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ARTICLE

Hope and Academic Procrastination in Adolescents: A Moderated Mediation Model

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ABSTRACT

Academic procrastination among adolescents is an increasingly prominent problem. It is important to look for influences behind academic procrastination in the adolescent population. The present study aimed to reveal the explanatory mechanisms underlying the association between hope and academic procrastination behaviors among Chinese adolescents by testing the mediating role of attentional control and the moderating role of trait mindfulness. Participants in the current study were 1156 Chinese adolescents who completed self-report questionnaires on hope, attentional control, academic procrastination, and trait mindfulness. The results indicated that adolescent hope was negatively related to academic procrastination and that attentional control partially mediated this association. In addition, trait mindfulness moderated the direct association between hope and academic procrastination in the mediated model. In conclusion, identifying the mechanisms by which hope is associated with academic procrastination in adolescent populations is of potential value for the prevention of and intervention in this undesirable study habit.

KEYWORDS

Academic procrastination; hope; trait mindfulness; attentional control

1 Introduction

Procrastination is a complex psychological problem that has cognitive, emotional, and behavioral components. It is defined as the voluntary delay of an intended act despite the awareness that this needless delay will be detrimental in the long term [1]. Academic procrastination is a form of procrastination, including failing to perform an activity within the desired time frame or postponing activities one ultimately intends to complete until the last minute [2]. Academic procrastination is prevalent in students' learning activities, with over 40% of adult students exhibiting academic procrastination themselves [3], with some individuals even developing idiosyncratic procrastination [4].

Academic procrastination not only negatively affects the academic achievement of the procrastinator [5,6], but also has negative consequences on their quality of life and mental health during their school life [7]. For example, a study by Balkis et al. [8] showed that academic procrastination was negatively related to academic life satisfaction and academic performance.

In addition, most prior studies on procrastination behaviors were conducted among college students [7,9,10], but academic procrastination is not only highly prevalent in college but also increasingly common among secondary school students. Chinese high school students need to face college entrance exams, which can bring considerable academic pressure. In addition, high school students are in late adolescence, and changes associated with rapid physical development and sexual maturation may cause them to exhibit a high degree of emotional sensitivity and imbalance [11]. Therefore, the negative effects of academic delays on academic performance and the emotional state of high school students may be more serious and need more attention from researchers. Research on the factors and mechanisms of academic procrastination is essential for the prevention of and intervention in this unhealthy and destructive study behavior pattern.

1.1 Hope and Academic Procrastination

For problem solving, hope is both a prerequisite and a coping strategy [12]. Snyder developed a systematic integration of hope-related concepts and developed a well-established and accepted theory of hope [13–15]. Hope is defined as a perceived ability to construct pathways to desired goals and motivate oneself through agency thinking to apply those pathways [15]. Based on the above definition, hope can be divided into two components: pathway thinking and agency thinking. Path thinking is the cognitive component of hope, which refers to the specific pathways and methods to accomplish the goal. Agency thinking is the motivational component of hope, which refers to the perceived ability to achieve the desired goal through an existing path.

Numerous studies have explored the importance of hope for educational research and practice. Higher levels of student hope were found to be associated with higher school achievement levels. This result was validated in cross-cultural studies [16,17]. Researchers also found an association between hope and academic procrastination. For instance, a study by Alexander et al. [18] found that both factors of hope negatively predicted academic procrastination caused by fear of failure. Considering hope as a positive achievement emotion, Gadosey et al. [19] also found that lower levels of state hope were associated with state procrastination. Although a small number of studies have briefly explored the relationship between hope and procrastination, no study has yet further explored the mechanisms underlying the relationship between hope and academic procrastination behavior among adolescents. Therefore, in the current study, we first tested the previous findings on the relationship between hope and academic procrastination in a Chinese adolescent population. In the following, we focused on the role of attentional control in this relationship for further exploration.

1.2 The Mediating Effect of Attention Control

Attention control is a cognitive process that reflects the ability to regulate the allocation of attention, and primarily includes the ability to focus and shift attention [20,21]. It is a key factor influencing the achievement of target behaviors. The higher the attentional control ability, the easier it is for individuals to focus their attention on the target behavior and the less likely they are to develop procrastination behaviors [22]. Self-regulatory executive functioning (S-REF) also states that negative factors can trigger a lack of attentional control, leading to a decrease in individual productivity and ultimately to procrastination behaviors [9,23–25]. Empirical research by Ferine et al. [25] also found that attentional control had a significant, negative predictive effect on procrastination, providing evidence for the S-REF interpretation. Therefore, it is possible that attention control is negatively associated with procrastination in learning situations.

Furthermore, Snyder et al.'s [26] hope theory suggests that individuals with high hope feel more certain about the path to achieve their target and can be more flexible in changing the approach when faced with difficulties, thereby facilitating goal achievement. These characteristics suggest that highly hopeful

individuals may also have higher attention control because they need to focus their attention on the current path and have the flexibility to shift their attention when the path is blocked rather than falling into repetitive thinking. According to Attention Control Theory [24], anxiety impairs the ability to control attention and affects individuals' performance in cognitive tasks. Attentional control is a top-down process, and anxiety causes attentional bias to threatening information possibly by impairing this top-down processing [24,27]. It has been shown that higher hope predicts lower anxiety [28,29], suggesting that hope may also positively affect attentional control by influencing the process of top-down processing of attention. Hopeful individuals believe they are capable of coping with their problems and envisioning a positive future [15], which may help they modify their attention to threatening information and thus improve their attentional control. Thus, hope may positively predict an individual's ability to control attention.

Considering the positive association between hope and attentional control and the negative association between attentional control and academic procrastination, the present study hypothesized that hope may have an indirect association with academic procrastination through the mediating role of attentional control (H2).

1.3 The Moderating Effect of Trait Mindfulness

In the theoretical framework of hope, the concept of "false hope" has attracted our attention. "False hope" represents an inappropriate hope that distorts reality [26,30]. The arising of such hope may have a negative impact on the motivation of the individual due to the unattainability of the goal [31]. In a meta-analysis of hope and academic outcomes, Marques et al. [32] also suggested that there may be potential moderating variables between hope and academic-related outcomes that warrant further exploration. Therefore, the present study proposes that trait mindfulness, a protective factor associated with perceived reality, may moderate existing mediating models.

Trait mindfulness is a psychological quality in which individuals purposefully maintain their attention on current internal experiences or external stimuli but make no judgments or evaluations of them [33]. Mindfulness not only plays a protective regulatory role in response to negative events [34] but also has a critical function in the regulation of healthy behaviors [35].

We suggest that trait mindfulness may act as a moderator in the association between hope, attentional control, and academic procrastination. Garland et al.'s [36] clinical study demonstrated that mindfulness played a central role in the cognitive reappraisal of positivity. On this basis, researchers [36] proposed the mindful coping model (MCM). The MCM suggests that when individuals evaluate a specific event as threatening, hurtful, or debilitating beyond their capacity, a decentered adaptive response to stress evaluation in a mindful way, focusing on the dynamic process of awareness rather than the content of awareness, will expand attention and enhance cognitive flexibility. With an expanded metacognitive state, individuals engage in positive cognitive reappraisal of the stressful event, redefining or reframing the stressful event. According to this theory, mindfulness may moderate our assumed mediation model in two ways.

First, MCM proposes that mindfulness helps individuals adopt a decentered response in the face of specific events, which can extend attention and enhance cognitive flexibility. Bishop et al. [37] also suggested that mindfulness requires individuals to observe and attend to the changing present experience, continuously detecting information that emerges internally and externally. As a result, mindfulness can provide a more comprehensive awareness and contribute to a more flexible, adaptive response to events. This capability of mindfulness can enhance the effectiveness of problem-solving path selection, thus helping hopeful individuals to function more efficiently.

Second, the MCM proposes that mindfulness can facilitate positive reappraisal of stressful events by individuals. Positive reappraisals can increase self-control resources, especially in the presence of negative emotions, and the availability of self-control resources can facilitate self-control learning [38].

Thus, individuals with high mindfulness can better control academic procrastination by making a stronger connection between hope and academic behavior through positive reappraisal.

In addition, when goals are not achieved, individuals may fall into recurring thoughts about the content, cause, and outcome of this negative event, i.e., ruminative thinking [39]. Raes et al. [40] found that trait mindfulness was negatively associated with uncontrollable ruminative thinking. They proposed that mindfulness can moderate the relationship between the overall contemplation level and contemplative uncontrollability, preventing ruminations performed in a rational-analytic manner from becoming uncontrollable. Thus, mindfulness can help individuals reserve more attention and cognitive resources for goal accomplishment, thereby enhancing the benefits of hope and attention control in coping with academic procrastination.

Combining the above three points, the current study hypothesized that mindfulness may play a moderating role in the relationship between hope and academic procrastination and attentional control, as both the direct association between hope and procrastination and the association between attentional control and academic procrastination would be moderated by mindfulness (H3). Specifically, we hypothesized that the association between hope and attentional control and the association between attentional control and academic procrastination would be stronger among adolescents high in trait mindfulness.

In summary, this study proposes to construct a mediational model with regulation to examine the relationship between hope and academic procrastination and, on this basis, to examine the mediating role of attentional control and the moderating role of mindfulness.

2 Method

2.1 Subjects

The current research invited 1258 high school students from two schools in Gansu and Xinjiang, China, to participate in the survey in their classes. They were informed that their participation was voluntary and that their privacy was protected. They were also asked to complete the questionnaire independently. There were 577 (45.9%) male and 681 (54.1%) female subjects, and all subjects were between the ages of 13–19 (M = 15.98, SD = 0.971). The purpose of the study was emphasized prior to the survey, and informed consent was provided to all participants and their teachers and parents. After the survey, we offered the participants a lecture on mental health for compensation at the request of the respondents' schools.

2.2 Measures

2.2.1 Academic Procrastination

The Chinese version of the Aitken Procrastination Questionnaire (API) for secondary school students, developed by Aitken et al. [41] and revised by Liu et al. [42], was used to measure the degree of academic procrastination. The scale has 13 items and consists of 2 dimensions: task aversion and fear of failure. Task aversion consists of 7 items (1, 2, 4, 6, 7, 8, 10), which reflect the individual's distaste for the task in academic life and the delay in starting or completing the task. Fear of failure includes 6 reverse-scored items (3, 5, 9, 11, 12, 13), measuring the fear of failure due to delay in learning life. The questionnaire was rated on a five-point Likert-type scale, with "not at all" to "perfect" scoring from 1 to 5. The API had an alpha of 0.84 in the current study. The Cronbach's α for the sub-dimensions of task aversion and fear of failure were 0.83 and 0.69.

2.2.2 Mindfulness

For the measurement of mindfulness, the Chinese version of the Child Adolescent Mindfulness Measure (CAMM) was used. The scale, developed by Greco et al. [43] and translated by Liu et al. [44], is a test of mindfulness disposition specifically for children and adolescents aged 10–17 years. It has fewer questions (contains 10 questions on a scale of 0–4) and is easy for adolescents to understand, fitting into the daily learning and life of children and adolescents. The content includes both awareness and judgment of the

present moment and acceptance of thoughts and feelings. A higher score represents a higher level of mindfulness. The CAMM had an alpha of 0.85 in this study. The Cronbach's α of the awareness and non-judgment dimensions was 0.84, and the alpha of the acceptance dimension was 0.62.

2.2.3 Attention Control

The Attentional Control Scale, developed by Derryberry et al. [21] and adapted by Carriere et al. [20], was used to assess attentional control. The questionnaire consists of 8 items. All items were scored on a five-point scale from 1 to 5, and the scores of all items were reversed and averaged to obtain the attentional control scores of the subjects. The scale contains two dimensions of attentional distraction (item 1,2,3,4, $\alpha = 0.81$) and difficulty in shifting attention (item 5,6,7,8, $\alpha = 0.83$). In present study ACS produced an alpha of 0.87.

2.2.4 Hope

The Children's Hope Scale developed by Snyder et al. [45] was translated and refined by Zhao et al. [46]. There are 6 items, including two dimensions: path thinking (e.g., "I think what I did in the past will help me in the future") and agency thinking (e.g., "There are many ways I can solve a problem when I am in a difficult situation"). The scale uses a 6-point Likert scale (1 "never" to 6 "always") to investigate an individual's (12–16 years old) level of hope, with higher scores indicating higher levels of hope. In this study, the Cronbach's α of the scale was 0.90. The Cronbach's α for the sub-dimensions of path thinking and agency thinking were 0.84 and 0.80.

2.3 Data Analyses

All data analyses were performed using SPSS 25. First, descriptive statistics and correlation analyses were carried out. Then, the moderated mediation model was tested using the SPSS PROCESS macro [47], a procedure that has been widely used to test complex models (e.g., [9]).

3 Results

3.1 Common Method Bias

The Harman single factor method was used to test for common method bias. The results showed that there were 30 factors with eigenvalues greater than 1, and the variance explained by the first factor was 26.15%, which was less than the 40% threshold, indicating that there was no serious common method bias in this study.

3.2 Descriptive Statistics and Correlation Coefficients

The descriptive statistics and correlation matrix are shown in Table 1. Hope was positively correlated with attentional control ($r = 0.44$, $p < 0.001$) and trait mindfulness ($r = 0.42$, $p < 0.001$) and negatively correlated with academic procrastination ($r = -0.53$, $p < 0.001$). Attentional control was negatively associated with academic procrastination ($r = -0.53$, $p < 0.001$) and positively associated with trait mindfulness ($r = 0.56$, $p < 0.001$). Trait mindfulness was negatively correlated with academic procrastination ($r = -0.49$, $p < 0.001$).

3.3 Testing the Mediation Model

The mediation model was assessed using Model 4 in the SPSS macro developed by Hayes [47]. As shown in Table 2, the results indicate that adolescent hope was significantly and positively associated with academic procrastination ($\beta = -0.76$, $p < 0.001$). The direct path remained significant after including attentional control as a mediating factor ($\beta = -0.52$, $p < 0.001$), indicating that the association between hope and academic procrastination was partially mediated by attentional control.

Table 1: Descriptive statistics and correlations between variables

Variables	1	2	3	4
1. Hope	—			
2. Attention control	0.44***	—		
3. Academic procrastination	−0.53***	−0.53***	—	
4. Mindfulness	0.42***	0.56***	−0.49***	—
M	32.28	24.14	27.03	23.42
SD	8.17	5.66	6.01	6.61

Note: ***$p < 0.001$.

Table 2: Mediation analysis

Dependent variable	Independent variable	β	SE	*t*	*p*	95% CI	
						Lower	Upper
Total effect							
AP	Hope	−0.76***	0.04	−19.40	<0.001	−0.83	−0.68
Conclude mediative effect							
AC	Hope	0.46***	0.03	15.10	<0.001	0.40	0.52
AP	AC	−0.51***	0.04	−12.40	<0.001	−0.59	−0.43
	Hope	−0.52***	0.04	−12.77	<0.001	−0.60	−0.44

Note: N = 1156. AP, Academic procrastination; AC, Attention control. ***$p < 0.001$.

Furthermore, the upper and lower limits of the bootstrapped 95% confidence intervals for the direct effect of hope on academic procrastination and the mediating effect of attentional control did not contain 0 (see Table 3), indicating that hope was associated with procrastination through the mediating effect of attentional control.

Table 3: Decomposition of total effects, direct effects, and mediating effects

	Estimated effect	95% CI		Ratio to total effect
		Lower	Upper	
Total effect	−0.76[a]	−0.83	−0.68	
Direct effect	−0.52[a]	−0.60	−0.44	79.00%
Indirect effect	−0.24[a]	−0.29	−0.19	21.00%

Note: N = 1156. [a] Empirical 95% confidence interval does not overlap with zero. Bootstrap sample size = 5000. 95% CI confidence interval.

3.4 Testing the Moderated Mediation Model

The moderated mediation model was tested using Model 15 in the SPSS macro developed by Hayes [47]. Model 15 assumes that the latter half of the mediation model and the direct path are moderated, consistent with the hypothesized model in this study. The results (see Table 4) indicated that the interaction of hope with trait mindfulness was a significant predictor of academic procrastination ($\beta = -0.01$, $p = 0.04$), but the interaction of attentional control with trait mindfulness was not a statistically significant predictor of academic procrastination ($\beta = 0.01$, $p = 0.20$). This finding suggests

that trait mindfulness can play a moderating role in the association between hope and academic procrastination but not in the relationship between attentional control and academic procrastination.

Table 4: Conditional process analysis

Dependent variable	Independent variable	β	SE	*t*	*p*	95% CI	
						Lower	Upper
AP	AC	−0.38***	0.05	−8.24	< 0.001	−0.47	−0.29
	Hope	−0.47***	0.04	−11.09	< 0.001	−0.55	−0.38
	Mindfulness	−0.24***	0.04	−6.28	< 0.001	−0.32	−0.17
	AC × Mindfulness	0.01	0.00	1.29	0.20	−0.00	0.02
	Hope × Mindfulness	−0.01*	0.01	−2.07	0.04	−0.02	−0.00

Note: N = 1156. AP, Academic procrastination; AC, Attention control. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

To better understand the moderating role of trait mindfulness, simple slope plots of hope *vs.* academic procrastination behaviors were developed for adolescents with lower (1 standard deviation below the mean) and higher (1 standard deviation above the mean) levels of mindfulness. As shown in Fig. 1, for adolescents with higher levels of trait mindfulness (+1 SD), hope significantly and negatively predicted academic procrastination ($\beta = -0.54$, $p < 0.001$), whereas for adolescents with lower levels of trait mindfulness (−1 SD), the association between hope and academic procrastination was weaker ($\beta = -0.39$, $p < 0.001$).

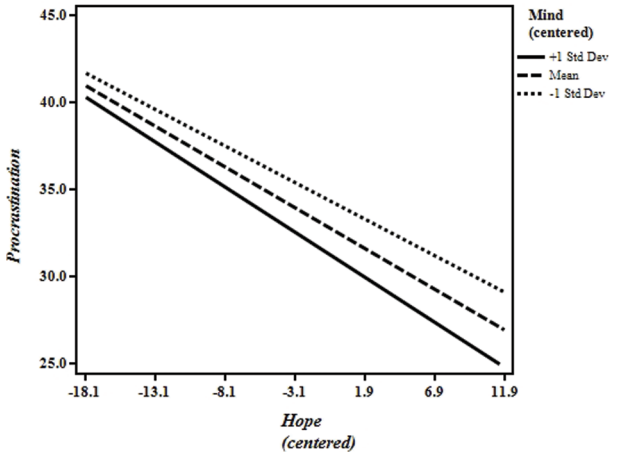

Figure 1: Simple slopes of the interaction effect
Note: N = 1156.

4 Discussion

The present study investigated 1258 high school students from China and found that hope was associated with academic procrastination among Chinese adolescents not only directly but also indirectly through the mediation of attentional control. Furthermore, the direct association of hope with academic procrastination was moderated by trait mindfulness. Specifically, for individuals high in trait mindfulness, the association between hope and academic procrastination was larger than those low in trait mindfulness.

The present study showed that hope was negatively correlated with adolescent academic procrastination, a finding consistent with previous research using a graduate student population as subjects [18]. This result is

also consistent with hope theory [15], which proposes that individuals with high hope have more persistent positive emotions when pursuing goals, whereas those with low expectations are more likely to have uncontrollable negative emotions in the face of difficulties, triggering self-critical rumination that leads to cognitive deviation from the task.

Consistent with our hypothesis, the present study showed that attention control mediates the association between hope and academic procrastination. For the first stage of the mediating process (i.e., the association between hope and attentional control), the findings confirm that individuals with higher levels of hope alone have higher attention control, confirming our hypothesis. This result suggests that hope may influence attention control by a similar mechanism to anxiety (Attention Control Theory) [24], by influencing top-down processing of attention in a positive and controlled manner, thereby enhancing attentional control.

For the second stage of the mediating process (i.e., the association between attentional control and academic procrastination), the results are consistent with self-regulatory executive functioning [48]. This finding suggests that attentional control can help individuals reduce academic procrastination by facilitating changes in maladaptive beliefs related to procrastination and by helping oneself to reduce the consumption of attentional resources due to self-focus, thereby increasing the cognitive resources available for performance and task completion [25]. This result is consistent with previous findings [25,49], further emphasizing the strong link between attentional control and procrastination behavior. Combining these two points, the present study found that hope can inform the mechanisms underlying the link between hope and academic procrastination by promoting individuals' attentional control, and thus, reducing their academic procrastination behaviors.

The present study also found that trait mindfulness moderated the direct association between hope and academic procrastination. Specifically, among adolescents with higher trait mindfulness, the negative association between hope and academic procrastination was larger. In other words, adolescents with higher trait mindfulness were more likely to use hope to reduce their academic procrastination than those with lower mindfulness. Considering the mindful coping model [36], the decentered responses and stronger positive cognitive reappraisal provided by mindfulness can help individuals gain a better perspective and better positive reappraisal skills, thus helping them hope to be more efficient in defining paths and more effectively implemented into action. Moreover, trait mindfulness provides protection against ruminative thinking. Dealing with ruminative thinking in a nonjudgmental, nonevaluative manner prevents it from becoming uncontrollable, thus reducing the cognitive resources it takes up [40].

However, the findings did not confirm the hypothesized moderating effect of trait mindfulness on the relationship between attentional control and procrastination. This finding may be due to the potential influence of trait mindfulness on attentional control. Since one of the fundamental components of mindfulness is being aware of the present moment in a nonjudgmental manner [37,50], mindfulness may be considered an affective factor of attentional control. Researchers have found that subjects' attentional performance and cognitive flexibility during the task were positively correlated with practicing meditation and level of mindfulness [51]. Petranker et al. [52], in their research, again validated with a large sample that trait mindfulness was positively associated with sustained attention accuracy. Thus, mindfulness may positively predict an individual's ability to control attention, which further influences academic procrastination behaviors and leads no regulatory effect to emerge. Furthermore, in the previous section, we predicted that the moderating effect of trait mindfulness on the relationship between attentional control and procrastination arises through a reduction in uncontrollable ruminative thinking, which increases cognitive resources [40]. However, there is also evidence that attentional control also plays an important role on the development of ruminative thinking [53,54], which may lead to a weakening of the moderating effect of trait mindfulness.

The above findings reveal the importance of hope, a positive motivational mindset, in changing academic procrastination and its possible underlying mechanisms, informing interventions for this problem of academic procrastination. The findings suggest that future improvements in academic procrastination may be achieved by enhancing students' hope [55,56] and strengthening students' attentional control. The Making Hope Happen program (MHH) proposed by Pedrotti et al. [57] has been shown to be applicable in secondary school student education systems and to significantly increase student hope [57]. Therefore, the MHH program can be promoted for use as a hope intervention in schools.

In addition, the moderating effect of mindfulness on the relationship between hope and academic procrastination suggests that incorporating mindfulness has implications for correcting poor study habits [58]. Increasing the level of mindfulness in adolescents may be a useful way for future interventions for procrastination. It has been demonstrated that training in mindfulness on campus can provide many benefits to students. Future research could further explore the effects of mindfulness interventions on academic procrastination behaviors in adolescent populations.

4.1 Limitations and Future Directions

In interpreting the results of this study, some limitations need to be discussed. First, the cross-sectional design of this study did not allow for clear evidence of causality. Future studies may use longitudinal studies or experimental programs to improve the research design. Second, the data were self-reported, and the results may be influenced by social expectations and understanding of the questionnaire content. Prospective research should use multiple informants (e.g., evaluations from peers, teachers, and parents) to reduce the impact of self-reported data on the results. Finally, participants were selected from only two high schools in China, limiting the ability to generalize the findings to adolescents in other areas. A cross-cultural sample should be included in further studies to test the generalizability of the current results.

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