 (corresponds exactly). Scores for each category were calculated, ranging from 4 to 28. A Chinese version of the scale has been validated (Zhang, Li, Li, Li, & Zhang,

2016). The Cronbach's alpha ranged from 0.75 to 0.86 in China (Zhang et al., 2016). In the present sample the Cronbach's alpha ranged from 0.79 to 0.87.

2.3.2 Academic stressors

Academic stressors were measured with the Law Student Perceived Stress Scale (LSPSS) (Bergin & Pakenham, 2015). The measure includes four sources of stress that may be experienced by students: academic demands, social isolation, career pressure and study/life imbalance. Each of the 24 items was scored on a 5-point Likert scale ranging from 1 (not stressful at all) to 5 (very stressful). A total score ranging from 24 to 120 was calculated by adding all the items. The instrument has been validated in the population of law students and has a Cronbach's alpha of 0.89 (Bergin & Pakenham, 2015). In the current study, some wordings of the questionnaire were slightly adjusted to suit university students in general and was translated to Chinese by the researcher. A back-translation was made by another bilingual student who had not seen the scale. This back-translation was inspected with comparison to the original scale by the supervisor and modifications of the translation were made accordingly. In the present sample the Cronbach's alpha was 0.89.

2.3.3 Depression

The Patient Health Questionnaire (PHQ-9) was used to measure symptoms of depression (Kroenke, Spitzer, & Williams, 2001). Nine items corresponding to the diagnostic criterion of DSM-IV were scored on a scale from 0 (not at all) to 3 (nearly every day). A total score ranging from 0 to 27 was calculated. The instrument has been translated and validated in China, with an alpha of 0.86 (Wang et al., 2014). In the present sample the Cronbach's alpha was 0.87.

2.3.4 Anxiety

To measure symptoms of anxiety, the Generalized Anxiety Disorder screener (GAD-7) was used (Spitzer, Kroenke, Williams, & Löwe, 2006). Participants rated seven items from 0 (not at all) to 3 (nearly every day). A total score of 0 to 21 was yielded. The instrument has been translated and validated in China with a population of general hospital outpatients (He, Li, Qian, Cui, & Wu, 2010). A Cronbach's alpha of 0.89 is reported (He et al., 2010). In the present sample the Cronbach's alpha was 0.93.

2.3.5 Cognitive coping

The Cognitive Emotion Regulation Questionnaire was implemented to measure the cognitive strategies used by participants in response to stress (Garnefski et al., 2002). The questionnaire consists of 36 items, measuring nine distinct cognitive strategies used by people when they face stressful situations: self-blame, other-blame, rumination, catastrophizing, putting into perspective, positive refocusing, positive reappraisal, acceptance and planning. There are four items for each of the strategies. Participants scored the items on a 5-point Likert scale from 1 (almost never) to 5 (almost always). Scores for the nine subscales were calculated individually, each ranging from 4 to 20. The questionnaire has been translated and validated in China with a population of university students. The Cronbach's alpha range from 0.76 to 0.90 (Zhu et al., 2008). In the present sample the Cronbach's alpha ranged from 0.71 to 0.86.

2.3.6 Behavioral coping

The Behavioral Emotion Regulation Questionnaire was used to measure behavioral coping strategies of the participants (Kraaij & Garnefski, 2019). The instrument includes 20 items, with 4 items measuring each of the 5 behavioral strategies: seeking distraction, withdrawal, actively approaching, seeking social support and ignoring. Participants scored each item on a 5-point Likert scale from 1 (almost never) to 5 (almost always). Scores for the five strategies were

calculated, each ranging from 4 to 20. The questionnaire is validated in the Netherlands and has demonstrated good validity and reliability with Cronbach's alpha between 0.86 to 0.93 (Kraaij & Garnefski, 2019). In this study, the scale was translated by the researcher into Chinese. After a back-translation by another bilingual student, the researcher made adjustments to the translation. In the present sample the Cronbach's alpha ranged from 0.73 to 0.85.

2.3.7 Life events

13 negative life events happened in the life time, for example "divorce of parents", "death of a significant other" and "unwanted pregnancy" were measured by a self-constructed checklist (available at www.cerq.leidenuniv.nl). 0 or 1 was scored for each item, yielding a total score of 0 to 13. A Chinese version was translated by the researcher and back-translated by another student.

2.4 Data analysis

Data analysis was done with R. Firstly, descriptive statistics including mean, standard deviation and frequency tables were calculated. Cronbach's alpha was calculated for all the scales using the package Psych. To answer the first research question, Pearson correlation was run for all the variables to form a correlation matrix. To answer the second and third question, mediation and moderation models were tested with path analysis with the method of maximum likelihood using the package Lavaan. Bootstrapping was performed for the benefit that it does not require multivariate normality of the sample. The number of iterations was 5000. Number of life events were controlled. For the second question, mediation was tested by regressing academic stress on subscales of academic motivation, and depression and anxiety were regressed on academic stress, academic motivation and number of life events. Indirect effects of specific paths were calculated by multiplying the two parameters on that path, for example $\beta_{amotivation\text{-}stress} * \beta_{stress\text{-}anxiety}$. Mediation is concluded when this indirect effect is significant, regardless of the direct

effect (Hayes, 2013; Zhao, Lynch, & Chen, 2010). For the third question, all coping strategies were tested individually as moderators. Variables of stress and coping strategies were centered and interaction variables were created with the product of the two centered variables. Depression and anxiety were then regressed on academic stress, coping strategy, number of life events and the interaction variable. Bonferroni correction was used to counteract the problem of multiple comparison. The alpha level for the third question was .0036 (.05 divided by 14, number of coping strategies).

Further analyses for the third question were done to examine each significant interactions in more detail. The sample was split into three subgroups: one group with the score of the moderating variable lower than 1 standard deviation below the mean; the second group with the score of the moderating variable between -1 and +1 standard deviation from the mean; and the third group with the score of the moderating variable higher than 1 standard deviation above the mean. For each group, depression and anxiety symptoms were regressed on stress and life events.

Finally, the most significant moderators were added to the mediation model by a stepwise approach in order to form a moderated mediation model including academic motivations, academic stress, coping strategies, life events and symptoms of anxiety and depression. This model was then compared with the mediation-only model to answer the second part of the third question, namely whether there is still moderation in the context of the mediation.

3. Results

3.1 Descriptive statistics and correlations

Mean, standard deviation, Chronbach's alpha and Pearson correlations among all the variables were computed (Table 1). Chronbach's alpha of all scales were acceptably good (0.71 to 0.93). Academic stress was positively correlated with symptoms of depression ($r(291) = 0.39$, $p < .001$) and anxiety ($r(291) = 0.42$, $p < .001$). Amotivation and the three types of extrinsic

Table 1

Reliability Coefficients, Descriptive Statistics and Pearson Correlations Between All Variables

	α	Mean	*SD*	1	2	3	4	5	6	7	8	9	10
1 Depressive symptoms	0.87	16.89	5.04	-									
2 Anxiety symptoms	0.93	12.76	4.77	0.74***	-								
3 Life events	-	1.54	2.72	0.28***	0.29***	-							
4 Academic stress	0.89	50.57	9.57	0.39***	0.42***	.07	-						
5 Self-blame	0.73	10.15	2.89	0.43***	0.49***	0.14*	0.26***	-					
6 Acceptance	0.76	11.53	3.31	0.27***	0.34***	0.17**	0.15*	0.59***	-				
7 Rumination	0.71	10.92	3.21	0.34***	0.43***	0.20***	0.25***	0.64***	0.78***	-			
8 Positive refocusing	0.80	11.17	3.33	0.24***	0.24***	.07	0.16**	0.42***	0.52***	0.54***	-		
9 Refocus on planning	0.86	12.75	3.72	0.12*	0.19**	.01	0.14*	0.49***	0.62***	0.65***	0.61***	-	
10 Positive reappraisal	0.84	12.69	3.62	0.12*	0.18**	0.06	0.11*	0.41***	0.56***	0.60***	0.63***	0.85***	-
11 Putting into perspective	0.73	10.39	3.23	0.31***	0.40***	0.18**	0.22***	0.43***	0.54***	0.62***	0.51***	0.48***	0.50***
12 Catastrophizing	0.80	8.66	3.29	0.49***	0.57***	0.22***	0.33***	0.42***	0.38***	0.45***	0.29***	0.14*	0.11
13 Other-blame	0.81	8.68	2.94	0.40***	0.44***	0.23***	0.20***	0.29***	0.35***	0.38***	0.28***	0.14*	0.14*
14 Seeking distraction	0.79	11.36	3.21	0.35***	0.37***	0.16**	0.19**	0.42***	0.47***	0.47***	0.56***	0.43***	0.47***
15 Withdrawal	0.83	8.9	3.54	0.54***	0.50***	0.20***	0.30***	0.44***	0.29***	0.36***	0.15**	.01	.00
16 Actively approaching	0.85	12.08	3.34	0.11	0.17**	.02	0.12*	0.32***	0.42***	0.44***	0.45***	0.67***	0.65***
17 Seeking social support	0.81	11.40	3.44	0.10	0.20***	0.10	0.16**	0.19**	0.30***	0.36***	0.32***	0.40***	0.42***
18 Ignoring	0.73	10.72	3.24	0.35***	0.35***	0.15*	0.23***	0.41***	0.48***	0.45***	0.41***	0.30***	0.29***
19 Intrinsic motivation - to know	0.85	21.30	4.04	-0.11	- .04	.04	.04	.08	0.15*	0.13*	0.15**	0.31***	0.32***
20 Intrinsic motivation - to accomplish	0.87	20.29	4.63	-0.15*	- .06	.03	.00	.08	0.10	0.10	0.18**	0.26***	0.32***
21 Intrinsic motivation - to experience	0.83	19.73	4.49	-0.12*	- .04	.03	.05	.05	.03	.07	0.16**	0.19**	0.26***
22 Extrinsic motivation - identified	0.82	21.66	4.18	-0.11	- .03	.02	0.15*	0.13*	0.18**	0.16**	0.22***	0.34***	0.35***
23 Extrinsic motivation - introjected	0.79	18.49	4.82	.00	.08	0.11	0.16**	.08	.00	0.11	0.10	0.13*	0.18**
24 Extrinsic motivation – external	0.84	21.18	4.61	.07	.09	.01	0.35***	0.12*	0.18**	0.17**	0.15*	0.21***	0.21***
25 Amotivation	0.87	11.27	5.60	0.38***	0.30***	0.21***	0.17**	0.10	- .08	.02	- .05	-0.24***	-0.21***

Table 1 (*continued)*

	11	12	13	14	15	16	17	18	19	20	21	22	23	24
11 Putting into perspective	-													
12 Catastrophizing	0.45***	-												
13 Other-blame	0.43***	0.68***	-											
14 Seeking distraction	0.44***	0.36***	0.25***	-										
15 Withdrawal	0.30***	0.60***	0.47***	0.41***	-									
16 Actively approaching	0.41***	0.13*	.08	0.48***	.04	-								
17 Seeking social support	0.34***	0.24***	0.23***	0.39***	0.11	0.59***	-							
18 Ignoring	0.35***	0.42***	0.27***	0.59***	0.60***	0.30***	0.24***	-						
19 Intrinsic motivation - to know	.08	-0.11	- .07	.07	-0.15*	0.25***	0.11	- .04	-					
20 Intrinsic motivation - to accomplish things	0.10	- .08	- .03	.06	-0.15*	0.25***	.09	- .08	0.81***	-				
21 Intrinsic motivation - to experience stimulation	.09	-0.10	-0.11	.06	-0.19**	0.20**	.05	- .08	0.76***	0.77***	-			
22 Extrinsic motivation - identified	0.14*	- .08	- .06	0.15*	-0.14*	0.29***	0.15*	- .02	0.74***	0.64***	0.66***	-		
23 Extrinsic motivation - introjected	.07	.07	.06	.08	.01	0.11	0.13*	.05	0.56***	0.63***	0.60***	0.55***	-	
24 Extrinsic motivation – external regulation	0.14*	0.11	.08	0.16**	.07	0.20**	0.14*	0.20***	0.40***	0.29***	0.35***	0.60***	0.49***	-
25 Amotivation	.02	0.34***	0.26***	.09	0.35***	-0.16**	- .02	0.22***	-0.28 ***	-0.23 ***	-0.16**	-0.27 ***	0.10	.06

Note. $N = 291$. α= Cronbach's alpha.

Names of variables 20, 21 and 24 were not presented in full on the first page of the table due to limited space. The full names are to be found on the second page of the table.

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

motivations positively correlated with academic stress, while intrinsic motivations did not correlate with academic stress. Amotivation positively correlated with symptoms of depression ($r(291) = 0.38$, $p < .001$) and anxiety ($r(291) = 0.30$, $p < .001$), intrinsic motivation to accomplish things and to experience stimulation negatively correlated with depression ($r_1(291) = -0.15$, $p = .011$; $r_2(291) = -0.12$, $p = .044$), while the other types of motivations did not correlate with these symptoms.

Almost all the cognitive and behavioral strategies measured in the questionnaire positively correlated with each other as well as with symptoms of depression and anxiety. Actively approaching and seeking social support did not significantly correlate with symptoms of depression (Table 1). Life events also positively correlated with symptoms of depression ($r(291) = 0.28$, $p < .001$) and anxiety ($r(291) = 0.29$, $p < .001$).

Certain cognitive and behavioral coping strategies correlated with one or more types of academic motivation. Positive refocusing, refocus on planning, positive reappraisal, and actively approaching correlated with various types of intrinsic and extrinsic academic motivations while negatively correlated with amotivation. Withdrawal demonstrated the opposite correlation patterns from these strategies. Catastrophizing and other-blame showed moderate positive correlation with amotivation. Acceptance, rumination, putting into perspective, seeking distraction and seeking social support weakly correlated with extrinsic motivations (Table 1).

3.2 Indirect Effects (mediation)

A mediation model was tested with four predictors: amotivation and three extrinsic motivations, two outcomes: depression and anxiety, and one mediator: academic stress. Two of the indirect effects were not significant, thus two predictors, extrinsic motivation - introjected regulation and extrinsic motivation - identified regulation, were dropped from the model. The new model with two predictors (amotivation and extrinsic motivation - external regulation) had a good fit ($\chi^2(1) = 0.41$, $p = 0.523$, CFI = 1.00, TLI = 1.02, RMSEA = .00, 90% CI[.00, 0.13]) and was not significantly worse than

the original model, $\chi^2_{diff}(1) = 0.42$, $p = 0.519$. This new model with standardized correlation coefficients and bootstrapped p-values was illustrated in Figure 2.

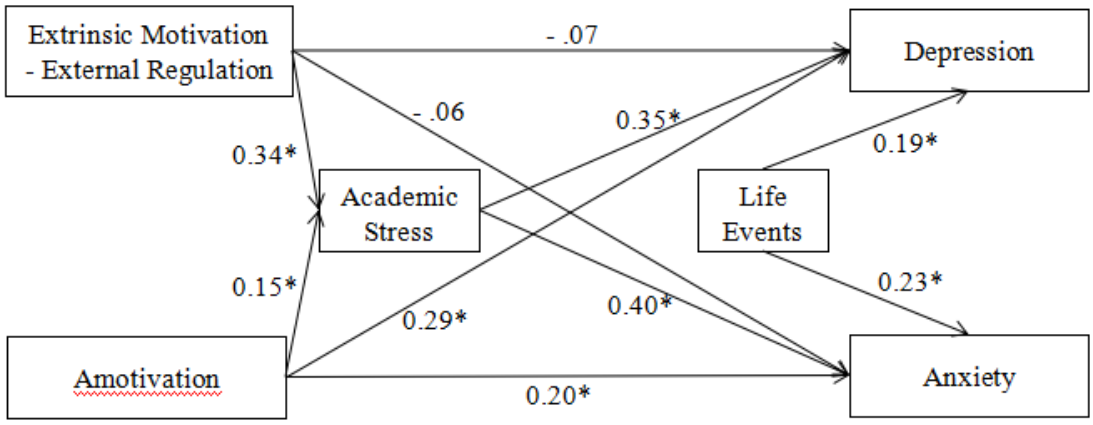

Figure 2. Results for the mediation model
$N = 291$. $^{**}p < .01$, $^{***}p < .001$

Direct effects of amotivation on symptoms of depression ($\beta = 0.29$, $p < .001$) and anxiety ($\beta = 0.20$, $p < .001$) were still significant after accounting for the indirect effects. No significant direct effects of extrinsic motivation - external regulation on symptoms of depression ($\beta = -.07$, *NS*) and anxiety ($\beta = -.06$, *NS*) were observed (Figure 2).

Indirect effects were observed between extrinsic motivation - external regulation and amotivation with symptoms of depression and anxiety through academic stress. These indirect effects were calculated by multiplying the two coefficients on the specific path. The indirect effect between extrinsic motivation - external regulation and depression was 0.12, *SE* = .03, 95% CI [.07, 0.17]. The indirect effect between extrinsic motivation - external regulation and anxiety was 0.13, *SE* = .03, 95% CI [.08, 0.19]. The indirect effect between amotivation and depression was .05, *SE* = .02, 95% CI [.01, .09]. The indirect effect between amotivation and anxiety was .06, *SE* = .02, 95% CI [.02, 0.10]. These results were not presented in a table.

3.3 Interactions (moderation)

The results of regressions testing the interaction effects of each coping strategy with academic stress on depression and anxiety were presented in Table 2. Academic stress,

life events and most of the cognitive and behavioral coping strategies (except for refocus on planning, positive reappraisal, actively approaching and seeking social support) were significant predictors of symptoms of anxiety and depression. For the regression on symptoms of depression, the interaction items Seeking distraction*Stress (β = 0.15, p = .002) and Ignoring*Stress (β = 0.15, p = .002) were significant after Bonferroni correction. For the regression on anxiety, the interaction items Rumination*Stress (β = 0.16, p = .001), Seeking distraction*Stress (β = 0.16, p = .001) and Ignoring*Stress (β = 0.15, p = .003) were significant after Bonferroni correction.

Results of the further analyses for the significant interactions were presented in Table 3. Under the conditions high-rumination, high-seeking distraction and high-ignoring, the relationships between academic stress and symptoms of depression and anxiety were stronger. When rumination was low, the relationship between academic stress and anxiety seemed to be weaker, while this was not the case for seeking distraction and ignoring.

3.4 Final model (moderated mediation)

Since seeking distraction seemed to have the most significant interaction effect with academic stress, it was, together with its interaction item with stress, added into the mediation model as predictors for depression and anxiety. Rumination and Rumination*Stress were then added as predictors for anxiety, but the interaction item was not significant (β = .05, p = 0.223). Thus, rumination and its interaction item were dropped from the model. The model with seeking distraction as moderator was illustrated in Figure 3 and had a good fit ($\chi^2(4) = 5.65$, p = 0.227, CFI = 1.00, TLI = 0.98, RMSEA = .04, 90% CI [.00, 0.10]). When it was compared with the mediation-only model in Figure 2, the new model fit the data not significantly worse than the mediation-only model, $\chi^2_{diff}(3) = 5.24$, p = 0.155.

The moderated mediation model (Figure 3) was thus decided to be the final model. In this model, symptoms of depression and anxiety seemed to be connected with two

Table 2

Standardized Coefficients of the Interactions between Academic Stress and Individual Coping Strategies on Depression and Anxiety

Strategy	Depression			Anxiety		
	β_{11} Int	β_{12} Coping	β_{13} Stress	β_{21} Int	β_{22} Coping	β_{23} Stress
Self-blame	0.13	0.30***	0.30***	.08	0.37***	0.31***
Acceptance	.07	0.19***	0.35***	0.10	0.26***	0.37***
Rumination	0.14	0.21***	0.32***	0.16**	0.31***	0.33***
Positive refocusing	0.12	0.19***	0.35***	0.12	0.19***	0.38***
Refocus on planning	.07	.08	0.37***	.01	0.15	0.39***
Positive reappraisal	.09	.08	0.37***	0.11	0.14	0.39***
Putting into perspective	.06	0.20***	0.33***	0.11	0.29***	0.34***
Catastrophizing	.09	0.35***	0.26***	0.10	0.43***	0.27***
Other-blame	.02	0.28***	0.32***	.03	0.32***	0.34***
Seeking distraction	0.15*	0.25***	0.32***	0.16**	0.26***	0.35***
Withdrawal	.03	0.42***	0.25***	.05	0.36***	0.30***
Actively approaching	.07	.06	0.37***	.08	0.12	0.39***
Seeking social support	.02	.01	0.37***	.06	0.12	0.39***
Ignoring	0.15*	0.23***	0.33***	0.15*	0.22***	0.37***

Note. $N = 291$. Int = interaction item of coping strategy and academic stress, Coping = coping strategy, Stress = academic stress. Depression and anxiety were regressed on coping strategy, academic stress, the interaction item and life events.

*$p < 0.0036$; **$p < 0.0018$; ***$p < 0.0009$ after Bonferroni correction.

Table 3

Standardized coefficients of the Paths Stress-Depression and Stress-Anxiety with Different Levels of Rumination, Seeking Distraction or Ignoring

Coping strategy		Stress - Depression		Stress - Anxiety	
	N	Std. *β*	*P*-value	Std. *β*	*P*-value
Rumination					
Low	32	-	-	0.19	0.342
Middle	214	-	-	0.37	< .001
High	39	-	-	0.49	< .001
Ignoring					
Low	36	0.27	0.103	0.35	.015
Middle	194	0.28	< .001	0.32	< .001
High	54	0.56	< .001	0.56	< .001
Seeking distraction					
Low	58	0.20	0.106	0.23	.044
Middle	184	0.27	< .001	0.32	< .001
High	46	0.65	< .001	0.64	< .001

Note. Dash signifies that information was not relevant.

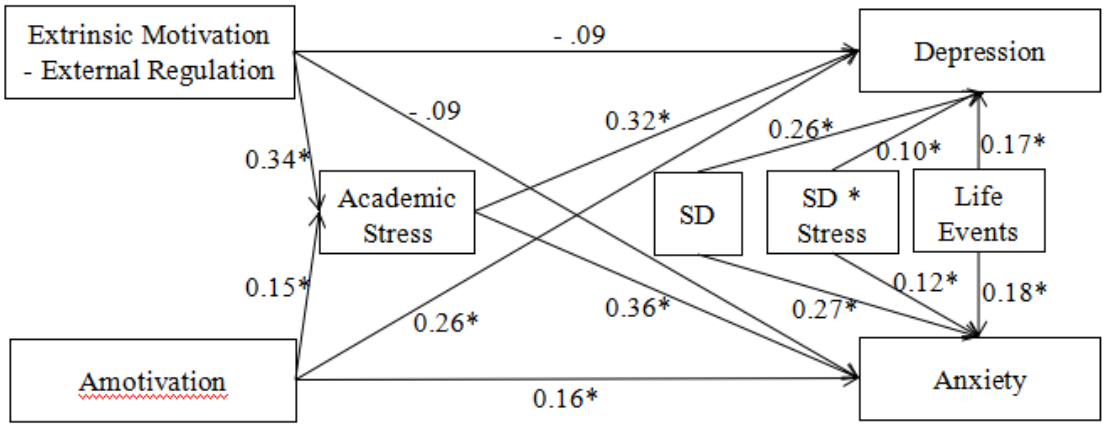

Figure 3. Results for the moderated mediation model
N = 291. SD = Seeking distraction, Stress = Academic stress.
*p < .05, **p < .01, ***p < .001

types of academic motivations and life events. Amotivation had both a direct and indirect link with the emotional symptoms, while only an indirect link through academic stress was observed for extrinsic motivation-external regulation. For the paths from academic stress to depression and anxiety, interaction was observed between academic stress and the behavioral coping strategy seeking distraction.

4. Discussion

4.1 Conclusions and comparisons with other studies

The purpose of this study was to form a comprehensive model to understand the factors that may influence symptoms of anxiety and depression in academic settings in China. The following questions were investigated: 1. How do academic motivation, academic stress, cognitive and behavioral coping strategies and symptoms of anxiety and depression correlate with each other? 2. Does academic stress mediate the relationship between academic motivation and symptoms of depression and anxiety? 3. Do coping strategies moderate the relationship between academic stress and symptoms of depression and anxiety? Answers to all three questions were positive. Specific conclusions and unexpected findings corresponding to each hypothesis are stated as below.

The first hypothesis concerning the inter-correlation of the variables was partially supported. As expected from previous research (Baker, 2004), academic stress positively correlated with symptoms of depression and anxiety. Positive correlations between amotivation and these three constructs; between extrinsic motivations and academic stress, as well as between certain coping strategies and symptoms of depression and anxiety were also in line with previous research (Baker, 2004). Contrary to the expectations and previous research (Huang et al., 2016; Miquelon et al., 2005), however, no detrimental effects of extrinsic motivations were observed and the protective effects of intrinsic motivations were weak. This might be accounted for by

the positive and moderate correlations among intrinsic and extrinsic motivations, which was observed in China (Zhang et al., 2016), but not in North America (Baker, 2004; Miquelon et al., 2005). Protective effects of adaptive coping strategies were weak. This could be due to a smaller sample size than used by Kraaij and Garnefski (2019), or that the effect of these strategies may depend on a more flexible implementation (Aldao & Nolen-Hoeksema, 2010), which is discussed later.

The results suggest that stress associated with the academic environment may be associated with less ideal mental health in students. Furthermore, students who lack motivation for school or those who are extrinsically motivated may experience more stress. Those who lack motivation are also likely to have more symptoms of depression and anxiety.

The second research question intending to explore the possible mediation effects of academic stress in the relationship between academic motivation and symptoms of depression and anxiety was confirmed. Two types of academic motivations: lack of motivation (amotivation) and being motivated only because of external demands or rewards (extrinsic motivation - external regulation), indirectly linked with symptoms of depression and anxiety through academic stress, although being motivated for external demands or rewards did not seem to have a direct influence on these symptoms. It might be interpreted that when students are not motivated to study or are only doing so for external reasons, they may experience higher academic stress, and this is in turn linked with poorer mental well-being. This result is consistent with the Transactional Theory of Stress and Coping (Lazarus & Folkman, 1987). When a person lacks motivation, one possibility is that he/she has low perceived competence, i.e., he/she does not feel that his/her actions could be effective in changing the process or the consequences (Ryan & Deci, 2000). This may affect the secondary appraisal of stressful information, which results in a higher level of stress from the given stressor (Lazarus & Folkman, 1987). Another possibility is that a person sees little value in the activity (Ryan & Deci, 2000) but still has to carry it out due to environmental requirements. The students may experience a lack of autonomy which links with higher stress (Pearson &

Moomaw, 2005) and could have a detrimental effect on the mental well-being (Deci & Ryan, 1987).

The third research question concerning the possible moderating effect of cognitive and behavioral coping strategies on the relationship between academic stress and symptoms of anxiety and depression was also confirmed. High scores of seeking distraction and ignoring, seemed to link with a stronger relationship between academic stress with both depression and anxiety. Rumination seemed to have a similar effect on the relationship between academic stress and anxiety. This indicates that academic stress may have a more detrimental influence on the emotional well-being of students who extensively use the coping strategies seeking distraction, ignoring or rumination.

The findings are in line with previous findings about the role of rumination (Kraaij et al., 2003) and disengagement coping (Connor-Smith & Compas, 2002). In contrast with previous studies (e.g., O'NEILL & Kerig, 2000; Troy et al., 2010), however, self-blame and positive reappraisal were not concluded as moderators. This might be explained by a lower alpha level of the current study or the specificity of the effect of coping strategies depending on the type of stressor (Clarke, 2006). The fact that no moderation effect of adaptive strategies was observed might be explained by the assumptions about coping strategies in this study. While we examined coping strategies as relatively stable traits, some researchers have suggested the possibility that coping could be influenced by the situation (Calvete, Corral, & Estévez, 2008; Stikkelbroek, Bodden, Kleinjan, Reijnders, & van Baar, 2016; Ruscio et al., 2015) and may be more effective when used flexibly to suit the demands of the situation (Cheng & Cheung, 2005; Bonanno & Burton, 2013). Aldao and Nolen-Hoeksema (2010) argued that while maladaptive coping strategies may be associated with worse psychological well-being in most situations, adaptive strategies are protective only when they are properly matched with the situation.

Lastly, a moderated mediation model combining all the variables mentioned above was also supported by the results. In this model, academic stress mediated the relationship between academic stress and symptoms of depression and anxiety, while

seeking distraction moderated the links between academic stress and symptoms of depression and anxiety. This implies that extensive use of seeking distraction as a coping strategy may be a risk factor for students who lack motivation or those who are motivated only for external demands or rewards. They may have a higher chance of experiencing symptoms of anxiety and depression from their already elevated academic stress.

4.2 Implications and significance

The current study is the first one to examine academic motivation, academic stress, coping strategies and symptoms of depression and anxiety in one model for the population of Chinese college students. The results suggest that academic stress links with poorer mental well-being. Motivations which correspond to low self-determination (lack of motivation and motivation only for external demands or rewards) are likely to be important factors that directly and indirectly link with symptoms of psychopathology through academic stress. When facing academic stress, extensive use of certain coping strategies (rumination, seeking distraction and ignoring) may be linked with more emotional problems. Among which, seeking distraction seems to be the most important in the context of academic motivation. The conclusions may be generalizable to students from other universities or tertiary vocational schools in China since the sample of this study is reasonably diverse. Generalization to male-dominant groups should, however, be made with caution.

Programs intended to improve mental health of college students may be recommended to consider lowering academic stress, changing academic motivation and reducing the extensive use of maladaptive coping strategies such as seeking distraction, rumination and ignoring. Attempts could be made to reduce the feeling of the students that they don't have any reason to study or that they are doing so solely for external rewards or demands. This might be done by supporting autonomy of the students (Deci & Ryan, 1987). A meta-analysis evaluated autonomy-supporting programs as effective

and suggestions were given for the development of such programs (Su & Reeve, 2011). Effective intervention programs targeting maladaptive coping strategies have also been developed for other populations (e.g., Garnefski et al., 2013) and might be modified for college students.

4.3 Limitations and future directions

There are several limitations of this study. First of all, since only cross-sectional data was collected, no causal conclusions could be drawn. Secondly, measuring coping strategies as stable straits might have limited our exploration of the role of adaptive strategies. Thirdly, the length of the questionnaire might have influenced the validity of the data due to the possible tiredness or impatience of participants. Fourthly, the small alpha to compensate for the number of tests performed in this study may make not very strong effects difficult to detect. Lastly, the sample of this study was predominantly female. Since previous research demonstrated certain gender differences in the coping process (Grant et al., 2000), the results of this study might not be generalizable to males.

Future research on effective coping could try to measure coping strategies as choices in response to individual stressors, instead of as a stable trait. Characteristics of stressors may be explored and combinations of different kinds of stressors with coping strategies could be studied to develop a strategy that enable people to choose the most adaptive strategies in a given situation. Longitudinal data could be used to explore the effects of coping strategies. For example, participants could be asked to respond several times a day for a few consecutive days (Ruscio et al., 2015). Furthermore, a more selected group of strategies could be assessed so that multiple-testing could be reduced and the questionnaire could be made shorter. Attempts should also be made to recruit more males in the study.

4.4 Conclusion

In conclusion, the results of this study suggest that academic motivations with low levels of self-determination to have an indirect link with poorer mental health through academic stress in Chinese college students. Seeking distraction as a consistent coping strategy seems to accentuate the relationship between academic stress and psychopathological symptoms. Rumination and ignoring appear to have the same moderating effect when motivation is not taken into consideration. The findings imply that intervention or prevention programs could consider adding components that address the academic motivation and specific coping strategies of students. Further research is recommended to recruit more male participants and explore the potentially adaptive strategies by, for example, viewing them as impermanent and situational.

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