Exploring Taiwanese university students' self-regulatory processes, perceived stress, and academic coping

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ABSTRACT

This study investigated the roles of self-regulatory processes and perceived academic stress in the academic coping of Taiwanese university students, as well as the relationships of these variables to academic resilience and anxiety. Additionally, this study explored the moderating influence of self-criticism on the connections between mindfulness and academic coping. A total of 535 Taiwanese undergraduate students completed an online survey assessing the variables described above. The collected data were analyzed using regression techniques. The results showed that self-compassion abilities were identified as essential factors associated with engagement coping and academic resilience. There is also a link between students' engagement coping and academic resilience. Moderation analyses suggested that the adaptive effects of mindfulness on academic coping were only shown for students low in self-criticism. The findings from this study provide empirical support for the conceptual model of adaptive stress and coping processes.

Contribution/Originality: The research advances our understanding of the distinctions between self-criticism and self-compassion by exploring their individual effects on coping. Moreover, this study shows originality in examining the moderator role of self-criticism in the relationship between mindfulness and academic coping. The findings provide insights into students' adaptive coping with academic stress.

1. INTRODUCTION

Many college students have reported that the stress they experience stems significantly from academic demands, such as preparing for and taking exams, managing an overwhelming load of academic tasks, and time constraints to complete assignments (García-Izquierdo, Ríos-Risquez, Carrillo-García, & Sabuco-Tebar, 2018). Different coping strategies in response to these stressors may shape diverse outcomes, impacting both academic performance and mental well-being (Kroshus, Hawrilenko, & Browning, 2021). Previous findings by Acharya, Jin, and Collins (2018) showed that many students lack the coping resources necessary for college success. Insufficient coping skills can elevate the challenge of adjusting to college, academic setbacks, and diminished psychological well-being (Eisenbarth, Champeau, & Donatelle, 2013). There is clearly a need to understand the process of coping with academic demands during this period of time. This study attempted to identify crucial factors related to adaptive responses (i.e., engagement coping and academic resilience) to academic difficulties within the context of Taiwanese higher education and to the conceptual model of adaptive stress and coping processes (Dvořáková,

Greenberg, & Roeser, 2019). The aspiration is that the outcome of this study would provide insights into the influence of university students' self-regulatory skills on their academic coping and coping outcomes.

1.1. Conceptual Framework

Dvořáková et al. (2019) and Lazarus and Folkman (1984) built upon the transactional model of appraisal and coping and developed a model to conceptualize the stress and coping processes experienced by college students. In Lazarus and Folkman's theory (Biggs, Brough, & Drummond, 2017) stress is regarded as a transactional condition influenced by an individual's appraisal of a situation and their psychological and behavioral responses to it. Coping is a process in which a person tries to manage the situations appraised as taxing or overwhelming. The coping process depends on three elements: environmental demands, individual resources to meet those demands, and appraisals. This theory differentiates between two types of appraisals: primary and secondary appraisals. Individuals use primary appraisal to gauge whether something that occurs is relevant to their well-being. The focus of secondary appraisal is on whether one possesses adequate resources to effectively handle the given demand (i.e., coping options). The process of appraisal negotiates between environmental demands and individual resources (Biggs et al., 2017; Obbarius, Fischer, Liegl, Obbarius, & Rose, 2021). Accordingly, when it comes to the investigation into academic coping, it is vital to take into consideration the person's subjective appraisal of the academic demands and perceptions of the available resources to navigate these challenges (Teixeira, Brandão, & Dores, 2022).

Dvořáková et al. (2019) incorporated self-regulatory processes into Lazarus and Folkman's coping model (Biggs et al., 2017). They posited that students' self-regulatory abilities, including mindfulness and self-compassion, function as personal resources in coping processes both before and after evaluating stressful demands. Specifically, these researchers proposed that mindfulness and self-compassion skills may be linked to adaptive coping through the build-up of effective resources. Moreover, self-regulatory skills are likely to enhance post-coping engagement and mental health. Individuals with elevated levels of mindfulness and self-compassion may perceive challenges as more manageable in the initial appraisal process because of their constant use of self-regulatory skills. Also, in the process of secondary appraisals, these students may be better able to employ potent coping strategies to handle demanding situations and thereby considerably reduce stress.

This study empirically examines the conceptual model developed by Dvořáková et al. (2019) and focuses on the relationships among university students' mindfulness, self-compassion, perceived academic stress, coping styles, and coping outcomes (i.e., academic resilience and anxiety). Students' perceived academic stress was thought to reflect their appraisal of whether academic demands surpassed their personal coping resources. In the light of the model developed by Dvořáková et al. (2019) we assumed that students' self-regulatory processes and perceived stress are associated with their deployment of coping strategies and coping outcomes.

In terms of the dimensions of coping styles, the differentiation between engagement and disengagement coping was employed in this study, guided by Carver and Connor-Smith (2010) who observed that this distinction holds significant importance. Engagement coping is structured, adaptable, and positive in nature. This type of coping aims to reduce the source of stress by actively processing and changing the stressful situation. Disengagement coping pertains to reactions characterized by cognitive or behavioral disengagement from stressful situations. Rather than actively addressing a stressor, individuals employing disengagement coping often choose to ignore, avoid, or distort a specific stimulus perceived as threatening (Moritz et al., 2016). Those who adopt disengagement coping may temporarily evade negative emotions linked to the threat. In the grand scheme of things, nevertheless, this coping approach is generally ineffective at mitigating stress since it fails to acknowledge the presence of the stressor and its eventual consequences (Alshahrani, Cusack, & Rasmussen, 2018; Carver & Connor-Smith, 2010). In this study, students' self-regulatory processes were presumed to be correlated with their use of academic coping strategies and coping outcomes.

In this study, the conceptual model of adaptive stress and coping processes (Dvořáková et al., 2019) was employed as the guiding framework. The primary objective was to delve into the impact of self-regulatory processes on the coping strategies adopted by Taiwanese university students in response to academic adversity and subsequently how these coping strategies influenced the outcomes. Additionally, we sought to examine the moderating role of self-criticism in the relationship between mindfulness and the utilization of academic coping strategies among students. Ultimately, these insights would empower the development of targeted interventions aimed at fostering adaptive coping mechanisms amidst the challenges associated with higher education. Drawing upon Dvořáková et al. (2019) the suppositions of this research are that students' self-regulation processes serve as pivotal determinants influencing their coping tendencies in response to academic demands, subsequently shaping the outcomes of these coping efforts. Also, it was anticipated that self-criticism assumes a moderating role in the connection between mindfulness and students' adoption of academic coping strategies. Specific hypotheses detailing these relationships will be elaborated upon later in the text.

The literature review is structured as follows: Initially, the components of self-regulatory processes are introduced, and the interconnections between self-regulation and the strategies employed to navigate academic challenges are elucidated. A comparative analysis of the roles played by self-compassion and self-criticism representing contrasting styles of self-regulation in shaping students' coping practices was conducted. Additionally, the potential moderating influence of self-criticism on the relationship between mindfulness and academic coping was explored. Existing research on coping and resilience was examined, outlining the rationale for selecting academic resilience and anxiety as the coping outcomes under investigation in this study. Finally, based on the extensive literature review, we present specific hypotheses that form the foundation for testing.

2. LITERATURE REVIEW

2.1. Self-Regulatory Processes and Coping

Dvořáková et al. (2019) recognized self-compassion as the crucial self-regulatory ability that determines one's coping styles and outcomes in response to stressors. In a conceptual sense, self-compassion can be viewed as a complex idea characterized by three contrasting dimensions: the interplay between self-kindness and self-judgment, the dynamic between recognizing common humanity and experiencing isolation, and the balance between mindful awareness and avoiding over-identification (Allen & Leary, 2010; Neff, 2023; Trompetter, De Kleine, & Bohlmeijer, 2017). Our current investigation focuses on the trio of positive elements. Embracing self-kindness entails treating oneself with kindness and empathy in moments of stress. Common humanity entails perceiving one's struggles and imperfections as an inevitable facet of the shared human journey. The component mindfulness was particularly emphasized in the model developed by Dvořáková et al. (2019). Mindfulness refers to the acceptance of painful thoughts and emotions without amplifying or evading them. Individuals with a heightened sense of mindfulness often exhibit a keen awareness of their thoughts and emotions, enabling them to sustain a broader perspective even in challenging situations. Notably, self-compassion has shown a positive correlation with favorable outcomes and a negative association with unfavorable results. The emotional welfare of university students has been correlated with the level of self-compassion (Gunnell, Mosewich, McEwen, Eklund, & Crocker, 2017; Neff, 2023). In addition, self-compassion exhibits connections with heightened life satisfaction and positive emotional states (Hope, Koestner, & Milyavskaya, 2014; Neff, 2023) and is inversely linked to anxiety levels, self-consciousness, and depression (Neff, 2023; Terry, Leary, & Mehta, 2013).

In the face of adversities, self-compassion emerges as a valuable resource for coping. This inner quality involves positive cognitive restructuring processes (i.e., adaptive appraisals) that enable a person to change their perspective of stressful situations and reinterpret undesirable incidents with less dire implications (Allen & Leary, 2010). Students with high self-compassion use the strategies of acceptance and positive reinterpretation to cope with academic failure. In addition to the positive relationship with engagement coping, self-compassion showed a

negative correlation with maladaptive coping strategies such as denial and mental disengagement (Neff, 2023). Being self-compassionate in the face of academic setbacks encourages people to accept responsibilities and engage in proactive coping rather than avoidance or denial, for they have less of a need to deny their failures (Allen & Leary, 2010; Bluth & Neff, 2018). On top of the facilitative role in the coping process, self-compassion may promote mental health through the deployment of coping strategies (Dvořáková et al., 2019). Specifically, adaptive resilience among students may result from positively coping with academic setbacks through a warm and accepting approach.

In comparison with self-compassion, self-criticism is a harsh self-regulatory tactic. Self-criticism is a process involving the act of critically evaluating and scrutinizing oneself (Shahar, 2015). This type of self-regulatory process has been found to correlate with adverse emotions such as self-contempt and anxiety (Whelton & Greenberg, 2005) as well as psychological distress (Halamová et al., 2018). Further, Dunkley, Blankstein, Halsall, Williams, and Winkworth (2000) identified that avoidant coping entirely mediated the connections between self-criticism and symptoms of depression and anxiety. Individuals with elevated levels of self-criticism were preoccupied with their perceived inability to overcome challenges. Instead of engaging in active coping with difficulties, they engaged in the avoidance of stressors (Dunkley, Zuroff, & Blankstein, 2003). Research exploring the impact of self-regulatory processes, specifically encompassing self-compassion and self-criticism, on the academic coping of university students is currently lacking. This investigation contributes to an enhanced understanding of how distinct forms of self-regulation influence students' ability to navigate academic difficulties. The findings from such research could provide valuable information about effective self-regulatory practices that promote adaptive coping, thereby enriching the body of knowledge in this area.

In addition to the direct association with coping strategies, self-criticism may function as a moderator between students' adaptive self-regulatory processes (i.e., mindfulness in the present study) and coping. Highly self-critical individuals often establish exceedingly high standards for themselves. They tend to quickly blame their abilities and personal qualities when faced with setbacks (Dunkley et al., 2003). These characteristics may undermine efforts to regulate attention and emotions arising from mindfulness. Consequently, even when they engage in adaptive self-regulation such as mindfulness, as people with low self-criticism do, the academic coping strategies used by these two groups may not be the same. The present investigation examined how self-criticism moderated the connections between mindfulness and strategies for coping with academic demands. Previous studies have not explored whether the association between mindfulness and students' academic coping is influenced by self-criticism. To the best of our knowledge, this study is the first attempt to identify the moderating role of self-criticism in shaping the impact of mindfulness on coping tendencies among university students. As a metacognitive state of awareness, mindfulness enables a person to reframe the stressors and find positive meaning during the appraisal process. The reframing and meaning-making strategies allow students to better manage academic challenges (Kiken & Fredrickson, 2017). Because of its advantageous effects on regulating attention and emotions, Neff (2023) maintained that mindfulness is the core component of self-compassion. Empirical evidence Zubair, Kamal, and Artemeva (2018) also suggested that mindfulness boosted university students' stress coping and overall well-being. Given the well-documented beneficial effects of mindfulness, it would be useful to understand whether the moderating influence of self-criticism alters the presumed positive impacts of mindfulness on academic coping.

2.2. Coping and Resilience

As posited by Dvořáková et al. (2019) mindfulness and self-compassion skills may significantly determine students' coping options and outcomes. A key mental health outcome related to coping is resilience, which is described as an adaptive process in which individuals respond to stressors (Fletcher & Sarkar, 2013). Resilience among university students has garnered increasing attention over the past decade (McArthur et al., 2017). Academically resilient students have been found to be able to bounce back from setbacks and adjust to academic demands (Jowkar, Kojuri, Kohoulat, & Hayat, 2014). In line with Dvořáková et al. (2019) previous findings (Artuch-

Garde et al., 2022; Pidgeon & Keye, 2014) indicated that individuals' self-regulation and coping skills functioned as significant contributing factors to resilience. Given the often reported negative correlation between resilience and anxiety (Yap et al., 2023) in the current research, academic resilience and anxiety were selected as the coping outcomes to be investigated. While numerous studies (e.g., Cassady, 2022) have concentrated on college students' anxiety in academic settings, little research has delved into the distinct relationships between academic anxiety, resilience, and students' self-regulatory processes along with coping tendencies. A positive correlation was anticipated between academic resilience and students' mindfulness, self-compassion, and engagement coping while expecting a negative association with academic anxiety.

2.3. The Present Study

The present study was carried out to investigate the roles of Taiwanese university students' self-regulatory processes and perceived academic stress in their academic coping, as well as the relationships of these variables to academic resilience and anxiety. This study was guided by the conceptual adaptive stress and coping process model of Dvořáková et al. (2019) in which the importance of self-compassion was emphasized. In this study, we viewed the three positive components of self-compassion—mindfulness, self-kindness, and common humanity—as adaptive self-regulatory processes. Further, there is a dearth of knowledge within the realm of higher education regarding the potential connections between self-compassion and students' academic coping and its associated outcomes (Dvořáková et al., 2019). Identifying the personal resources that are beneficial for coping and resilience is vital to reducing the potentially harmful effects of stressors. In the present study, three hypotheses were tested. The first hypothesis is that students' self-regulatory processes (i.e., self-compassion and self-criticism) along with perceived academic stress are significantly related to how they cope with academic challenges. The second hypothesis is that self-criticism moderates the relationships between mindfulness and academic coping. The third hypothesis is concerned with students' coping outcomes. Our anticipation was that self-regulatory processes, encompassing self-compassion and self-criticism, perceived academic stress, and academic coping (with a distinction between engagement and disengagement coping) would demonstrate significant connections with both academic resilience and anxiety. The hypothesized relationships among the variables in the current study are illustrated in Figure 1.
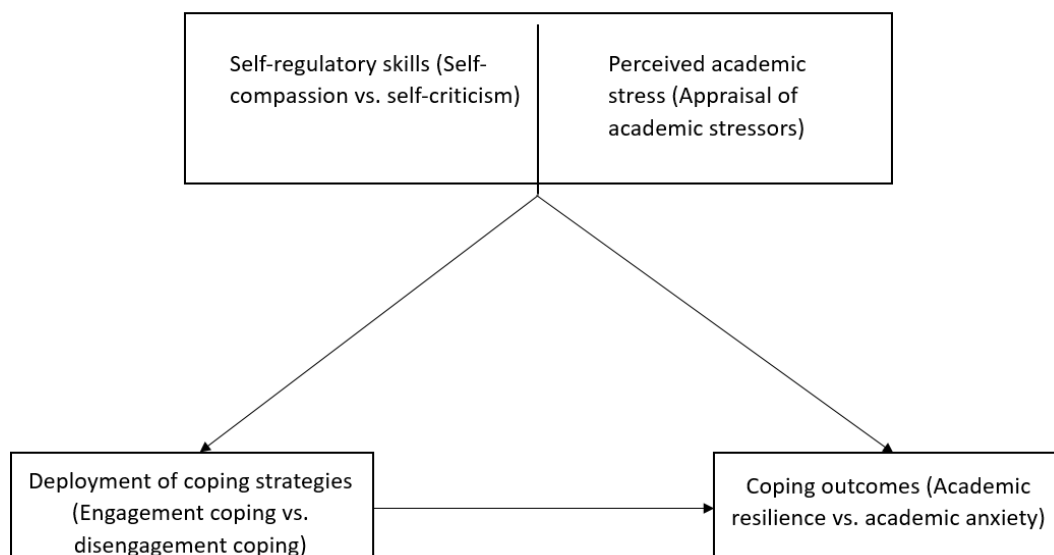

Figure 1. The hypothesized relationships among the variables of interest.

3. METHOD

In this study, data collection was carried out using the survey method. Specifically, questionnaires featuring numerically rated items (i.e., six-point Likert scale) were designed to gauge participants' responses to the variables

outlined below. The survey was conducted online, and the participants spent approximately 15 minutes completing it. To delve deeper into the topic of interest, regression techniques were employed to analyze the data and extract valuable insights.

3.1. Participants

A total of 535 Taiwanese undergraduate students took part in the study, comprising 247 males and 288 females. These students were drawn from five universities in northern Taiwan and represented various academic disciplines, including liberal arts (7.3%), science and engineering (55%), commerce (25.2%), and social sciences (12.5%). As an incentive, all participants were offered a New Taiwan Dollar 100 gift card upon completing the survey. The majority of the students were in their third or fourth year of study, and the average age of the participants was 21.4 years (SD = 1.6 years), ranging from 19.4 to 35.8 years, and all participants were full-time students.

3.2. Procedure

Data collection occurred at the onset of the fall semester in the academic year. Approval for student participation was secured from the instructors of the relevant classes. All students participated in the study willingly and voluntarily. Before administering the survey, the participants were briefed on the study's objectives, and their consent was obtained. A commitment to maintaining confidentiality was also assured.

3.3. Measures

Participants were asked to respond to all questions through a six-point Likert scale. The self-report survey used in this study was presented in the Chinese language. The assessments underwent translation into Chinese and were then subjected to a back-translation process into English. Information regarding each scale employed in the present investigation is outlined below.

Self-compassion. The Self-Compassion Scale (SCS) (Neff, 2023) was created with the explicit aim of capturing thinking, feelings, and actions linked to different facets of being compassionate to oneself. It evaluates three fundamental components of self-compassion. Each component includes items scored both positively and negatively. In alignment with the focus on exploring the safeguarding impacts of self-compassion, the affirmative aspects were utilized, which comprise three subscales: self-kindness (5 items; α = 0.81), common humanity (4 items; α = 0.81), and mindfulness (4 items; α = 0.75). The SCS has been applied in studies involving the Taiwanese academic context (Neff, Pisitsungkagarn, & Hsieh, 2008) and has demonstrated robust reliability and validity. Elevated scores on the scale indicate increased self-compassion.

Self-criticism. The assessment of students' self-critical thoughts utilized a scale adapted from the Forms of Self-criticizing/Attacking and Self-reassuring scale (FSCRS, Gilbert, Clarke, Hempel, Miles, and Irons (2004)). This tool aims to gauge the inclination toward self-criticism or self-reassurance when faced with perceived setbacks or failures. It comprises three factors: inadequate self, focusing on personal inadequacy and failures (9 items); hated self, measuring the desire to harm or persecute oneself (5 items); and self-reassurance (8 items). In line with the current study's focus on exploring students' critical self-evaluation, the subscale assessing feelings of inadequacy was employed. Higher scores on this scale indicate elevated levels of feeling inadequate, and the scale demonstrates strong reliability (α = 0.91).

Perceived stress. To measure students' perceived academic stress, a scale adapted from the Perceived Stress Scale (PSS, Cohen, Kamarck, and Mermelstein (1983)) was employed. The PSS was developed to gauge the degree to which individuals perceive various situations in their lives as stress-inducing. The items were crafted to capture the sense of unpredictability, lack of control, and overwhelm that the respondents experienced in the last month. The questions are rather general in nature. In order to specifically assess students' feelings and thoughts regarding

academic stress, the original questions were reworded to fit the academic context (10 items; α = 0.89). Higher scores suggest higher levels of perceived academic stress.

Academic coping strategies. To evaluate how students deployed academic coping strategies, a scale derived from the Coping Orientations to Problems Experienced (COPE) inventory (Cohen et al., 1983) was used. This measure is designed to gauge the ways in which individuals in the broader population react to stress in various circumstances. In line with the emphasis on investigating academic coping, we replaced the term "problem" with "academic problem" when assessing students' responses in a stressful academic environment. There are two scales in the modified version of academic coping inventory. The three components, namely active coping (4 items), planning (4 items), and suppression of competing activities (2 items) represent the category of engagement coping (α = 0.90), while disengagement coping comprises five items (α = 0.74). Higher scores indicate a greater inclination toward a specific coping style.

Academic resilience. To gauge students' academic resilience, a scale adapted from the Academic Resilience (Martin & Marsh, 2006) and the Academic Resilience Scale-30 (ARS-30, Cassidy (2016)) was employed. This 12-item scale assesses students' ability to effectively navigate setbacks, challenges, adversities, and pressures within the academic realm. Certain items drawn from the ARS-30 specifically measure students' perseverance in the face of academic difficulties. Elevated scores on the scale indicate higher levels of academic resilience, and it exhibits strong reliability (α = 0.93).

Academic anxiety. Students' academic anxiety was measured by the scale adapted from the State-Trait Anxiety Inventory (STAI, Spielberger, Gorsuch, Lushene, Vagg, and Jacobs (1983)). This scale assesses core attributes related to feelings of apprehension, tension, nervousness, and worry. The STAI distinguishes between the momentary condition of the state of anxiety and the enduring characteristic of the trait of anxiety. Because the current study aims to explore students' responses to academic stress, the items measuring the state of anxiety were used. These items were also reworded to evaluate the levels of students' temporary anxiety due to stressful academic situations (e.g., I feel nervous in the process of doing the coursework, 15 items; α = 0.91). Higher scores indicate greater academic anxiety.

3.4. Data Analysis

The analysis employed hierarchical multiple regressions to investigate students' academic coping, resilience, and anxiety as criterion variables. To test the initial and secondary hypotheses, hierarchical regression analyses were conducted with engagement and disengagement coping as the criteria. The first step involved introducing the three components of self-compassion and self-criticism. In the second step, the interaction term of mindfulness and self-criticism, together with perceived stress, were included. The variables of mindfulness and self-criticism were centered before computing the interaction term to mitigate multicollinearity (Howell, 2013). Moderation analyses were then undertaken to explore whether the relationship between mindfulness and students' engagement and disengagement coping varied based on self-criticism (the moderator). For the third hypothesis, hierarchical regression analyses on academic resilience and anxiety were conducted. The initial step included the entry of the three components of self-compassion and self-criticism in the regression models. In the second step, perceived stress was introduced. The final step incorporated both engagement and disengagement coping. Priority was given to the entry of the components of self-compassion and self-criticism, reflecting the research focus on determining the significant roles of these self-related variables in the criterion variables.

4. RESULTS

4.1. Hierarchical Regressions Predicting Students' Engagement and Disengagement Coping

Engagement coping. Descriptive statistics and correlation coefficients for the variables under investigation are presented in Table 1. Table 2 showcases the outcomes of the regression analyses conducted on students coping in

the academic context. The initial regression model included all the aspects of self-regulatory processes, collectively accounting for a substantial amount (22%) of the variance in engagement coping; $F(4, 531) = 37.26$, $p < 0.001$. Self-kindness and mindfulness showed positive associations with engagement coping; $\beta = 0.26$, $p < 0.001$ and $\beta = 0.20$, $p < 0.001$, respectively. In Step 2, the interaction term between mindfulness and self-criticism together with perceived stress were added. The addition resulted in a 5% increase in the explained variance of engagement coping; $F(6, 529) = 31.67$, $p < 0.001$. Upon considering the factor introduced in the initial phase, the interaction term and perceived stress exhibited negative associations with this category of coping; $\beta = -0.12$, $p = 0.002$, and $\beta = -0.22$, $p < 0.001$, respectively.

To explore the significant interaction, simple slope tests were conducted, following the recommendation of Aiken, West, and Reno (1991). Performing simple regression analyses, we examined how mindfulness impacted engagement coping in students with varying levels of self-criticism—specifically, those scoring one standard deviation above and below the mean. As illustrated in Figure 2, the positive association between mindfulness and engagement coping proved to be statistically significant in the low self-criticism group ($B = 0.25$, 95% $CI[0.15, 0.36]$, $p < 0.001$), but this connection failed to achieve significance among their highly self-critical counterparts ($B = 0.09$, 95% $CI[-0.02, 0.19]$, $p = 0.11$).

Table 1. Descriptive statistics and correlations for study variables (N = 535).

Variable	1	2	3	4	5	6	7	8	9
1. Self-kindness	—								
2. Mindfulness	0.67***	—							
3. Common humanity	0.65***	0.53***	—						
4. Self-criticism	-0.43***	-0.30***	-0.26***	—					
5. Perceived stress	-0.31***	-0.24***	-0.19***	0.56***	—				
6. Engagement coping	0.43***	0.41***	0.36***	-0.14**	-0.26***	—			
7. Disengagement coping	0.05	-0.00	0.09	0.25***	0.26***	-0.27***	—		
8. Academic resilience	0.56***	0.54***	0.46**	-0.38***	-0.46***	.059***	-0.21***	—	
9. Academic anxiety	-0.30***	-0.22**	-0.17**	0.50***	0.71***	-0.31***	0.27**	-0.49***	—
M	3.74	3.93	3.84	3.56	3.33	4.40	3.02	4.11	3.58
SD	0.86	0.83	0.97	1.07	0.87	0.72	0.80	0.84	0.80

Note: ** $p < 0.05$, *** $p < 0.001$.

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Table 2. Hierarchical regression analyses predicting academic coping (N = 535).

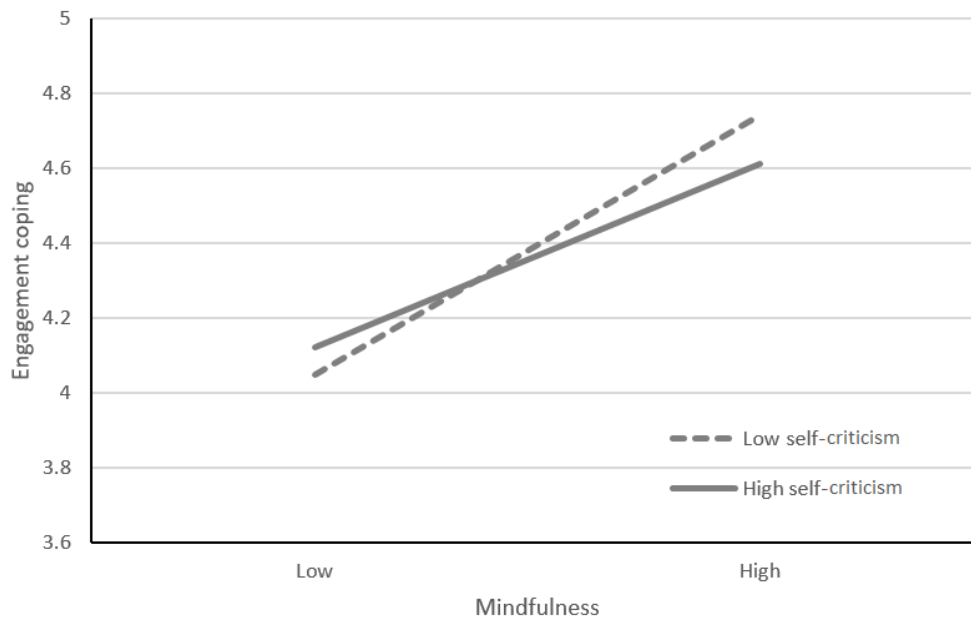| Predicted outcome	Variable	Step 1		Step 2	
		β	t	β	t
Engagement coping					
	Self-kindness	0.26***	4.29	0.27**	4.55
	Common humanity	0.09	1.84	0.10	1.97
	Mindfulness	0.20***	3.72	0.18***	3.54
	Self-criticism	0.06	1.28	0.17**	3.71
	Self-criticism × Mindfulness	—	—	-0.12**	-3.11
	Perceived academic stress	—	—	-0.22***	-4.77
	ΔR^2	0.22		0.05	
Disengagement coping					
	Self-kindness	0.18**	2.73	0.17**	2.66
	Common humanity	0.10	1.87	0.10	1.84
	Mindfulness	-0.08	-1.38	-0.07	-1.18
	Self-criticism	0.34***	7.38	0.23***	4.44
	Self-criticism × Mindfulness	—	—	0.09*	2.13
	Perceived stress	—	—	0.19***	3.88
	ΔR^2	0.10		0.04	

Note: * p < 0.1, ** p < 0.05, *** p < 0.01.

Figure 2. The moderating role of self-criticism in the relationship between mindfulness and engagement coping.

Disengagement coping. The introduction of variables in Step 1, namely self-kindness, common humanity, mindfulness, and self-criticism, accounted for a notable portion of the variance (10%) in disengagement coping, $F(4, 531) = 15.42$, $p < 0.001$. Both self-kindness ($\beta = 0.18$, p = 0.007) and self-criticism ($\beta = 0.34$, $p < 0.001$) exhibited positive associations with disengagement coping. The results from Step 2 indicated that the inclusion of the interaction term and perceived stress contributed to a 4% increase in the explained variance for disengagement coping, F(6, 529) = 13.89, $p < 0.001$. After accounting for the variables in Step 1, both the interaction term and perceived stress showed positive correlations with disengagement coping, $\beta = 0.09$, p = 0.034 and $\beta = 0.19$, p < 0.001, respectively.

In light of the notable interaction effects, additional simple slope tests were conducted to assess how mindfulness affected disengagement coping in students with high (1 SD above the mean) and low (1 SD below the mean) levels of self-criticism. As depicted in Figure 3, among students with low self-criticism, increased levels of mindfulness were associated with reduced disengagement coping ($B = -0.14$, 95% $CI[-0.27, -0.02]$, $p = 0.024$). In

contrast, this relationship was not statistically significant for students with high self-criticism (B = -0.01, 95% CI [-0.13, 0.12], p = 0.935).
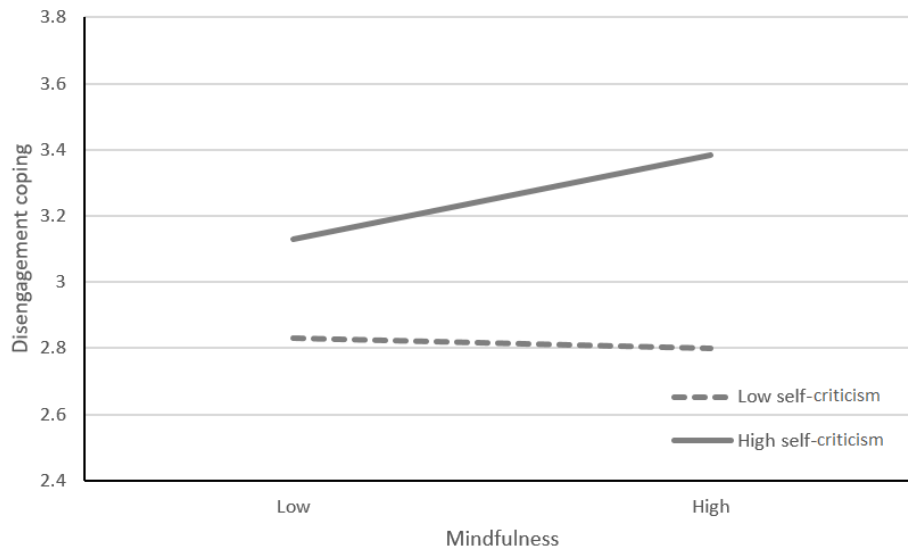

Figure 3. The moderating role of self-criticism in the relationship between mindfulness and disengagement coping.

4.2. Hierarchical Regressions Predicting Students' Academic Resilience and Anxiety

Academic resilience. Table 3 displays the outcomes of the hierarchical regression analyses investigating academic resilience and anxiety among students. In the initial regression model, the combination of self-kindness, common humanity, mindfulness, and self-criticism accounted for 39% of the variance in students' academic resilience, $F(4, 531)$ = 85.72, $p < 0.001$. Specifically, self-kindness (β = 0.22, p < 0.001), common humanity (β = 0.14, p = 0.003), and mindfulness (β = 0.26, $p < 0.001$) were positively associated with academic resilience, while self-criticism emerged as a negative predictor (β = -0.17, $p < 0.001$). The introduction of perceived stress in Step 2 augmented the explained variance in academic resilience by 6%, $F(5, 530)$ = 88.38, $p < 0.001$. After adjusting for the other variables introduced in the initial step, perceived stress exhibited a negative connection with academic resilience, β = -0.30, p < 0.001. The inclusion of engagement and disengagement coping in the final step led to a 10% increase in the explained variance for academic resilience, $F(7, 528)$ = 93.31, $p < 0.001$. After accounting for the variables introduced in Steps 1 and 2, engagement coping exhibited a positive association with academic resilience, β = 0.33, $p < 0.001$.

Academic anxiety. In the initial stage of the analysis, the three components of self-compassion and self-criticism collectively accounted for a significant proportion of the variance (26%) in students' academic anxiety, $F(4, 531)$ = 47.41, $p < 0.001$. Self-criticism was positively related to academic anxiety, β = 0.46, $p < 0.001$. The subsequent introduction of perceived stress in the second step led to a remarkable 26% increase in the variance explained for academic anxiety, $F(5, 530)$ = 117.94, $p < 0.001$. After considering the variables introduced in Step 1, perceived stress demonstrated a positive correlation with academic anxiety, β = 0.62, $p < 0.001$. The third step involved the inclusion of engagement and disengagement coping, resulting in a modest 2% increase in the explained variance for academic anxiety, $F(7, 528)$ = 89.83, $p < 0.001$. After adjusting for the variables introduced in Steps 1 and 2, engagement coping displayed a negative association with academic anxiety, β = -0.13, $p < 0.001$.

Table 3. Hierarchical regression analyses predicting academic resilience and anxiety (N = 535).

Predicted outcome	Variable	Step 1		Step 2		Step 3	
		β	t	β	t	β	t
Academic resilience							
	Self-kindness	0.22***	4.05	0.21***	4.02	0.13**	2.77
	Common humanity	0.14**	3.02	0.14**	3.24	0.11**	2.89
	Mindfulness	0.26***	5.69	0.25***	5.58	0.18***	4.47
	Self-criticism	-0.17***	-4.53	-0.01	-0.30	-0.05	-1.36
	Perceived academic stress	—	—	-0.30***	-7.78	-0.22***	-6.03
	Engagement coping	—	—	—	—	0.33***	9.30
	Disengagement coping	—	—	—	—	-0.06	-1.90
	ΔR^2	0.39		0.06		0.1	
Academic anxiety							
	Self-kindness	-0.11	-1.81	-0.08	-1.70	-0.06	-1.13
	Common humanity	0.04	0.79	0.03	0.86	0.04	1.08
	Mindfulness	-0.03	-0.65	0.01	0.11	0.03	0.76
	Self-criticism	0.46***	11.04	0.13**	3.47	0.15***	3.69
	Perceived academic stress	—	—	0.62***	17.18	0.59***	16.04
	Engagement coping	—	—	—	—	-0.13***	-3.61
	Disengagement coping	—	—	—	—	0.04	1.15
	ΔR^2	0.26		0.26		0.02	

Note: ** $p < 0.05$, *** $p < 0.001$.

5. DISCUSSION

This study investigated the interrelationships among Taiwanese university students' self-regulatory processes, perceived academic stress, academic coping, and coping outcomes. As academic demands were reported as a major source of stress for many college students (García-Izquierdo et al., 2018) it is crucial to explore how students can strengthen their coping resources to improve academic coping and related outcomes. The findings from this study provide empirical support for the conceptual model of adaptive stress and coping processes outlined by Dvořáková et al. (2019). Self-compassion was identified as an essential factor for engagement coping and academic resilience. There is also a link between students' engagement coping and their academic resilience. Moreover, this study enhances the comprehension of the distinctions between self-criticism and self-compassion by exploring their individual effects on academic coping processes. In contrast to the advantageous effects of self-compassion, self-criticism plays an adverse role in how students cope with academic stress. The moderation analysis also revealed the unfavorable effects of self-criticism. Next, the various significant findings are explored in greater depth.

5.1. Factors Related to Academic Coping

Consistent with the model used by Dvořáková et al. (2019) the results of the present study show that mindfulness and self-kindness positively predict students' adaptive coping. Self-regulatory skills may serve as personal resources that empower students to perceive failure or disappointment as steppingstones toward success. As a result, they become proactive in addressing and resolving challenges. Nonetheless, diverging from earlier research outcomes (Neff, 2023) which indicated a negative correlation between self-compassion and maladaptive coping strategies, the present study unveils a positive connection between self-kindness and disengagement coping. In this context, self-kindness entails the empathetic and compassionate embrace of one's distressed self during moments of stress and adversity. Students possessing this quality tend to view academic stress as less daunting, leading them to proactively tackle challenges. However, being kind and compassionate to oneself in difficult situations could also result in avoiding the rigors of academic demands. In other words, students may resort to disengagement coping to alleviate stress. In the context of Taiwanese students' academic coping, self-kindness clearly has both positive and negative implications.

Regarding the impact of an alternative form of self-regulatory processes, it was observed that self-criticism is not linked to engagement coping and exhibits a positive correlation with disengagement coping. These results align with prior research findings (Dunkley et al., 2003) that because of self-critical individuals' constant concerns about their incompetence to overcome problems, they are inclined to resort to avoidance coping to evade stressful situations. Low self-efficacy as a consequence of self-criticism deters students from using truly effective strategies to handle difficulties. According to certain researchers Heine (2003) and Kitayama and Markus (2000) self-criticism is considered beneficial for individuals in interdependent East-Asian cultures such as Taiwan. They maintained that critical self-scrutiny is essential for self-improvement efforts, which are vital to function effectively within an interdependent cultural context. However, the findings of this study contradict this view. It is evident that self-criticism does not lead to optimal coping strategies and outcomes among Taiwanese students.

As expected, students' perceived academic stress negatively predicts engagement coping and positively predicts disengagement coping. Lazarus and Folkman's theory (Biggs et al., 2017) suggests that the appraisal of coping options depends on the negotiation between environmental demands and individual resources. Thus, higher levels of perceived academic stress indicate that these students believe that academic challenges exceed their personal capabilities to handle the demands. Students experiencing elevated stress levels are, therefore, less inclined to use engagement coping strategies to actively approach stressful situations as an opportunity for learning and personal growth. Rather, they are inclined to employ disengagement coping as a strategy to evade the distress linked with academic adversity (Carver & Connor-Smith, 2010; Moritz et al., 2016).

5.2. Moderating Effects of Self-Criticism

Results of the current research confirm the hypothesis that self-criticism moderates the relationship between mindfulness and academic coping. The positive relationship between mindfulness and engagement coping and the negative relationship between mindfulness and disengagement coping are only shown for students who have low self-criticism. Persistently engaging in harsh self-judgment upon failure seems to hinder the effects of mindfulness on regulating academic coping. Mindfulness, as a key self-regulatory skill, is intended to assist students not only in accepting negative thoughts and emotions associated with setbacks but also in deriving constructive meaning from such experiences. This metacognitive ability allows students to select proactive coping strategies to battle academic challenges. However, when students are so self-critical that they set unrealistically high standards for excellence, the self-blame resulting from not meeting these standards can undermine the academic engagement facilitated by mindfulness. The findings also show that mindfulness can only reduce the adoption of disengagement coping among individuals who do not easily become disappointed with themselves after academic failure. The relationship between mindfulness and Taiwanese students' academic coping appears to be contingent on the level of self-criticism. These findings greatly enhance our comprehension of how self-criticism may interact with mindfulness to result in diverse coping options.

5.3. Factors Related to Academic Resilience and Anxiety

In testing the third hypothesis, the present results again align with the conceptual model proposed by Dvořáková et al. (2019). The three components of self-compassion, namely mindfulness, self-kindness, and common humanity, emerge as internal strengths that contribute to the development of academic resilience as an adaptive coping outcome. When accounting for self-criticism, mindfulness, self-kindness, and common humanity show no associations with academic anxiety. Notably, self-criticism stands out as the sole significant predictor of anxiety. The presumably soothing effects of self-compassion on academic anxiety seem to be suppressed by the predominant influences of self-criticism. The stringent self-evaluation and emphasis on negative aspects of stressful events due to self-criticism can make academic demands seem so overwhelming that there is little space for students' self-compassion to function. Additionally, the findings of this study highlight a detrimental association between self-

criticism and academic resilience, implying that self-criticism is likely to undermine the development of academic resilience. When individuals engage in self-criticism, they may experience uncertainty and anxiety in handling academic setbacks, ultimately impeding their resilience.

The effects of perceived stress are in line with those of self-criticism. Students experiencing higher levels of academic stress tend to display increased anxiety and a reduced capacity to cope effectively with stress. Consideration must be given to both self-criticism and perceived stress in the formulation of adequate coping strategies for academic difficulties. As opposed to the detrimental effects of self-criticism and perceived stress, the present findings reveal the beneficial role of engagement coping in students' resilience. Engagement coping, on the one hand, is shown to enhance students' ability to bounce back from academic failures. On the other hand, this type of coping has the potential to decrease students' academic anxiety. It is noteworthy that engagement coping emerges as the only type of coping style that contributes significant variance to these outcome variables. The potentially debilitating effects of disengagement coping on resilience and anxiety appear to be mitigated when engagement coping strategies come into play.

There is nearly an equal amount of total variance accounted for by the independent variables regressed on academic resilience and anxiety (55% and 54%, respectively). Although the effects of these variables are considerable, mindfulness and self-compassion skills only have significant effects on academic resilience. These results offer validation for the aspect of the third hypothesis that pertains to academic resilience. As outlined by Dvořáková et al. (2019) these self-regulatory processes contribute to the enhancement of engagement coping and academic resilience among Taiwanese university students.

6. IMPLICATIONS AND FUTURE RESEARCH

The results of this research suggest that the components of self-compassion, mindfulness and self-kindness function as positive predictors of engagement coping and academic resilience. These results demonstrate the need for cultivating university students' self-compassion. In addition, the findings show that self-criticism, the contrasting type of self-regulatory process, is positively related to disengagement coping and academic anxiety. The moderation analysis also suggests that for students with high self-criticism, the optimal effects of mindfulness on their academic coping cannot be detected. Put differently, self-criticism is counterproductive in the process of coping with academic stress. To foster positive coping skills for academic resilience, students' self-criticism needs to be reduced. Recognizing self-compassion as a crucial countermeasure to self-criticism (Wakelin, Perman, & Simonds, 2022) nurturing self-compassion is considered an effective strategy for diminishing self-criticism. Based on the findings of this study, the practice of nurturing self-compassion may simultaneously strengthen engagement coping and academic resilience.

While the results of this study contribute valuable insights to educational practices, it is essential to acknowledge at least two limitations that should be considered in future research. First, because the conceptual model of Dvořáková et al. (2019) focuses on the coping resources of general self-regulatory skills, in the present study, general self-compassion is regarded as students' personal resources for academic coping. However, since we are interested in exploring factors related to coping and outcomes within the academic context, future research could employ an academic-specific version of the self-compassion scale (Martin, Kennett, & Hopewell, 2019). Academic self-compassion is expected to account for greater variance in academic coping and related outcomes than general self-compassion. The second limitation is that this study explores the connections between self-regulatory processes and academic coping, as well as coping outcomes in university students. However, given its cross-sectional and correlational design, the exact directions of the relationships among the variables cannot be conclusively established. Future investigations could enhance precision by employing a cross-lagged panel model, allowing for a more nuanced identification of antecedent variables over time.

7. CONCLUSION

In conclusion, most of our hypotheses were confirmed. The results of this study offer empirical validation for the adaptive stress and coping model proposed by Dvořáková et al. (2019). The self-regulatory processes and academic stress perceptions of Taiwanese university students demonstrated significant associations with their coping orientations. Specifically, self-compassion components emerged as positive predictors of engagement coping, while self-criticism and perceived academic stress were positively linked to disengagement coping. Moreover, self-criticism functioned as the moderator of the impact of mindfulness on academic coping. In terms of coping outcomes, academic resilience was positively influenced by all components of self-compassion, along with engagement coping. Conversely, self-criticism and perceived stress were found to have positive associations with academic anxiety.

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