

Emotion Regulation Strategies Moderating the Relationship Between Perceived Causes of Anxiety and Social and Emotional Learning Outcomes in Taiwanese Adolescents

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This study investigated how emotion regulation (ER) strategies, including positive coping emotion regulation strategies (PCER) and maladaptive emotion regulation strategies (MER), as well as perceived causes of anxiety, linked to the social and emotional learning (SEL) outcomes (e.g., relationship skills) in Taiwanese adolescents. Specifically, this study aimed to examine the moderating roles of ER strategies (PCER, MER) in the relationship between perceived causes of anxiety and SEL outcomes. The sample of this study consisted of 1,588 Taiwanese junior high school students (48% girls). Results showed that controlling for sex and self-control, adolescents' perceived causes of anxiety negatively predicted their SEL outcomes. The greater use of PCER and MER positively predicted adolescents' SEL outcomes. However, the findings revealed that the more use of PCER, as compared to the less use of PCER, intensified the negative association between perceived causes of anxiety and SEL outcomes. Moreover, the less use of MER, as compared to the more use of MER, intensified the negative association between perceived causes of anxiety and SEL outcomes. Overall, the findings from this study support the intervention of

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cultivating adolescents' ER strategies while considering the different levels of their perceived causes of anxiety, in relation to SEL outcomes.

Keywords: adolescent; emotion regulation strategies; perceived causes of anxiety; social and emotional learning outcomes

Introduction

Emotion Regulation and Social and Emotional Learning Outcomes

When people face stressful conditions, they are motivated to manage their negative emotions to comfort themselves and reach personal goals. This process is emotion regulation (ER) (Dixon-Gordon et al., 2015). Extremera and Rey (2015) found when perceiving high stress, people with high ER ability reported higher scores in happiness than those with low ER ability. In the literature, ER strategies are often classified into two types (Grynberg & López-Pérez, 2018; Macklem, 2008; McMahon & Naragon-Gainey, 2018; Sanchis-Sanchis et al., 2020). The first type is adaptive ER strategies or approach coping, such as active coping, cognitive reappraisal, problem solving, seeking support, acceptance and engagement. According to a meta-analysis of adolescents' ER strategies (J. Ö. Schäfer et al., 2017), there were three prevalent adaptive ER strategies in adolescents: changing thoughts about the meaning of the hardship (cognitive reappraisal), thinking of the solutions to the problem (problem solving), and facing the hardship without avoidance (acceptance). The second type is maladaptive ER strategies or avoidance coping, such as passive coping, avoidance, suppression, rumination, distraction and disengagement. In the meta-analysis (J. Ö. Schäfer et al., 2017), three common maladaptive ER strategies in adolescents were addressed: running away from the stress and the negative emotions (avoidance), suppressing emotional expressions and emotional experiences (suppression), and continuously sticking to the emotional experiences (rumination).

However, whether an ER strategy is adaptive or maladaptive for people's psychological adjustments is not absolutely fixed, especially for the ER strategy utilized by adolescents (Huang, 2021; Ng & Seibyl, 2024), who are in the developmentally critical time period to learn the use of ER strategies (Modecki et al., 2017; Sanchis-Sanchis et al., 2020). Predicting which ER strategy would be effective is tricky as it requires taking into account many factors (Sheppes & Gross, 2012). In the 2024 American Psychological Association convention, Ng and Seibyl (2024) from the Yale Center for Emotional Intelligence gave a presentation

“Supporting Students’ Emotion Regulation Development: Pros and Cons of Four Different Strategies.” They emphasized that “no one strategy is helpful for every person or in every situation” by listing the pros and cons of different kinds of ER strategies.

Nevertheless, in the present study, to concretely identify the patterns of different types of ER strategies, ER strategies were still divided into “positive coping emotion regulation strategies” (PCER) (e.g., cognitive reappraisal), which belonged to the idea of adaptive ER, and “maladaptive emotion regulation strategies” (MER), which was the relatively opposite of the adaptive ER, in the analyses.

People’s ER is linked to their various social and emotional learning (SEL) outcomes (Merrell & Gueldner, 2010; Morrish et al., 2018; Y. F. Wang, 2012), such as social functioning (Jacob et al., 2014), subjective happiness and well-being (Extremera & Rey, 2015), mental health (Ahmed et al., 2015), school adjustments (Macklem, 2008), peer relations (Kim & Cicchetti, 2010), life satisfaction (Ng, 2018), and depression (Boden & Thompson, 2015; Extremera & Rey, 2015). Deng et al. (2017) targeted Chinese adolescents, finding the relation between adolescents’ ER and their social and emotional development as well.

Regarding the definition of SEL, this study uses the prevalently adopted SEL framework proposed by the Collaborative for Academic, Social, and Emotional Learning (CASEL). According to the SEL framework (CASEL, 2020), there are five competencies of SEL: self-awareness (e.g., identifying own beliefs and emotions, accurate self-perception, positive mindset), self-management (e.g., impulse control, stress management, goal setting), social awareness (e.g., perspective taking, empathy, respecting others), relationship skills (e.g., communication skills, relationship building, interpersonal conflict coping), and responsible decision-making (e.g., identifying problems, analyzing resources, problem solving). SEL can be seen as the general concept of wellness (Merrell & Gueldner, 2010). In particular, it is the core of positive youth development (Modecki et al., 2017; Taylor et al., 2017). SEL outcomes contain growth mindset, self-efficacy, self-management, and social awareness (Loeb et al., 2019).

To some extent, ER is a specific part in the self-management competence of SEL (CASEL, 2020). However, there are nuances between these two. From the perspective of measures, SEL represents the overall mental health functioning, and it is not likely to assess the whole contents of SEL at once (Berg et al., 2017; Merrell & Gueldner, 2010). Yet, ER is merely an emotional competence in people’s social and emotional development (Halle & Darling-Churchill, 2016). ER is comparatively easy to be assessed in measures with a single scale.

The Emotion Regulation Buffering Effect on the Link Between Perceived Causes of Anxiety and SEL Outcomes in Adolescents

Adolescents are particularly vulnerable to anxiety because of the rapid changes in physical and psychological development (Riediger & Klipker, 2014; Steinberg, 2019). Youth anxiety is a predictor of functional impairment in academic, family, and social functioning areas (Swan & Kendall, 2016). Anxious youth are likely to have poor emotional competence in SEL (Mathews et al., 2016). Perceived causes of anxiety such as factors about self-development, peer relations, family relations, and school adjustments play roles in predicting early adolescents' problem behaviors (Chang & Chang, 2010; Student Health Service, Department of Health, 2022), which is measured in SEL (Halle & Darling-Churchill, 2016). Also, adolescents' uncontrollable life events were found negatively linked to their life satisfaction (Ng et al., 2018). It reveals that how adolescents perceive causes of anxiety or stressors associates with their psychosocial outcomes.

Nevertheless, adolescents' ER may have the stress-reducing effect by buffering the negative SEL outcomes derived from perceived causes of anxiety. Thus, the choice of ER strategies is critical for adolescents to handle their perceived causes of anxiety, so as to influence their SEL outcomes. It indicates the buffering role of ER strategies in the relationship of perceived anxiety/stress and the psychosocial consequences. This is the theoretical foundation for the present study.

In this study, regarding the independent variable and the dependent variable, instead of investigating the traditional association between adolescents' general level of anxiety and the negative outcomes, it examined the link between the extent to which adolescents perceived causes of anxiety and the SEL outcomes, which represents the overarching construct of social and emotional adjustments (Divecha & Brackett, 2020). Moreover, Swan and Kendall (2016) articulated that there has been a need to have more outcome research focusing on the positive factors such as positive functioning. It shows that there is a research gap. Based on this, Hypothesis 1 (H1) in this study was: adolescents' perceived causes of anxiety will negatively predict their SEL outcomes.

On the basis of the above, since perceived causes of anxiety is negatively associated with SEL outcomes, and the ER strategies play a buffering/moderator role in that link, the ER strategies and the interactions between ER strategies and perceived causes of anxiety matter in adolescents' SEL outcomes.

In ER strategies, the extensive research has indicated that PCER is critical to positive SEL-related outcomes (e.g., Bar-On, 2007; Buckley & Saarni, 2009). The greater use of

cognitive reappraisal, which is the most common representative of PCER, is positively linked to life satisfaction (Ng, 2018), well-being (Verzeletti et al., 2016), and adaptive psychological outcomes (Tibubos et al., 2018). Sanchis-Sanchis et al. (2020) also found that adolescents were inclined to use adaptive ER strategies. Notably, in terms of PCER in this study, six out of ten items were measured about the concept of cognitive reappraisal. Hence, research of cognitive reappraisal was referred to address the idea of PCER in this study. In the present study, Hypothesis 2 (H2) was: adolescents' PCER will positively predict their SEL outcomes.

On the other hand, there are evidences showing that adolescents are likely to use MER, including avoidance, suppression, and rumination (J. Ö. Schäfer et al., 2017; Zimmer-Gembeck & Skinner, 2011), which was found associated with psychosocial detrimental outcomes (Grynberg & López-Pérez, 2018; J. Ö. Schäfer et al., 2017), such as maladaptive social functioning (Jacob et al., 2014), less life satisfaction (Ng, 2018), less well-being (Verzeletti et al., 2016), depression (Boden & Thompson, 2015), and maladaptive psychological outcomes (Tibubos et al., 2018). Therefore, Hypothesis 3 (H3) was: adolescents' MER will negatively predict their SEL outcomes.

Despite the above, interestingly, MER was found also adoptable for people to temporally deal with the extreme stress in specific contexts (Dixon-Gordon et al., 2015; Macklem, 2008; McRae & Gross, 2020; Roth & Cohen, 1986; Swerdlow et al., 2020). For example, studies indicate that although distraction is maladaptive in the long run, it can provide short-term relief with minimal effort. Conversely, reappraisal is adaptive in the long run, and it is effective in the conditions with low-intensity stress. But reappraisal becomes effortful in the conditions with high-intensity stress (Rammensee et al., 2023; Sheppes & Gross, 2012; Tan et al., 2023). Additionally, Jiang et al. (2022) revealed when perceiving high stress level, the buffering effect of reappraisal decreased for girls, and the short-term protective function of suppression appeared for boys. Similarly, Nardelli et al. (2023) found when facing high-emotional intensity contexts, people tended to use disengagement, categorized as MER; by contrast, when facing low-emotional intensity contexts, they tended to use engagement, categorized as PCER.

In brief, prior studies reveal that PCER such as reappraisal, which results in the prolonged well-being, is relatively appropriate for handling the less intense stressors. MER such as suppression, which negatively links to the prolonged well-being, may be more tolerable for people to effectively ease the more intense stressors to get the immediate mental relief (Dixon-Gordon et al., 2015; Hermann et al., 2017; Matthews et al., 2022; McRae & Gross, 2020; Sheppes, 2014; Sheppes & Gross, 2012; Sheppes et al., 2011; Swerdlow et al., 2020). It

reflects that in the contexts with high perceived anxiety, people may choose MER over PCER to deal with the intense stressors, so as to get the short-term instead of the long-term socioemotional comfort.

When it comes to the long-term SEL outcomes, the use of PCER is definitely the better choice than MER (Sheppes & Gross, 2012). Both PCER and MER have their pros and cons in moderating the link of perceived anxiety and SEL-related outcomes (Ng & Seibyl, 2024; Sheppes, 2020). There are some conditions that PCER may have costs and MER may have benefits for coping with perceived stress relating to SEL-related outcomes (Sheppes, 2020; Sheppes & Gross, 2012). Indeed, Ng and Seibyl (2024) articulated that reappraisal was helpful in situations influenced by subjective perceptions. But it required a lot of brain power and could be counterproductive in situations that should be changed. They also proposed that rumination could magnify the unpleasant emotions. But it could be beneficial when the focus was constructive and short term.

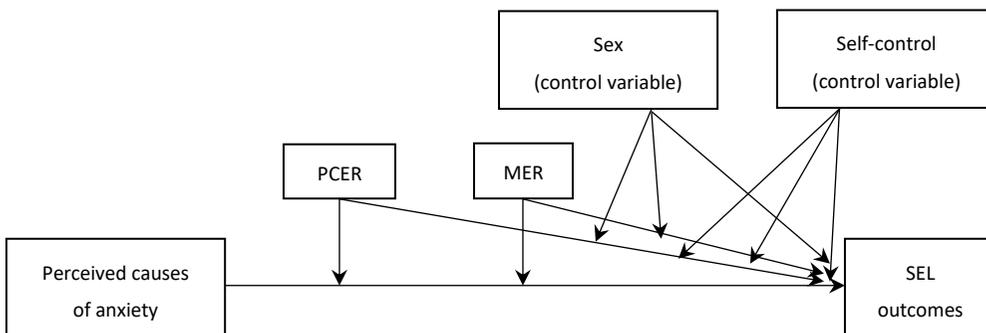
In the present study, participants' SEL outcomes were assessed by asking their current and/or recent social and emotional states. That is, SEL outcomes measured in this study was more like the short-term. Based on this premise, regarding the negative association between perceived causes of anxiety and SEL outcomes hypothesized in H1, given the intense perception of many causes of anxiety may not be effectively regulated by PCER and may be managed, to some extent, by MER to tentatively reduce the immediate stress (McRae & Gross, 2020; Roth & Cohen, 1986; Sheppes, 2020; Sheppes et al., 2011), Hypothesis 4 (H4) was: the greater use of PCER will intensify the negative association between adolescents' perceived causes of anxiety and SEL outcomes; and Hypothesis 5 (H5) was: the less use of MER will intensify the negative association between adolescents' perceived causes of anxiety and SEL outcomes. In other words, as long as adolescents perceived many causes of anxiety, the more use of PCER may be costly for the successful coping (Ford & Troy, 2019) as the confronting attitudes toward tricky stressors may trigger increased distress (Roth & Cohen, 1986; Sheppes, 2020), and result in more negative SEL outcomes at that time. Instead, in such condition, adolescents' more use of MER may benefit from the temporary stress reduction in response to the perceived overwhelming anxious stimuli (Roth & Cohen, 1986; Sheppes, 2020; Sheppes & Gross, 2012).

To most strongly test the predictions of PCER, MER, and perceived causes of anxiety to SEL outcomes, this study also controlled individual differences (sex, self-control) that may be related to SEL outcomes. Sex is associated with people's SEL outcomes, with girls having more emotion expression (Kring & Gordon, 1998) and empathy in peer relations (Endresen

& Olweus, 2001) than do boys. In addition, self-control is positively predictive of SEL outcomes (Elias et al., 2007; Halle & Darling-Churchill, 2016; Macklem, 2008). After all, it is related to the self-management competence in the SEL framework (CASEL, 2020). Self-control is also similar to but differ from the construct of ER (Halle & Darling-Churchill, 2016; Wenzel et al., 2024). The former emphasizes resisting the pleasurable desire; the latter aims to reach the hedonic goals (Wenzel et al., 2024). The increased use of ER was found to lead to increased self-control failures. This showed that there was a partial incompatibility between self-control and prohedonic ER (Wenzel et al., 2024).

Collectively, in addition to investigating the predictions of adolescents’ PCER, MER, and perceived causes of anxiety to their SEL outcomes, this study mainly aimed to examine how PCER and MER moderated the association between adolescents’ perceived causes of anxiety and SEL outcomes. This study expands on the previous literature to shed light on the mechanism behind Taiwanese adolescents’ different types of ER, perceived causes of anxiety, and SEL outcomes. Figure 1 is the conceptual diagram for the present study.

Figure 1: The Conceptual Diagram for this Study



Methods

Participants

Convenience sampling was adopted for the recruitment in this study. Regarding the pilot study for the developments of the three scales, 432 municipal junior high school students (47% girls; 48% 7th graders, 25% 8th graders, 27% 9th graders) were recruited in southern Taiwan in Spring 2021. Afterwards, in the formal test of this study, 1,588 municipal junior high school students (48% girls; 34% 7th graders, 56% 8th graders, 10% 9th graders) were recruited from northern, middle, and southern Taiwan in Fall 2021.

Procedure

In terms of the research ethics approval, the proposal of this study was reviewed by the Committee in the Office of Research and Development at a university in southern Taiwan. This study got the research grant from the above university.

Regarding the assessments developed in this study, based on limited relevant literature and the consideration of potential cultural differences, Adolescents' Perceived Causes of Anxiety Scale, Adolescents' Emotion Regulation Strategies Scale, and Adolescents' Social and Emotional Learning Outcomes Scale were generated in the current study. First, three experts in the field of educational psychology were invited to check the expert validity of each scale. The scales were then revised in accordance with the experts' feedback. Next, a pilot study was conducted. According to the results of the pilot study with item analysis, exploratory factor analysis (EFA), and internal consistency reliability test, the three scales were modified to form the finalized scales for the formal test.

In light of the recruitment, the sample for both the pilot study and the formal test was recruited through class announcement by the municipal junior high school teachers who helped data collection for this study. Basically, in the class announcement for data collection, participants were given an introduction of this study (e.g., the purpose and procedure of this study). It was emphasized in the introduction that the participation to this study was totally voluntary and anonymous. Participants could stop participating in the surveys anytime if they felt uncomfortable during the process of data collection. The data of this study were collected within the classroom.

Additionally, in the analyses of this study, the missing data were handled with pairwise deletion. The advantage of this method is that the researcher can use more of the data. The samples were deleted only when the missing data existed in the variables that needed to be analyzed (H. L. Wang et al., 2012).

Measures

Adolescents' Perceived Causes of Anxiety Scale (APCAS)

To explore Taiwanese adolescents' perceived causes of anxiety, built on prior research findings of Chinese adolescents' stressors (e.g., Chang & Chang, 2010; Student Health Service, Department of Health, 2022), APCAS was developed for this study. Participants rated the degree to which they agreed with each item (e.g., "I am anxious about my future.") on a

five-point scale (1 “totally disagree” to 5 “totally agree”). A mean score of all items is created with higher scores indicative of more self-perceived causes of anxiety.

With pilot study, item analysis revealed that the item-total correlation of each item was larger than .36 ($p < .01$) so that all items were retained (Wu & Tu, 2014). Then, EFA suggested a four-factor solution. As shown in Table 1, factor loadings larger than .50 were retained, resulting in 15 items finally. The four factors explained 19.21% (“family relations”), 16.65% (“individual development and orientation”), 16.17% (“school adjustments”), and 12.07% (“adversities in family life”) of the variance respectively. The four factors cumulatively explained 64.09% of the variance.

Table 1: EFA of APCAS

Item number	Factor loading	Factor/Subscale
15	.87	Family relations
13	.86	
5	.71	
1	.56	
3	.82	Individual development and orientation
4	.78	
8	.76	
2	.50	
12	.88	School adjustments
7	.86	
14	.60	
10	.52	
11	.80	Adversities in family life
9	.67	
6	.61	

In addition, although the development of APCAS was an exploratory process to investigate Taiwanese adolescents’ perceived causes of anxiety, with data collected in the formal test, confirmatory factor analysis (CFA) of this scale was conducted as well. The indices of goodness of fit showed that $\chi^2(87) = 1503.268$, RMSEA = .106, CFI = .856, SRMR = .088.

In the formal test, Cronbach’s alpha was .89 for APCAS, .81 for the “family relations” subscale, .83 for the “individual development and orientation” subscale, .79 for the “school adjustments” subscale, and .67 for the “adversities in family life” subscale.

Adolescents' Emotion Regulation Strategies Scale (AERSS)

To assess Taiwanese adolescents' use of ER strategies in Chinese culture, based on a meta-analysis of adolescents' frequently used ER strategies (J. Ö. Schäfer et al., 2017), AERSS was generated for this study. Participants were asked to indicate the degree to which they agreed with each item (e.g., "When I am helpless, I seek advice from friends.") on a five-point scale (1 "totally disagree" to 5 "totally agree"). A mean score of all items is created with higher scores indicative of higher frequencies of using ER strategies.

First, with pilot study, item analysis showed the item-total correlations of all items were larger than .30 ($p < .01$) except for two items which were deleted afterwards (Wu & Tu, 2014). Next, EFA suggested a four-factor solution. As shown in Table 2, factor loadings

Table 2: EFA of AERSS

Item number	Factor loading	Factor/Subscale
6	.83	Positive coping
10	.82	
17	.80	
15	.79	
20	.78	
4	.70	
1	.69	
11	.65	
2	.63	
16	.60	Suppression
3	.77	
19	.74	
22	.73	
8	.72	
13	.70	
5	.67	Avoidance
21	.81	
18	.79	
7	.68	
12	.58	Rumination
14	.72	
9	.71	
23	.52	

larger than .50 were retained, resulting in 23 items finally. The four factors explained 25.13% (“positive coping”), 15.10% (“suppression”), 10.11% (“avoidance”), and 7.56% (“rumination”) of the variance respectively. The four factors cumulatively explained 57.89% of the variance. However, in the present study, to better identify the patterns of ER strategies in the analyses, “positive coping” subscale was named “PCER.” “Suppression,” “avoidance,” and “rumination” subscales, which belonged to the domain of maladaptive ER, were combined as “MER.”

Furthermore, although the development of AERSS aimed to explore how Taiwanese adolescents used ER strategies in Chinese culture, CFA with data collected in the formal test was also conducted. The indices of goodness of fit showed that $\chi^2(224) = 1948.376$, RMSEA = .074, CFI = .894, SRMR = .080.

In the formal test, Cronbach’s alpha was .87 for AERSS, .91 for the “positive coping” subscale (PCER), .88 for the “suppression” subscale, .76 for the “avoidance” subscale, .59 for the “rumination” subscale, and .85 for the combined MER.

Adolescents’ Social and Emotional Learning Outcomes Scale (ASELOS)

Prior research has indicated that there might be cultural differences in SEL (Collie et al., 2017; Ferreira et al., 2020; Mahfouz & Anthony-Stevens, 2020). Thus, referring to the SEL framework (CASEL, 2020), ASELOS was developed for this study to investigate the composite of Taiwanese adolescents’ SEL outcomes. Participants rated the degree to which they agreed with each item (e.g., “When I am angry, I am aware of my anger.”) on a five-point scale (1 “totally disagree” to 5 “totally agree”). A mean score of all items is created with higher scores indicative of more positive SEL outcomes. Basically, the SEL outcomes measured in this study tended to be participants’ short-term socioemotional adjustments as they were asked to report their current and/or recent social and emotional states.

With pilot study, item analysis indicated that the item-total correlation of all items was larger than .40 ($p < .01$), thereby all items were retained (Wu & Tu, 2014). Then, EFA suggested a five-factor structure. As shown in Table 3, factor loadings larger than .40 were retained, resulting in 28 items finally. The five factors explained 15.86% (“self-emotion awareness”), 14.24% (“relationship skills”), 13.59% (“self-emotion management”), 10.99% (“empathy and respect”), and 9.85% (“self-efficacy”) of the variance respectively. The five factors cumulatively explained 64.54% of the variance.

Table 3: EFA of ASELOS

Item number	Factor loading	Factor/Subscale
15	.75	Self-emotion awareness
9	.74	
6	.71	
3	.71	
12	.70	
18	.70	
1	.69	
5	.84	Relationship skills
14	.80	
11	.75	
8	.74	
21	.58	
2	.55	
17	.53	
19	.77	Self-emotion management
13	.69	
7	.68	
4	.66	
10	.65	
16	.58	
23	.80	Empathy and respect
24	.75	
26	.64	
20	.60	
28	.82	Self-efficacy
27	.79	
25	.72	
22	.49	

What is more, although the generation of ASELOS aimed to explore the composite of SEL outcomes in Taiwanese adolescents, CFA with data collected in the formal test was conducted as well. The indices of goodness of fit showed that $\chi^2(344) = 4668.705$, RMSEA = .096, CFI = .846, SRMR = .064.

In the formal test, Cronbach's alpha was .95 for the ASELOS, .91 for the "self-emotion awareness" subscale, .90 for the "relationship skills" subscale, .88 for the "self-emotion management" subscale, .86 for the "empathy and respect" subscale, and .86 for the "self-efficacy" subscale.

Self-control Scale

To measure participant's self-control, the Chinese Brief Self-control Scale with 13 items in Unger et al. (2016), which was based on the short version of the original Self-control Scale (Tangney et al., 2004), was adopted in this study. Participants rated the degree to which they agreed with each item (e.g., "I refuse things that are bad for me.") on a five-point scale (1 "totally disagree" to 5 "totally agree"). A mean score of all items is created with higher scores indicative of more self-control. Cronbach's alpha was .76 for the self-control scale used in this study.

Statistical Analyses

In the statistical analyses of this study, first, preliminary analyses were performed with SPSS. Next, the examinations of H1 to H5 of this study were conducted with R software. In the regression with moderation model of this study, sex was dummy coded (boys: 0, girls: 1) in the analyses. To avoid multicollinearity, all continuous independent variables were mean-centered prior to analyses (Williams, 2015, 2021). To get an overarching picture of the relations among variables in the present study, in addition to the moderation effects which were aimed to be examined in this study (PCER and perceived causes of anxiety, MER and perceived causes of anxiety), other potential interaction effects between control variables and PCER as well as MER were also included in this model. The regression with moderation model is as follows:

$$E(\text{SEL}) = \alpha + \beta_1 (\text{perceived causes of anxiety})_c + \beta_2 (\text{PCER})_c + \beta_3 (\text{MER})_c + \beta_4 (\text{Sex}) + \beta_5 (\text{self-control})_c + \beta_6 (\text{Sex}) (\text{PCER})_c + \beta_7 (\text{self-control})_c (\text{PCER})_c + \beta_8 (\text{Sex}) (\text{MER})_c + \beta_9 (\text{self-control})_c (\text{MER})_c + \beta_{10} (\text{perceived causes of anxiety})_c (\text{PCER})_c + \beta_{11} (\text{perceived causes of anxiety})_c (\text{MER})_c + \varepsilon$$

Results

Preliminary Analyses

In terms of the means and standard deviations (*SD*) of the main variables in this study, the mean of participants' perceived causes of anxiety was 2.41 (*SD* = 0.76), PCER was 3.20 (*SD* = 0.80), MER was 3.07 (*SD* = 0.69), SEL outcomes was 3.65 (*SD* = 0.70), and self-control was 3.01 (*SD* = 0.59). Pearson correlations of all variables in this study are shown in Table 4.

Table 4: Pearson Correlations of All Variables

Variable	AN	PCER	MER	SEL outcomes	CON
AN	1				
PCER	-.17**	1			
MER	.36**	.17**	1		
SEL outcomes	-.24**	.63**	.16**	1	
CON	-.39**	.26**	-.17**	.28**	1

** $p < .01$

Note: AN = perceived causes of anxiety; PCER = positive coping emotion regulation strategies; MER = maladaptive emotion regulation strategies; SEL outcomes = social and emotional learning outcomes; CON = self-control

It was indicated that boys used more PCER ($F = 9.05, p < .01$) than girls, whereas girls used more MER ($F = 18.93, p < .001$) than boys. There were no significant sex differences in participants' perceived causes of anxiety ($F = 3.09, p = .079$), SEL outcomes ($F = 0.32, p = .572$), and self-control ($F = 1.65, p = .199$).

The preliminary analyses also revealed that 9th graders perceived more causes of anxiety ($F = 7.61, p < .01$) and used more MER ($F = 5.60, p < .01$) than 7th and 8th graders. There were no significant grade differences in participants' PCER ($F = 1.54, p = .215$), SEL outcomes ($F = 2.10, p = .123$), and self-control ($F = 2.88, p = .057$).

Testing the Hypotheses of This Study

As shown in Table 5, in this model, the intercept represented that the predicted value of SEL outcomes for boys (the reference group) with averaged perceived causes of anxiety, PCER, MER, and self-control was 3.60. Regarding the main effects, consistent with H1 and H2, adolescents' perceived causes of anxiety negatively predicted SEL outcomes ($\beta_1 = -.14, p < .001$). Adolescents' PCER positively predicted SEL outcomes ($\beta_2 = .47, p < .001$). Yet, contrary to H3, adolescents' MER was found positively predictive of SEL outcomes ($\beta_3 = .15, p < .001$). Each of these main effects existed above and beyond individual's sex and self-control. The results also showed adolescents with more self-control gained more SEL outcomes ($\beta_5 = .11, p < .001$).

Table 5: Regression With Moderation Model for SEL Outcomes as the Dependent Variable

Independent variable	β	SE	t value	Multicollinearity test	
				Tolerance	VIF
Intercept (β_0)	3.60	.02	183.86***		
AN _c (β_1)	-.14	.02	-6.66***	.739	1.353
PCER _c (β_2)	.47	.03	18.60***	.853	1.173
MER _c (β_3)	.15	.03	5.24***	.791	1.265
Sex (β_4)	.05	.03	1.94	.973	1.028
CON _c (β_5)	.11	.03	4.06***	.800	1.249
Sex \times PCER _c (β_6)	-.00	.03	-.03		
CON _c \times PCER _c (β_7)	.07	.03	2.78**		
Sex \times MER _c (β_8)	-.05	.04	-1.12		
CON _c \times MER _c (β_9)	-.01	.03	-.17		
AN _c \times PCER _c (β_{10})	-.05	.02	-1.98*		
AN _c \times MER _c (β_{11})	.07	.03	2.77**		

* $p < .05$, ** $p < .01$, *** $p < .001$

Note: (a) AN_c = mean-centered score of perceived causes of anxiety; PCER_c = mean-centered score of positive coping emotion regulation strategies; MER_c = mean-centered score of maladaptive emotion regulation strategies; CON_c = mean-centered score of self-control

(b) The absolute value of the t value of each variable shows the relative importance of the independent variables in this model.

(c) β_6 was $-.001$. After rounding to 2 decimal places, it showed $-.00$ in the table.

In terms of the moderation effects, as hypothesized in H4, the negative association between perceived causes of anxiety and SEL outcomes was found stronger for those adolescents who used more PCER than those who used less PCER ($\beta_{10} = -.05$, $p < .05$). In support of H5, the negative association between perceived causes of anxiety and SEL outcomes was found stronger for those adolescents who used less MER than those who used more MER ($\beta_{11} = .07$, $p < .01$). Moreover, there was another finding that the PCER–SEL outcomes link was stronger for adolescents with more self-control ($\beta_7 = .07$, $p < .01$). The interaction effects above were plotted with more (1 *SD* above the mean) and less (-1 *SD* below the mean) values for the continuous independent variables in Figure 2 to 4.

In this model, the prediction of sex ($\beta_4 = .05$, $p = .052$), which was a control variable, to SEL outcomes, was not found. The interaction effects of sex and PCER ($\beta_6 = -.00$, $p = .975$), sex and MER ($\beta_8 = -.05$, $p = .264$), as well as self-control and MER ($\beta_9 = -.01$, $p = .862$) on SEL outcomes, were not found either in this study.

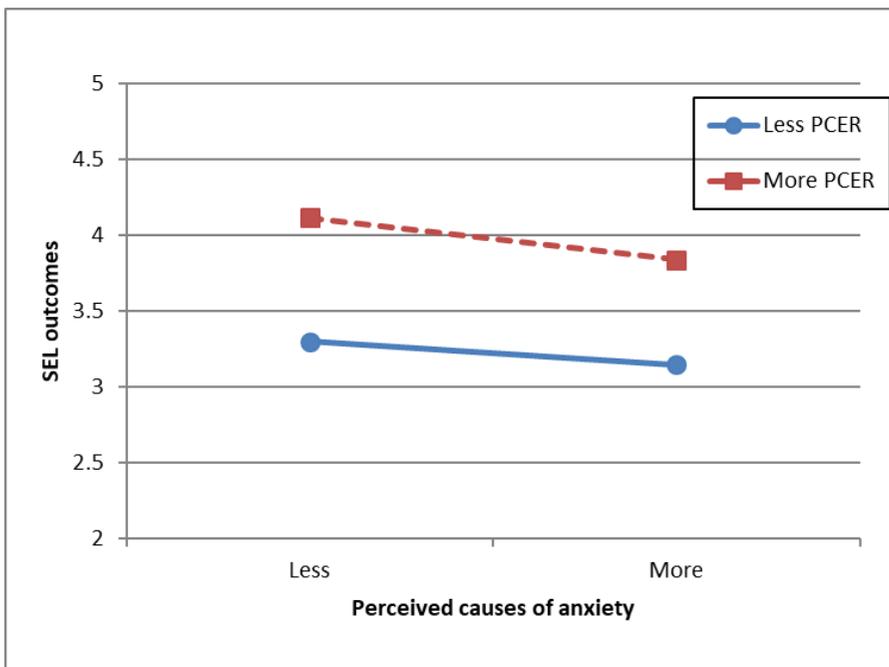
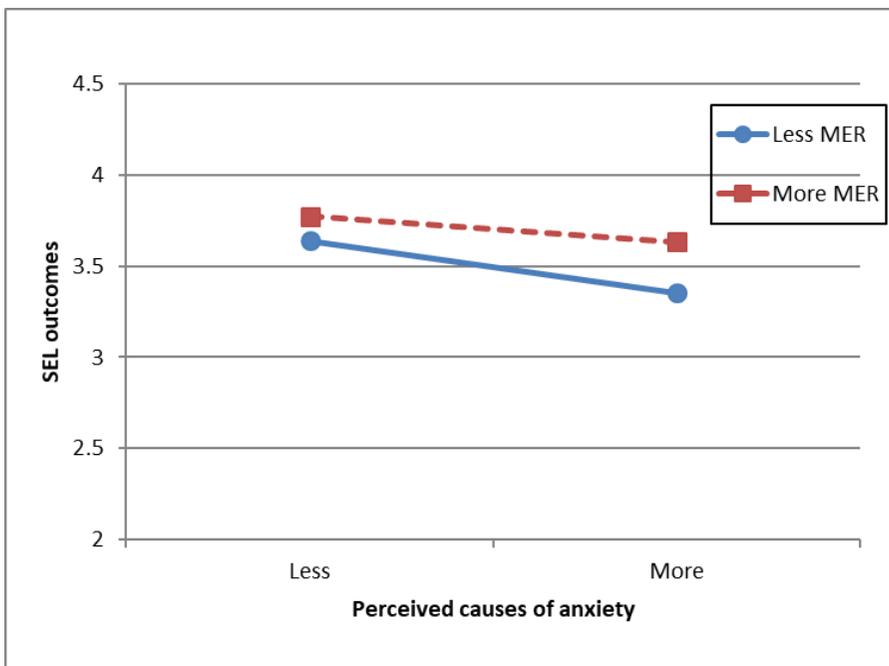
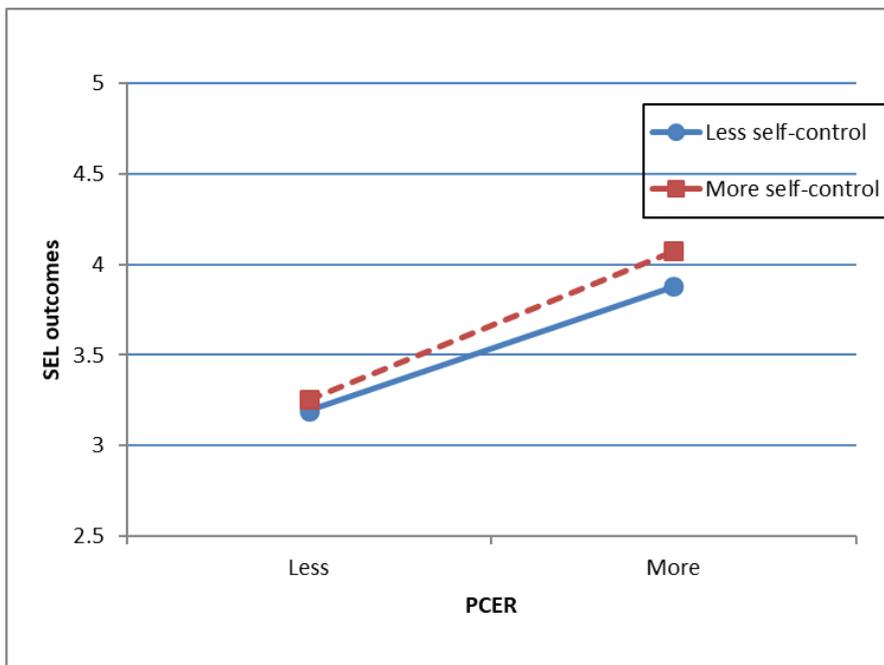
Figure 2: The Interaction Between Perceived Causes of Anxiety and PCER**Figure 3: The Interaction Between Perceived Causes of Anxiety and MER**

Figure 4: The Interaction Between PCER and Self-control

Discussion

The preliminary analyses showed boys tended to use PCER whereas girls tended to use MER. This result somehow mirrored previous research findings that girls tended to use only maladaptive emotion-focused coping, while boys tended to use both adaptive and maladaptive emotion-focused coping (Brougham et al., 2009). Similarly, Sanchis-Sanchis et al. (2020) found teen girls had higher scores than teen boys in the maladaptive strategy of rumination. The potential implication of this preliminary research result may be that more training of various and adaptive ER strategies for adolescents is needed. This study also revealed that 9th graders perceived more causes of anxiety and used more MER than the juniors. This finding reflected the fact that compared to Taiwanese 7th and 8th graders, 9th graders generally perceive more stressors during the preparation for the “Comprehensive Assessment Program for Junior High School Students” in Taiwan. Meanwhile, to ease the academic pressure, 9th graders, as compared to the juniors, were more likely to use MER to momentarily avoid or suppress the perceived academic anxiety (McRae & Gross, 2020; Swerdlow et al., 2020).

In light of the hypotheses in this study, understandably, adolescents' SEL outcomes decreased when they perceived many causes of anxiety, including issues of individual development, family events, and school adjustments. It reflected the general claim that people's anxiety is vulnerable to various poor psychosocial outcomes (Mc Elroy & Hevey, 2014; Ng et al., 2018; Sun et al., 2018; Swan & Kendall, 2016; Wahed & Hassan, 2017). This study, along with existing research about adaptive/engagement ER strategies and the social-emotional consequences (e.g., Awad et al., 2022; Bell & Calkins, 2000; J. Ö. Schäfer et al., 2017), indicated that adolescents' PCER positively predicted their SEL outcomes. Unexpectedly, in this study, MER was also found to positively predict their SEL outcomes. One possible reason for this result is that although MER was found harmful for adolescents' psychosocial adjustments in previous studies (e.g., J. Ö. Schäfer et al., 2017; Silk et al., 2003), sometimes it was still a way to manage people's bad moods provisionally. In the situation with high-intensity emotional experiences, suppression, avoidance or rumination, which belonged to MER, may help people ease the pressure in the short term (Dixon-Gordon et al., 2015; Ford & Troy, 2019; Hermann et al., 2017; Matthews et al., 2022; McRae & Gross, 2020; Roth & Cohen, 1986; Sheppes, 2020; Sheppes et al., 2011). This showed the uncertain essence and functions of MER.

Furthermore, culture influences the use of ER (Awad et al., 2022; Sheppes & Gross, 2012). Deng et al. (2017) articulated that some MER may be positively valued by Chinese adolescents in the Chinese context. They indicated that Chinese adolescents tended to suppress own emotions and control emotion expression. Chinese adolescents were found to have less negative emotional experiences when suppressing or constraining their emotions. Ng (2018) also found that suppression did not result in psychopathology in Eastern cultures because emotional control and restraint were emphasized in cultures with collectivism. In this way, MER may not negatively relate to people's SEL outcomes. In some social contexts, MER may serve adaptive functions in particular stressful situations (Deng et al., 2017; Macklem, 2008; A. Schäfer et al., 2020). Compared to Westerners, Asians focus more on maintaining interpersonal harmony (Heine, 2001; Matsumoto et al., 2008). Therefore, when people from Asian cultural contexts experience negative emotions, they may tend to suppress their negative emotions to show conformity in groups (Triandis, 1989). In this case, through the lens of social level, suppression, which is a prevalent MER in Western culture, may not be quite maladaptive for Asians.

When it comes to the moderation effects, consistent with expectations, with many perceived causes of anxiety, adolescents who used more PCER, as compared to those who

used less PCER, had more negative SEL outcomes as PCER was costly to handle the highly anxious situation at that instant (Sheppes, 2014; Sheppes, 2020; Sheppes et al., 2011). In fact, PCER (e.g., cognitive reappraisal) was found impacted by different factors, including individual (e.g., the importance of the anxious stimuli to individuals, skills of using PCER) and situational (e.g., the intensity of negative situation) factors (Ford & Troy, 2019). As a result, regarding the moderating effect of PCER on the link between adolescents' perceived causes of anxiety and SEL outcomes in this study, future research may need to further consider how adolescents value their causes of anxiety, their skills of using PCER, the intensity of the negative emotion situation, and the short-term as well as long-term SEL outcomes.

What is more, as expected, with many perceived causes of anxiety, adolescents who used less MER, as compared to those who used more MER, had more negative SEL outcomes since MER such as disengagement, distraction or avoidance, which can block the emotional processing, may be a way to temporally cope with the challenging causes of anxiety to protect people from the overexposure to immediate mental stress (Dixon-Gordon et al., 2015; Ng & Seibyl, 2024; Sheppes, 2014; Sheppes, 2020; Sheppes et al., 2011; Swerdlow et al., 2020).

In addition, there was another finding in this study. The result that the positive association between PCER and SEL outcomes was stronger for adolescents with more self-control versus those with less self-control was not surprising. Frankly speaking, self-control is conceptually linked to the self-management competence in SEL (CASEL, 2020). Consequently, when adolescents utilized more PCER, compared to those with less self-control, the increase of SEL outcomes for those with more self-control was more apparent.

Taken together, the pattern of these moderating roles of PCER and MER findings appears in sync with the prior research addressing the potential costs of adaptive coping, the potential benefits of maladaptive coping, and the subsequent socioemotional consequences (Nardelli et al., 2023; Sheppes, 2020) derived from perceived anxiety. It reflects the interactions of ER strategies and the perception of anxiety contexts matter in people's SEL outcomes (Gross, 2014; Modecki et al., 2017). This may set the stage for future studies to further test the flexible roles of PCER and MER in people's anxiety coping process and SEL outcomes.

Limitations and Future Directions

This study has several limitations. First, to avoid the confounding conceptualization of different kinds of ER, PCER and MER were used respectively in the analyses for this study. However, as noted earlier, there are pros and cons of each ER strategy (Ng & Seibyl, 2024). To optimize the understanding of ER in adolescence, future research may tailor on the

mechanism of the reasons behind adolescents' use of ER strategies (PCER, MER), the perceptions of anxiety, and the short-term as well as long-term SEL outcomes. In the present study, the measured SEL outcomes were more like the short-term consequences, and this study used cross-sectional data. It would be valuable for future researchers to conduct longitudinal studies to trace adolescents' long-term SEL outcomes.

Another limitation is about the findings of this study. In the analyses, despite the moderation effects were significant, the effect sizes of some β coefficients were quite small. The effect sizes of AN_c (β_1), CON_c (β_5), $CON_c \times PCER_c$ (β_7), $AN_c \times PCER_c$ (β_{10}), and $AN_c \times MER_c$ (β_{11}) were .02, .01, .01, .00, and .00 respectively. It showed the research findings reached significant level statistically, but in practical meaning, it revealed limited significance.

There is also a limitation to using self-report questionnaires, which may cause social desirability bias, in this study. Thus, peer-report and teacher-report measures could be supplementary assessments for future studies.

Conclusions

This study was among the first to illustrate how PCER, MER, and perceived causes of anxiety predicted Taiwanese adolescents' SEL outcomes, and examine under what conditions with the use of PCER and MER, the negative association between perceived causes of anxiety and SEL outcomes was stronger. This study expands previous literature about the relationships among ER, perceived anxiety, and the socioemotional adjustments in Taiwanese adolescents.

The present study indicated that adolescents' perceptions of many causes of anxiety negatively predicted their SEL outcomes. Interestingly, adolescents' SEL outcomes could be promoted by utilizing not only PCER, but also MER. Most importantly, this research revealed that the negative prediction of adolescents' perceived causes of anxiety to SEL outcomes was stronger when using more PCER and/or less MER. Bearing these findings in mind, we close with thoughts about implications for the training of diverse ER strategies for adolescents to treat different levels of perceived causes of anxiety, linking to their subsequent SEL outcomes.

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台灣地區青少年情緒調節策略調節其所感知的 焦慮來源與社會情緒學習結果間之關係

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摘要

本研究探討台灣地區青少年情緒調節 (emotion regulation, ER) 策略, 包括正向因應情緒調節策略 (positive coping emotion regulation strategies, PCER)、非適應性情緒調節策略 (maladaptive emotion regulation strategies, MER) 與所感知的焦慮來源, 如何連結至其社會情緒學習 (social and emotional learning, SEL) 結果 (例如: 人際技巧)。特別是, 本研究旨在檢視青少年 ER 策略 (PCER 和 MER) 對其所感知的焦慮來源與 SEL 結果間關係的調節作用。本研究樣本為 1,588 位台灣地區的國中生 (48% 女生)。研究結果顯示, 在控制了性別、自我控制後, 青少年所感知的焦慮來源, 會負向預測其 SEL 結果。採用 PCER 和 MER, 皆會正向預測其 SEL 結果。然而, 研究結果指出, 多用 PCER, 相較於少用 PCER, 會強化了青少年感知到的焦慮來源與其 SEL 結果間的負向關係。此外, 少用 MER, 相較於多用 MER, 會強化了青少年所感知的焦慮來源與其 SEL 結果間的負向關係。綜言之, 基於研究發現, 本研究建議培養青少年的 ER 策略時, 宜考量他們所感知焦慮來源的程度差異與個人 SEL 結果的相關。

關鍵詞: 青少年; 情緒調節策略; 所感知的焦慮來源; 社會情緒學習結果

