The Role of Self-discipline in Predicting Achievement for 10th Graders

Rui Zhao\(^1\)\(^*\) and Yi-Lung Kuo\(^2\)

\(^1\)School of Education, Durham University, Durham, UK
\(^2\)Applied Psychology, Beijing Normal University-Hong Kong Baptist University United International College Zhuhai City, China

ABSTRACT

This study investigated how sub-dimensions of self-discipline (behavioral control, thinking control, and emotional control) in predicting 10th graders’ achievement. A total of 608 10th graders were recruited in this study. Self-discipline was measured by The Middle School Students’ Self-control Ability Questionnaire. Students’ previous academic achievement is assessed by the Senior High School Entrance Examination (SHSEE, known as “Zhongkao”), and the composite scores of a school monthly exam served as the later achievement. Results show a certain amount of mediating effect that behavioral, thinking, and emotional control have in predicting academic achievement. Those sub-dimensions add small, but incremental variance to explain later academic achievement (behavioral \(\Delta R^2 = .023\), thinking control \(\Delta R^2 = .029\), and emotional control \(\Delta R^2 = .009\)).

Keyword: Self-discipline; Academic achievement; Mediating effect

1. Introduction

Self-discipline (also known as self-control) is the ability to continue with a task and suppress distracting responses when approaching a goal. It is not an automatic process, but rather needs conscious effort, which involves the control of individual’s behavior, thinking, and emotion [7, 12, 15]. Self-discipline has been studied for its various roles in different fields. In the vocational aspect, Bakker, Demerouti, and Lieke [2] found that conscientiousness, demonstrated by a high level of self-discipline, interacted with work engagement when predicting work performance. Further, work engagement could significantly improve work performance when individuals have higher conscientiousness. For tackling with adolescent psychosocial assessment, Finkenauer, Engels, and Baumeister [9] argued that self-discipline

\(^*\)Corresponding author: ruizhao2010@gmail.com
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partially mediated the relation between parenting behavior and adolescent emotional and behavioral problems. In educational settings, self-discipline served as a mediator for later academic achievement predicted by demographic and psychosocial factors such as gender and motivation [6, 10], while Duckworth and Seligman [5] found that self-discipline has better predictive power than IQ in predicting later academic achievement.

Although extensive studies have addressed the importance of self-discipline and its relation with academic achievement, there are, still, some gaps among them which could be filled in. First of all, compared to the adolescent population, most self-discipline studies have focused on either young children or college students (e.g., [5, 15]). This research gap also exists in Chinese educational settings where self-discipline is emphasized [11, 15]. Furthermore, the inconsistent findings were found in western and eastern societies. For example, although the role of self-discipline in predicting academic achievement has been widely acknowledged in previous western studies (e.g., [4, 5]), Wang [15] found that self-discipline in Chinese 10th graders is not significantly related to academic achievement, which she recommended that further study should be conducted in order to better figure out the specific reasons.

Further, in mainland China, the 10th grade, representing the beginning of high school, is an essential period for Chinese students, while students may experience the changes of school environment due to the results of Senior High School Entrance Examination (SHSEE, known as “Zhongkao”), which in turn may impact their later academic achievement [15]. Lastly, it is still unclear how sub-dimensions of self-discipline interacts with or mediates prior academic achievement in predicting the later academic achievement, especially in the Chinese middle school population.

Consequently, the purpose of this study was to examine the role of self-discipline in predicting the subsequent academic achievement of 10th graders, especially investigating the sub-dimensions of self-discipline.

Previous research measured self-discipline by using the Impulsivity subscale of the Eysenck 16 Junior Questionnaire where impulsivity was defined as “doing and saying things without thinking”, and using Brief Self-Control Scale, in which the thinking, emotional, and performance control were constructed [6, 7, 13]. Taylor, Kuo, and Sullivan [14] measured self-discipline in terms of its three subscales including impulse inhibition, concentration, and delay of gratification, which are referred as controlling for behaving immediately, fostering focused mind, and avoiding impatience, respectively [14]. Consistent with past studies, in this study, the authors studied self-discipline which is measured by three dimensions: behavioural control, thinking control, and emotional control.

The overall research questions of this study are: (1) Do sub-dimensions of self-discipline, such as behavioral control, thinking control, and emotional control, interact with prior academic achievement in predicting the later achievement of 10th graders, respectively? If not, do they show mediate effects in predicting subsequent academic achievement? (2) Do sub-dimensions of self-discipline provide
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statistically significant increases in variance of academic achievement? Specifically, do behavioral control, thinking control, and emotional control add incremental validity to prior academic achievement in predicting later achievement of 10th graders, respectively?

2. Method

2.1 Participants

A total of 608 10th grade students recruited from a public school in a city of Shandong Province, mainland China were included in this study. The mean age of the participants was 14.5 years (SD = .41). 52% of the total participants were female. Each participant signed a consent form before participating in this study.

2.2 Measures

Self-discipline. Self-discipline is measured by The Middle School Students’ Self-control Ability Questionnaire, a 36-item, 5-point Likert-type items, self-report inventory with the score range of 36 ~ 180 [15]. Higher score refers to stronger ability of self-discipline. The questionnaire measures three dimensions of self-discipline: behavioral control (15 items with score range: 15 ~ 75), thinking control (10 items with score range: 10 ~ 50), and emotional control (11 items with score range: 11 ~ 55). The overall internal reliability of this questionnaire is .92 (Spearman’s Split-half method), and the test-retest reliability is .81 [15].

Academic achievement. Prior academic achievement is measured by the composite score of the SHSEE of 472 10th graders. The SHSEE includes 9 subjects: Chinese (full score = 120), math (full score = 120), English (full score = 120), physics (full score = 100), chemistry (full score = 80), biology (full score = 50), history (full score = 70), geography (full score = 50), and politics (full score = 80). The total score of this exam is 790. Later academic achievement is measured by the composite score of a monthly exam administrated on 12th October, 2013 for 608 10th graders. These scores were obtained from the Office of Academic Affairs in the school. It also contains the 9 subjects, while the total score of the 9 subjects is 1,050. Specifically, as for Chinese, math, and English, full score for each subjects is 150, while for the rest 6 subjects, total score for each is 100.

2.3 Analyses

The raw score of SHSEE ranges from 584 to 730, the ranges of sub-dimensions of self-discipline are: behavioral control (27 ~ 75); thinking control (12 ~ 48); emotional control (17 ~ 51). As Aiken and West [1] recommended, the raw score of SHSEE and sub-dimensions of self-discipline were standardized into z-scores for further analyses.
Before running the multiple regression models to investigate research problems, data is plotted into the scatter plot to inspect the relationship between sub-dimensions of self-discipline and subsequent academic achievement (i.e., behavioral control and monthly test score). Multiple linear regression models were established to test the hypotheses that each sub-dimensions of self-discipline moderates or mediates the effect of prior academic achievement in predicting the later achievement of 10th graders.

Following Baron and Kenny [3], the mediation effect is examined by the process: (1) whether the independent variable significantly predicts the mediator; (2) whether the independent variable significantly predicts the dependent variable; (3) whether the mediator significantly predicts the dependent variable; (4) the relation between IV and DV becomes non-significant (full mediation) or weaker (partial mediation) when mediator is added to the model. Therefore, three models have been established:

\[ Y = cX + e_1 \]  
\[ M = aX + e_2 \]  
\[ Y = c'X + bM + e_3 \]

Where Y represents the later academic achievement, X represents the prior achievement, and M represents the mediators (i.e., behavioral control, thinking control, and emotional control, respectively). The mediation effect could be calculated by the product of estimated regression coefficients, “a” in the equation (1) and “b” in the Equation (2) [8].

To investigate the incremental contribution of behavioral control, thinking control, and emotional control in predicting the later academic achievement. Two models were established:

Model 1  
Let Y = later achievement, X₁ = prior achievement.

\[ Y = \beta_0 + \beta_1X_1 \]

Model 2  
Let Y = later achievement, X₁ = prior achievement, X₂ = sub-dimensions of self-discipline (i.e., behavioral control)

\[ Y = \beta_0 + \beta_1X_1 + \beta_2X_2 \]
The incremental validity of behavioral control, thinking control, and emotional control is the R-square difference between Model 1 and Model 2.

3. Results

3.1 Moderator role of behavioral, thinking, and emotional control

Table 1 indicates that behavioral control, thinking control, and emotional control do not significantly interact with previous academic achievement in predicting the later achievement of 10th graders, respectively; therefore, mediating roles of these three sub-dimensions of self-discipline were investigated for further analyses.

3.2 Mediating role of behavioral, thinking, and emotional control

Figures 1, 2, and 3 indicate that behavioral, thinking, and emotional control mediates the effect of prior academic achievement in predicting the later achievement, and all the sub-dimensions of self-discipline partially mediate the relation between prior and later achievement. For example, the pathway from prior to later achievement showed a strong positive prediction ($\beta = 46.37$, $p < .001$).

Table 1. Relationships between prior and later academic achievement as moderated by behavioral control, thinking control, and emotional control.

<table>
<thead>
<tr>
<th>Model</th>
<th>Constant</th>
<th>Prior</th>
<th>Behavior</th>
<th>Prior × Behavior</th>
<th>Prior</th>
<th>Thinking</th>
<th>Prior × Thinking</th>
<th>Emotion</th>
<th>Prior × Emotion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td>$716.41^{***}$</td>
<td>$44.43^{***}$</td>
<td>$11.25^{***}$</td>
<td>$.55$</td>
<td>$43.41^{***}$</td>
<td>$12.95^{***}$</td>
<td>$-2.87$</td>
<td>$717.77^{***}$</td>
<td>$45.75^{***}$</td>
</tr>
<tr>
<td></td>
<td>$2.39$</td>
<td>$2.44$</td>
<td>$2.45$</td>
<td>$2.41$</td>
<td></td>
<td>$2.43$</td>
<td>$2.48$</td>
<td>$2.48$</td>
<td>$2.39$</td>
</tr>
<tr>
<td></td>
<td>[716.11, 721.12]</td>
<td>[39.65, 49.22]</td>
<td>[6.44, 16.06]</td>
<td>[-4.2, 5.28]</td>
<td></td>
<td>[38.64, 48.18]</td>
<td>[8.09, 17.81]</td>
<td>[-4.90, 4.84]</td>
<td>[713.08, 722.45]</td>
</tr>
</tbody>
</table>

Note: $n = 608$. $\beta =$ unstandardized regression coefficient; SE = standard error; CI = confidence interval; Prior = SHSEE score; Behavior = Behavioral control; Thinking = Thinking control; Emotion = Emotional control.

$p < .01$ (two-tailed). $^{***}p < .001$ (two-tailed).
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Figure 1. Relationships between prior achievement and later achievement mediated by behavioral control.

Note: a, b, c = unstandardized coefficients; $R^2_1$ is the R-square of model $M = aX + e_1$; $R^2_2$ is the R-square of model $Y = c'X + bM + e_3$

* * * $p < .001$ (two-tailed).

Figure 2. Relationships between prior achievement and later achievement mediated by thinking control.

Note: a, b, c = unstandardized coefficients; $R^2_1$ is the R-square of model $M = aX + e_1$; $R^2_2$ is the R-square of model $Y = c'X + bM + e_3$

* * * $p < .001$ (two-tailed).

Achievement and behavioral control also showed a positive relation ($\beta = .16, p < .001$). Positive relation can also be found between behavioral and later achievement ($\beta = 11.27, p < .001$). The mediating effects of behavioral, thinking, and emotional control are 1.80, 2.98 and .65, respectively.

Note: a, b, c = unstandardized coefficients; $R^2_1$ is the R-square of model $M = aX + e_1$; $R^2_2$ is the R-square of model $Y = c'X + bM + e_3$

* * * $p < .001$ (two-tailed).
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3.3 Incremental validity of Behavioral control, thinking control, and emotional control

In Table 2, results show that behavioral control provide statistically significant increases in variance of later academic achievement ($\Delta R^2 = .023$). The incremental contribution of thinking control and emotional control beyond gender and prior achievement can account for 2.9% and .9% of the variance in predicting later achievement, respectively.

4. Discussion

Sub-dimensions of self-discipline were investigated in this study. Results show that students get higher score in later achievement partially because they are more self-disciplined on behavioral, thinking, and emotional aspects. The results of incremental validity show that thinking control provides the greatest statistically significant increases in variance of later academic achievement ($\Delta R^2 = .029$), compared to behavioral ($\Delta R^2 = .023$) and emotional control ($\Delta R^2 = .009$). For the implication in school settings, despite that the importance of academic achievement should be addressed, cultivating students’ self-discipline ability such as thinking control and behavioral control should also be encouraged. Therefore, educator should design the corresponding courses and raising the ability more focus on thinking and behavioral control of self-discipline.

Figure 3. Relationships between prior achievement and later achievement mediated by emotional control.

Note: a, b, c = unstandardized coefficients; $R^2_1$ is the R-square of model $M = aX + e_1$; $R^2_2$ is the R-square of model $Y = c'X + bM + e_3$

$^** p < .01$ (two-tailed). $^{***} p < .001$ (two-tailed).
Acknowledgement

The authors thank reviewers of Chinese American Educational Research and Development Association (CAERDA) for providing suggestions for studying sub-dimensions of self-discipline, Xue-Zhi Hu for assistance in collecting data and materials, and Hong-Jiao Wang for designing the questionnaire.

References


Table 2. Relationships between prior achievement, sub-dimensions of self-discipline, and later academic achievement.

<table>
<thead>
<tr>
<th></th>
<th>Later Achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1</td>
</tr>
<tr>
<td></td>
<td>β (SE) 95% CI</td>
</tr>
<tr>
<td>Constant</td>
<td>717.65***</td>
</tr>
<tr>
<td></td>
<td>(2.40) 722366</td>
</tr>
<tr>
<td>Prior</td>
<td>46.37***</td>
</tr>
<tr>
<td></td>
<td>(2.40) 5108</td>
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<tr>
<td>Behavior</td>
<td>11.27***</td>
</tr>
<tr>
<td></td>
<td>(2.45) 1607</td>
</tr>
<tr>
<td>Thinking</td>
<td>12.95***</td>
</tr>
<tr>
<td></td>
<td>(2.47)</td>
</tr>
<tr>
<td>Emotion</td>
<td>7.22***</td>
</tr>
<tr>
<td></td>
<td>(2.43)</td>
</tr>
<tr>
<td>$R^2(\Delta R^2)$</td>
<td>.442</td>
</tr>
<tr>
<td></td>
<td>(.023)</td>
</tr>
</tbody>
</table>

Note: $n = 608$. $\beta$ = unstandardized regression coefficient; SE = standard error; CI = confidence interval; Prior = SHSEE score; Behavior = Behavioral control. Thinking = Thinking control; Emotion = Emotional control.

" $p < .01$ (two-tailed). *** $p < .001$ (two-tailed).


