

An Examination of Academic Coping and Procrastination from the Self-Determination Theory Perspective

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Abstract

The present study attempted to examine factors related to Taiwanese adolescents' academic coping and procrastination. Three hundred and eighty-nine ninth grade Taiwanese students completed a self-reported survey assessing their perceptions of parental psychological control, satisfaction of basic psychological needs (i.e., the needs for autonomy, competence, and relatedness), academic coping, and procrastination. Results of hierarchical regressions suggested that in terms of predictors of academic coping, parental psychological control positively predicted disengagement coping. Autonomy and competence need satisfaction also emerged as significant predictors of academic coping. As for the determinants of academic procrastination, engagement and disengagement coping both functioned as significant predictors of students' procrastination on homework and exam preparation. Engagement coping negatively predicted academic procrastination. By contrast, disengagement coping was a positive predictor. Additionally, parental control positively predicted procrastination on exam preparation, whereas competence need satisfaction was a negative predictor. Implications for practices and future research were discussed.

Keywords: academic coping, academic procrastination, parental psychological control, basic psychological needs

1. Introduction

Academic pressures were identified as the essential sources of stress that Taiwanese adolescents experience (Chen et al., 2015). The Taiwanese education system requires all the ninth-grade students to take the joint entrance exam for senior high schools (Grade 10-12). The priority goal for Taiwanese junior high students is to obtain satisfactory scores on the entrance exam. Many Taiwanese regard academic achievement as the main route toward social and economic advancement. Taiwanese junior high students usually spend a great deal of time on exam preparation and find school stressful (Chen et al., 2015; Shih, 2012). Previous findings indicated that adolescents were faced with a range of school-related stressors such as poor test grades, difficulty with completing homework, and problems with understanding the material presented in class (Suldo, Shaunessy, & Hardesty, 2008). However, how teenagers coped with these stressors was an understudied topic (Leonard et al., 2015).

When students encountered academic stress, how they interpreted and reacted to academic challenges (i.e., academic coping) appeared to influence their success and satisfaction. Students who possessed adaptive coping resources were likely to respond to the stress without experiencing compromised functioning (Krypel & Henderson-King, 2010; Skinner & Zimmer-Gembeck, 2016). Previous studies on academic coping, nonetheless, were primarily limited to Caucasian samples. These studies did not examine coping and school adjustment in more diverse populations (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001). Since academic stress seemed closely related to students' maladjustment in the Taiwanese school context (Chen et al., 2015), in the present study, Taiwanese adolescents' academic coping was investigated.

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1.1 Academic Coping

Academic coping refers to the efforts that students make to react to academic challenges, setbacks, and difficulties (Krypel & Henderson-King, 2010). With respect to the dimensions or categories of coping, the distinction between engagement and disengagement coping, according to Carver and Connor-Smith (2010), appeared to have the greatest importance. The very distinction therefore received substantial attention in research with different populations including children, adolescents, and adults. Engagement coping is characterized by responses that are oriented either toward the source of stress (e.g., problem-focused coping) or toward the person's emotions or thoughts (e.g., emotion regulation or cognitive restructuring). Disengagement coping refers to responses that are oriented away from the stressors (e.g., withdrawal or denial). People adopting disengagement coping are inclined to act as though the stressor does not exist or try to distract themselves from it. Because disengagement coping does not directly deal with the stressor's existence and its eventual impact, this type of coping generally does not help to ease stress in the long run (Carver & Connor-Smith, 2010; Compas et al., 2001). In classroom settings, engagement in schoolwork normally contributes to students' subsequent learning outcomes. By adopting the distinction between engagement and disengagement coping and investigating the likely predictors of each type of coping, it was hoped that findings of the current study would provide insights into the determining mechanisms of coping responses within the Taiwanese academic context.

Students who coped with academic stress by facing the actual challenge (i.e., engagement coping) showed intrinsic interest in academic work (Appelhans & Schmeck, 2002). They took personal responsibility for their own academic behaviors and expended considerable efforts in their work. Also, students employing engagement coping displayed higher levels of self-efficacy in their ability to complete academic tasks. On the contrary, students who adopted disengagement coping to handle academic difficulties tended to show passive, withdrawn, anxious, and depressed behaviors. They were apt to refrain from taking part in class activities and to procrastinate on homework (Skinner & Wellborn, 1997). In other words, engagement coping could ameliorate students' tendency to procrastinate, whereas disengagement coping was likely to heighten their proclivity to delay completing a task.

1.2 Academic Procrastination

Academic procrastination can be described as an irrational tendency to delay in the completion of an academic task, even to the point of creating emotional discomfort and anxiety (Sénechal, Julien, & Guay, 2003). Students may intend to perform an academic activity within the expected or desired time frame, yet failing to motivate themselves to carry out the intention. It was estimated that 80% to 95% of college students engaged in procrastination consistently and problematically (Yerdelen, McCaffrey, & Klassen, 2016). Academic procrastination could be troubling to these students because results of previous studies revealed that procrastination was linked to a variety of negative outcomes including poor academic performance, missing or late assignments, anxiety during tests, and use of self-handicapping strategies (Dewitte & Schouwenburg, 2002; Kim & Seo, 2015; Lee, 2005; Park & Sperling, 2012). Procrastination also caused damaging mental health outcomes such as depression and lower levels of self-esteem (Lay & Schouwenburg, 1993; Tice & Baumeister, 1997).

Despite the well-documented evidence of the negative impact of academic procrastination on learning and psychological well-being among students, the antecedents of procrastination were yet to be determined (Steel, 2007). Moreover, the vast majority of existing research was focused on college students samples. There was shortage of studies on academic procrastination among adolescent students. To address this paucity, in addition to examining the relationship between academic coping and procrastination, the present study also attempted to explore factors related to Taiwanese junior high students' academic procrastination.

1.3 Satisfaction of Basic Psychological Needs

There was evidence that students' motivation and engagement were mainly determined by the degree to which their basic psychological needs were met (Ryan & Deci, 2017). Self-determination theory (SDT; Ryan & Deci, 2017) is a widely studied theory of human motivation that provides a framework for understanding human tendency toward active engagement and development. According to SDT, the three basic needs (i.e., the needs for autonomy, competence, and relatedness) serve as intrapersonal resources that guide individuals' coping in stressful encounters (Skinner & Wellborn, 1997). Autonomy refers to the need to experience one's behavior as freely chosen and volitional. Competence refers to the need to feel efficacious while interacting with the social environment, such as completing a learning project.

Relatedness refers to the need to feel connected to significant others, like parents or friends. SDT posits that a sense of autonomy constitutes an important psychological resource for dealing with stressful demands. Individuals with a sense of autonomy were prone to appraise objective stressors as challenges rather than threats and, in turn, utilized engagement coping to overcome obstacles. In contrast, students with low levels of autonomy tended to respond to challenging situations with high distress and frustration. Accordingly, they were likely to employ disengagement coping and academic procrastination to avoid negative emotions associated with encountered difficulties (Skinner & Edge, 2002). Put in another way, autonomy need satisfaction enabled students to proactively cope with academic stress. The active engagement arising from adaptive coping was conducive to easing students' procrastination.

As for a sense of competence, it constitutes the underlying process of control (Ryan & Deci, 2017). A person's sense of control was found to have powerful effects on how he or she coped with stress (Folkman, 2011). Individuals with great confidence in their ability to overcome obstacles were inclined to construe failures and stressors as challenges. Generally, they used problem solving and strategizing to tackle difficulties. Put differently, students whose need for competence was fulfilled tended to adopt engagement coping to deal with academic demands. By contrast, people who lacked a sense of competence often became pessimistic and doubting when faced with setbacks. They tended to use disengagement coping to shy away from the stressor if possible (Dweck & Molden, 2017). Moreover, students who felt efficacious usually demonstrated good time management skills when it came to homework completion and exam preparation (Brdar, Rijavec, & Loncaric, 2006). Previous findings indicated that a higher sense of control (i.e., competence need satisfaction) appeared to repel one's inclination to procrastinate (Steel, 2007).

Relatedness may also have a role in adolescents' academic coping and procrastination. Social support was one of the most effective means through which people coped with difficult and stressful events. Those who received social support buffered themselves from the adverse mental and physical health effects of stress. Attachment theory posits that the proximal predictors of adaptive coping are individuals' experiences with supportive relationships. People with loving relationships coped with stress better than those who were more socially isolated (Kim, Sherman, & Taylor, 2008; Skinner & Edge, 2002). Satisfaction of the need for relatedness is conceptualized as individuals' convictions about their own lovability and their expectations that social partners can be trusted to be warm and available when needed. Students whose need for relatedness was taken care of reacted to potential threats with little distress and with active attempts to solve the problems (Skinner & Zimmer-Gembeck, 2016). Academic procrastination was supposedly reduced as a consequence.

Skinner and her colleagues (Skinner & Edge, 2002; Skinner & Zimmer-Gembeck, 2016) suggested that people's appraisals of whether the three psychological needs were fulfilled were crucial mechanisms that brought about individual differences in coping. By exploring the effects of satisfaction of the three basic needs on academic coping and procrastination, how the needs for autonomy, competence, and relatedness were related to one's academic self-regulation would be determined.

1.4 Psychological Control

In contrast to the beneficial effects of satisfaction of basic psychological needs on individuals' development of self-governing functioning, psychological control refers to control attempts that intrude into the psychological and emotional development of the person through use of manipulative techniques like guilt induction and love withdrawal (Soenens, Vansteenkiste, Luyten, Duriez, & Goosens, 2005). Previous findings revealed that when interpersonal contexts were psychologically controlling, individuals' self-esteem hinged on performance, namely, contingent self-esteem. Contingent self-esteem required that one continuously matched some standard of excellence to feel worthy. This type of ego involvement led people to focus on proving and defending themselves rather than pursuing growth and challenge (Ryan & Deci, 2017). Soenens et al. (2005) also found that individuals experiencing psychological control doubted their behavior. They engaged in negative self-evaluation and had strong concerns about their potential mistakes. It was inferred that adolescents who perceived psychological control from their parents were apt to adopt avoidance strategies such as disengagement coping and procrastination to defend their fragile self-worth.

1.5 The Present Study

In summary, the purpose of the present study was to determine the mechanisms associated with Taiwanese adolescents' academic coping and procrastination.

Specifically, this study was devised to examine the following hypotheses: (a) Students' perceptions of parental psychological control and satisfaction of basic psychological needs (i.e., the needs for autonomy, competence, and relatedness) would significantly predict their engagement and disengagement coping; (b) Students' perceptions of parental psychological control, satisfaction of basic psychological needs, and academic coping (i.e., engagement and disengagement coping) would significantly predict their procrastination on homework and exam preparation. To test these hypotheses, four individual hierarchical regressions were performed in order that factors significantly predicted engagement and disengagement coping as well as procrastination on homework and exam preparation would be detected. On the basis of previous findings (Skinner & Zimmer-Gembeck, 2016; Soenens et al. 2005), students' perceptions of parental control and satisfaction of basic psychological needs were presumed to be determinants of their academic coping. Hierarchical regressions were selected as the data analytic technique so that the values of variance explained by each set of predictors could be calculated (Tabachnick & Fidell, 2013). In the similar vein, students' perceptions of parental control, satisfaction of basic psychological needs, and academic coping were expected to function as predictors of their procrastination on homework and exam preparation (Brdaret al., 2006; Ryan & Deci, 2017; Steel, 2007). To evaluate the amount of variance in academic procrastination accounted for by each set of factors, hierarchical regression analyses were also employed.

With regard to the sequence of entry of predicting factors in hierarchical regression models, according to Tabachnick and Fidell's suggestion (2013), independent variables that were presumed to be causally prior were given higher priority. Based upon SDT, students' satisfaction of basic psychological needs was likely to be influenced by parental psychological control (Ryan & Deci, 2017). For this reason, in the hierarchical regression analyses predicting academic coping, perceived parental psychological control was entered as the predictor in block 1 and satisfaction of needs for autonomy, competence, and relatedness was entered in block 2. As for hierarchical regressions predicting academic procrastination, because of the reason mentioned above, perceived parental psychological control was entered in block 1. In block 2, students' satisfaction of needs for autonomy, competence, and relatedness was entered. Given that both perceived parental psychological control and satisfaction of basic psychological needs were thought to affect the way in which individuals coped with academic stress (Skinner & Zimmer-Gembeck, 2016), students' use of academic coping strategies was entered in block 3 as the predictor of academic procrastination.

2. Method

2.1 Participants

The participants included 389 ninth-grade Taiwanese students from twelve classes in four junior high schools. Participating schools were located in the northern part of Taiwan. All of school principals granted initial consent for data to be collected in their schools. The 210 boys (54%) and 179 girls ranged in age from 14 years to 15 years, 9 months ($M = 14$ years, 8 months, $SD = 4$ months). The school districts were primarily middle class in terms of socioeconomic status. All of the participants were Taiwanese. Students' participation was voluntary. Guidelines for the proper treatment of human subjects were followed (APA, 2010). All participants had parental consent to take part in the study. Confidential treatment of the data was guaranteed.

2.2 Procedure

The data were collected at the beginning of the ninth grade. Students were invited to fill out a survey (described in detail below) during regular class time. It took participants about 20-25 minutes to complete the questionnaire. There were two research assistants in each class for the data collection. They assured students of the confidentiality of their self-reports and encouraged them to respond to all items as accurately as possible.

2.3 Measures

Participants were instructed to respond to all items using a five-point Likert scales, ranging from 1 (strongly disagree) to 5 (strongly agree). A Chinese language version of this self-report survey was used. All measures utilized in the present study were translated into Chinese and then back-translated into English. To ensure adequate translation, guidelines of the International Test Commission (Hambleton, 1994) were followed. Specifically, the translation process took account of linguistic and cultural qualities among Taiwanese adolescents. Participants' familiarity with item format, item content, and test procedures was ensured by checking with two Taiwanese junior high students during the translation process. Information on each scale used in the present study is detailed below. Table 1 summarizes the numbers of scale items, example items, and Cronbach's Alpha coefficients for the scales.

2.3.1 Parental control. Students' perceptions of parental psychological control were assessed by the Parental Psychological Control Scale (Shek, 2006). Ten items assessed parental psychological control in a global manner (e.g., "My parents want to control everything in my life"). Higher scores represented a higher level of perceived psychological control in the family context. This scale demonstrated good reliability with a Cronbach's α of .93.

2.3.2 Satisfaction of the basic psychological needs. Students' satisfaction of the basic psychological needs was assessed by the Basic Need Satisfaction at Work Scale (Baard, Deci, & Ryan, 2004). This scale was used to measure the extent to which students experienced satisfaction of their needs for autonomy (e.g., "I feel like I can pretty much be myself in my classroom"; 4 items; $\alpha = .86$), competence (e.g., "Most days I feel a sense of accomplishment from learning"; 4 items; $\alpha = .82$), and relatedness (e.g., "My classmates are pretty friendly toward me"; 4 items; $\alpha = .75$). Higher scores represented a higher level of satisfaction of the basic psychological needs.

2.3.3 Academic coping strategies. Students' use of academic coping strategies was assessed by the scale adapted from the Coping Orientations to Problems Experienced (COPE) inventory developed by Carver, Scheier, and Weintraub (1989). This inventory was used to measure the ways in which the general population responded to stress across different situations. Given that the current study was intended to investigate students' coping responses in academic settings, the word "problem" in the original items was changed to "academic problem" when students' tendency to cope with academic stress was assessed. The adapted academic coping inventory consisted of two scales. Engagement coping was comprised of three subscales (i.e., Active coping: "I take additional action to try to get rid of the academic problem"; 4 items; Planning: "I think about how I might best handle the academic problem"; 4 items; Suppression of competing activities: "I put aside other activities in order to concentrate on schoolwork"; 2 items; $\alpha = .93$). Disengagement coping was comprised of four items (e.g., "I reduce the amount of effort I am putting into solving the academic problem"; $\alpha = .74$).

2.3.4 Academic procrastination. Students' tendency to academic procrastination was assessed by the Academic Procrastination Questionnaire (Huang, 2009). This scale was originally developed to measure college students' inclinations of procrastination in different academic situations. Because the current study was devised to investigate junior high students' academic procrastination, very few items were modified according to adolescent students' experiences in school. The adapted academic procrastination questionnaire consisted of two subscales. The scale of procrastination on homework had 6 items that measured students' procrastination behaviors when doing homework (e.g., "I usually wait until the last minute to start my homework"). Higher scores indicated a higher tendency to procrastinate on completing homework. This scale demonstrated good reliability with a Cronbach's α of .90. The scale of procrastination on exam preparation consisted of 6 items that measured students' tendency to procrastinate on preparation when the exam was approaching (e.g., "While preparing for the examination, I usually procrastinate on carrying out my study plan"). Higher scores reflected a higher tendency to procrastinate on exam preparation. Cronbach's α was .86.

Table 1

Scale	Number of items	Example items	Alpha
Parental control	10	My parents want to control everything in my life.	.82
		My parents want to change me to meet their standard.	
Autonomy need satisfaction	4	I feel like I can pretty much be myself in my classroom.	.85
		I am free to express my ideas and opinions in my classroom.	
Competence need satisfaction	4	Most days I feel a sense of accomplishment from learning.	.70
		When I am working in my classroom I often feel very capable.	
Relatedness need satisfaction	4	My classmates are pretty friendly toward me.	.88
		I get along with my classmates.	
Engagement coping	10	I take additional action to try to get rid of the academic problem.	.78
		I think about how I might best handle the academic problem.	
Disengagement coping	4	I reduce the amount of effort I am putting into solving the academic problem.	.91
		I just give up trying to reach my goal.	
Procrastination on homework	6	I usually wait until the last minute to start my homework.	.90
		I usually procrastinate on carrying out the plan of doing homework.	
Procrastination on exam preparation	6	While preparing for the exam, I usually procrastinate on carrying out my study plan.	.86
		I usually postpone my study for exam because of other activities.	

Numbers of Items, Example Items, and Alpha Coefficients for Scales Used in the Present Study

3. Results

3.1 Regression Analyses

Descriptive information and correlations for study variables are shown in Table 2. Results from regression analyses are presented first for outcomes regarding students' use of academic coping strategies and then for their academic procrastination. In the preliminary analysis, gender was entered first in regression models. Results of the preliminary analysis suggested that gender failed to predict any outcome variable of interest. Accordingly, gender was not included as a predicting variable in the present study. The alpha level used to determine the significance of all of these analyses was set at .01. This more conservative alpha level was selected to reduce the possibility of making a Type I error arising from completing a series of analyses with related outcomes (Tabachnick & Fidell, 2013).

Table 2. Descriptive Statistics and Correlations for Study Variables (N =389)

Scale	1	2	3	4	5	6	7	8
1. Parental control	—							
2. Autonomy need satisfaction	-.23**	—						
3. Competence need satisfaction	-.11*	.56**	—					
4. Relatedness need satisfaction	-.27**	.60**	.47**	—				
5. Engagement coping	.09	.48**	.65**	.40**	—			
6. Disengagement coping	.38**	-.23**	-.11*	-.16**	-.15**	—		
7. Procrastination on homework	.23**	-.20**	-.30**	-.17**	-.35**	.36**	—	
8. Procrastination on exam preparation	.25**	-.17**	-.37**	-.11*	-.33**	.31**	.75**	—
<i>M</i>	2.67	3.96	3.27	3.86	3.36	2.44	2.79	3.13
<i>SD</i>	1.03	.88	.90	.79	.79	.82	1.00	.86

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

3.2 Hierarchical Regressions Predicting Students' Engagement and Disengagement Coping

3.2.1 Engagement coping. Results of hierarchical regressions predicting students' academic coping are displayed in Table 3. In the hierarchical regression analysis predicting engagement coping, perceived parental psychological control (Step 1) and autonomy, competence, and relatedness need satisfaction (Step 2) were regressed on engagement coping. Perceived parental control was entered in the first regression model and failed to significantly predict engagement coping, $F(1, 387) = 3.45, p > .01, R^2 = .01$. In Step 2, students' satisfaction of needs for autonomy, competence, and relatedness was individually included in the model. Adding these variables increased the amount of variance explained for engagement coping by 44%, $F(4, 384) = 76.46, p < .001, R^2 = .45$. Results from this step suggested that autonomy and competence need satisfaction positively predicted engagement coping.

3.2.2 Disengagement coping. In this set of regression analysis, perceived parental psychological control (Step 1) and autonomy, competence, and relatedness need satisfaction (Step 2) were regressed on disengagement coping. The amount of variance (14%) explained by students' perceptions of parental control in the first step of the regression model was statistically significant for disengagement coping, $F(1, 387) = 64.71, p < .001, R^2 = .14$. Perceived parental psychological control was found to positively predict students' disengagement coping. Adding students' satisfaction of basic psychological needs in Step 2 increased the amount of variance explained for disengagement coping by 2%, $F(4, 384) = 18.98, p < .001, R^2 = .16$. When parental control was taken into account, autonomy need satisfaction negatively predicted disengagement coping.

Table 3. Summary of Hierarchical Regression Analyses Predicting Academic Coping (N= 389)

Variable	Engagement coping				Disengagement coping				
	β	t	R^2	ΔR^2	β	t	R	R^2	ΔR^2
Step 1			.01	.01				.37	.14
Parental control	-.09	-1.86			.38***	8.04			
Step 2		.67	.45	.44			.40	.16	.02
Parental control	.02	.38			.35***	7.15			
Autonomy need satisfaction	.14**	2.61			-.17**	-2.71			
Competence need satisfaction	.54***	11.55			.01	.13			
Relatedness need satisfaction	.07	1.43			.04	.57			

Note. ** $p < .01$. *** $p < .001$. ΔR^2 denotes change in R^2

3.3 Hierarchical Regressions Predicting Students' Academic Procrastination

3.3.1 Procrastination on homework. Table 4 presents results of hierarchical regressions predicting students' academic procrastination. In the hierarchical regression analysis predicting procrastination on homework, perceived parental psychological control (Step 1), autonomy, competence, and relatedness need satisfaction (Step 2), as well as engagement and disengagement coping (Step 3) were regressed on this predicted outcome. The amount of variance (5%) explained by students' perceptions of parental control in the first step of the analysis was significant for students' procrastination on homework, $F(1, 387) = 20.70, p < .001, R^2 = .05$. Parental control positively predicted this type of academic procrastination. In Step 2, students' satisfaction of basic psychological needs was individually included in the model. Adding these variables increased the amount of variance explained for procrastination on homework by 8%, $F(4, 384) = 13.92, p < .001, R^2 = .13$.

Results from this step suggested that when parental control was controlled for, competence need satisfaction was negatively associated with procrastination on homework. In Step 3, students' engagement and disengagement coping were entered. Adding these variables increased the amount of variance explained for procrastination on homework by 12%, $F(6, 382) = 20.30, p < .001, R^2 = .25$.

When other predictors were controlled for, students' engagement coping negatively predicted students' tendency to delay completing homework. In contrast, the use of disengagement coping strategies positively predicted procrastination on homework.

3.3.2 Procrastination on exam preparation. In the hierarchical regression analysis predicting procrastination on exam preparation, perceived parental psychological control (Step 1), autonomy, competence, and relatedness need satisfaction (Step 2), as well as engagement and disengagement coping (Step 3) were regressed on this dependent variable.

Perceived parental psychological control was entered in Step 1 and accounted for a significant amount of variance (6%) in students' procrastination on exam preparation, $F(1, 387) = 25.11, p < .001, R^2 = .06$. Parental psychological control was positively associated with procrastination on exam preparation. Results from Step 2 showed that adding students' satisfaction of basic psychological needs increased the amount of variance explained by 13% for procrastination on exam preparation, $F(4, 384) = 23.11, p < .001, R^2 = .19$. When parental control was accounted for, students' satisfaction of need for competence negatively predicted procrastination on exam preparation. In the final step, students' engagement and disengagement coping were included. Adding these variables increased the amount of variance explained for procrastination on exam preparation by 6%, $F(6, 382) = 21.90, p < .001, R^2 = .25$. When other predictors were taken into consideration, students' use of engagement coping negatively predicted their procrastination on exam preparation. Conversely, disengagement coping emerged as a positive predictor.

Table 4. Summary of Hierarchical Regression Analyses Predicting Academic Procrastination (N= 389)

Variable	Procrastination on homework					Procrastination on exam preparation				
	β	t	R	R^2	ΔR^2	β	t	R	R^2	ΔR^2
Step 1			.22	.05				.24	.06	
Parental control	.23***	4.55				.25***	5.01			
Step 2			.36	.13	.08			.44	.19	.13
Parental control	.20***	4.02				.25***	5.15			
Autonomy need satisfaction	-.01	-.08				.05	.86			
Competence need satisfaction	-.29**	-4.85				-.43***	-7.60			
Relatedness need satisfaction	.03	.41				.12	2.05			
Step 3			.05	.25	.12			.50	.25	.06
Parental control	.10	2.08				.17***	3.47			
Autonomy need satisfaction	.08	1.29				.12	1.88			
Competence need satisfaction	-.15	-2.34				-.34***	-5.36			
Relatedness need satisfaction	.03	.58				.13	2.19			
Engagement coping	-.26***	-4.26				-.17**	-2.78			

Note. ** $p < .01$. *** $p < .001$ ΔR^2 denotes change in R^2 .

4. Discussion and Conclusion

Findings of the present study advanced the understanding of the determining factors of Taiwanese adolescents' academic coping and procrastination. This line of research was rarely studied and primarily limited to Caucasian college students samples. Results of hierarchical regressions suggested that in terms of predictors of academic coping, parental psychological control positively predicted disengagement coping. Autonomy and competence need satisfaction also emerged as predictors of academic coping. As for the determinants of academic procrastination, engagement and disengagement coping both functioned as significant predictors of students' procrastination on homework and exam preparation. In addition, parental control positively predicted procrastination on exam preparation, whereas competence need satisfaction was a negative predictor. Below, several important findings are discussed in more detail.

4.1 Predictors of Academic Coping

The present findings indicated that students' perceptions of parental psychological control did not account for a significant amount of variance in engagement coping ($R^2 = .01$). Parental use of manipulative techniques to control their children failed to predict students' adaptive coping with academic difficulties. Unlike the extremely small amount of variance explained by perceived parental control, both autonomy and competence need satisfaction accounted for a large portion of variance ($R^2 = .44$) in engagement coping. Apparently, the fulfillment of the needs for autonomy coupled with competence played a crucial role in enhancing students' engagement coping with academic stress. In consistence with previous findings (Skinner & Wellborn, 1997), when students reported higher levels of autonomy need satisfaction, they used engagement coping to tackle academic challenges. These adolescents not only reacted to difficulties with interest and flexibility, but construed environmental feedback as information that could be used to guide performance rather than as pressures to conform in some fashion.

Also, individuals with higher levels of competence need satisfaction likely interpreted failures as the need for improvement through further attention and effort. Performance setbacks inspired them to engage in self-regulation characterized by active, direct, and constructive coping (i.e., engagement coping) such that development of competence could be attained (Dweck & Molden, 2017).

Perceived parental psychological control explained a significant portion of variance ($R^2=.14$) in disengagement coping, suggesting that students experiencing psychologically controlling practices within the family context were prone to use disengagement coping. It was speculated that contingent self-esteem stemming from perceived parental psychological control led adolescents to pursue continual validation of self-worth and therefore to employ disengagement coping to protect self-worth when encountering academic difficulties. Such findings sustained the universality of SDT proponents' contention regarding the detrimental effects of psychological control on individuals' motivation and active engagement.

The fulfillment of the need for autonomy was the only kind of need satisfaction that significantly predicted disengagement coping ($\beta = -.17, p < .01$). Previous findings (Ryan & Deci, 2017) indicated that when one acted with a sense of autonomy, the autonomously motivated behaviors facilitated a stronger sense of true self-worth. Because secure feelings of self-worth did not depend on continual validation, adolescents high in autonomy showed less defensive coping styles (i.e., disengagement coping) to maintain self-esteem. It is noteworthy that relatedness need satisfaction failed to predict both engagement and disengagement coping in the present study. Perhaps the need for relatedness had little to do with the essence of either engagement or disengagement coping. Instead, this sort of need could be related to coping strategies focused on support seeking. In light of the very findings, there appeared to be a need to include support seeking as another category of coping in the future research.

4.2 Predictors of Academic Procrastination

Findings of the present study revealed that parental psychological control positively predicted procrastination on homework and exam preparation. The ego goals emphasized in psychologically controlling contexts were likely to orient students to be greatly concerned about whether their performance matched the evaluative standards (Soenens et al., 2005). Such an orientation, in turn, pressured them to engage in academic procrastination to protect their self-worth and to avoid potential failures or mistakes. The aggravating effects of parental control on procrastination suggested that a psychologically unhealthy family environment was evidently linked to the person's maladaptive achievement behaviors in the school context.

It turned out that among the three basic psychological needs, competence need satisfaction was the only significant predictor of procrastination on homework and exam preparation after controlling for effects of parental control. Students whose need for competence was fulfilled were significantly less likely to delay the completion of homework as well as exam preparation. Satisfaction of the need for competence provided students with a sense of efficacy at overcoming obstacles such that they remained optimistic in the face of challenges. The confidence in their ability to accomplish unpleasant tasks motivated these students to actively engage in schoolwork rather than to use procrastination to escape the difficulties. Satisfying adolescents' need for competence seemed closely related to diminishing their academic procrastination.

Other determining factors related to academic procrastination found in the current study included engagement and disengagement coping. Engagement coping negatively predicted procrastination on homework and exam preparation, whereas disengagement coping emerged as a positive predictor. Engagement coping enabled students to maintain vigorous interactions with academic material. They took personal responsibility for learning by showing more effort, persistence, concentration, interest, and enthusiasm. Also, they tended to have good time management skills when engaging in learning activities (Brdar et al., 2006). These characteristics were thought to function as antidote to procrastination. In other words, nurturing adolescents' engagement coping skills could be an effective way to remedy academic procrastination. In contrast, disengagement coping was connected with both types of academic procrastination. Escaping stress from the academic demands supposedly resulted in procrastination on homework and exam preparation. The longer one avoided dealing with the problem, the more intractable it became (Carver & Connor-Smith, 2010).

Academic coping was found to have stronger predicting effects on procrastination on homework ($\Delta R^2 = .12$) than on exam preparation ($\Delta R^2 = .06$). Moreover, results of the hierarchical regression analysis showed that both parental psychological control and competence need satisfaction failed to significantly predict procrastination on

homework after adding engagement and disengagement coping as predictors to the regression model. It was inferred that academic coping fully mediated the relationships of parental control and competence need satisfaction with procrastination on homework. It is, however, important to note that in the present study, these predictors only accounted for one fourth of the variance in academic procrastination. The rest of the variance in the two types of procrastination was explained by other variables than factors investigated in the current study.

4.3 Implications for Education

Results of the present research revealed that students' satisfaction of basic psychological needs explained a fairly large portion of variance (44%) in engagement coping. To foster engagement coping, accordingly, it would be helpful to satisfy their needs for autonomy and competence. Students' need for autonomy could be met by teachers' provision of autonomy support. Autonomy-supportive practices such as taking the student's perspective or allowing opportunities for self-initiation and choice allowed students to experience their interactions with academic activities and materials as more self-determined (Ryan & Deci, 2017). In addition, classroom settings that provided structure were presumed to fulfill the individual's need for competence. Structure refers to the amount and clarity of information that teachers communicate to students about expectations and how those expectations can be realized. Provision of structure propelled students to enact effective strategies preventing them from construing setbacks as signs of incompetence. In turn, students were prone to be focused on active problem solving when obstacles arose (Jang, Reeve, & Deci, 2010; Skinner & Wellborn, 1997). On the basis of the present findings, when adolescents were able to cope with academic difficulties in a more flexible and constructive manner, academic procrastination was reduced significantly.

In light of the significant amount of variance in disengagement coping and academic procrastination explained by parental psychological control, the detrimental effects of this factor are worth noting. To lessen disengagement coping and academic procrastination, parents are advised to decrease psychological control while interacting with children. Specifically, the use of manipulative techniques like guilt-induction and love withdrawal to pressure children into compliance with parental standards should be cautiously avoided (Reeve & Tseng, 2011; Reeve, 2006).

4.4 Limitations and Future Research

Although results of the present study provided insights into educational practices, there were several limitations that needed to be addressed in the future research. First, as mentioned earlier, in addition to engagement and disengagement coping, future research is encouraged to include support seeking as another category of academic coping and to examine whether satisfaction of the need for relatedness is significantly related to this type of coping. A more comprehensive categorization of academic coping can offer a clearer understanding of how basic psychological needs are associated with different types of coping strategies.

Second, a closer look at the results from hierarchical regressions suggested that academic coping likely mediated the relationships of parental psychological control and satisfaction of basic psychological needs with students' academic procrastination. Whereas the hierarchical regression analyses employed in the current research helped to detect the relative importance of each set of predictors, such a procedure did not allow the examination of mediating relationships. Future research should use structural equation modeling to test the mediation model. Finally, given that predictors examined in the present study did not account for large amounts of variance in adolescents' academic procrastination, researchers are advised to explore other potential predictors in future studies. For instance, the classroom environment may also play a role in student procrastination. Future research should investigate the extent to which teachers' psychological control and autonomy support influence students' tendency to procrastinate. Such knowledge will help to develop effective interventions that promote adaptive academic engagement.

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