

Relationship Between Growth Mindset and Self-Control Amongst Chinese Primary School Students: A Longitudinal Study

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Purpose: Growth mindset and self-control, both recognized as pivotal qualities with significant impacts on personal success, possess respective robust predictive power for academic achievement and broader life outcomes. However, the bidirectional relationship between them remains largely unexplored. This study aims to investigate whether growth mindset, conceptualized as the belief that abilities can be developed through effort and support, prospectively predicts the development of self-control over time. Additionally, it endeavors to explore whether self-control, a crucial positive psychological trait, exerts an influence on the fostering of growth mindset. In summary, our research focuses on elucidating the bidirectional relationship between growth mindset and self-control among Chinese primary school students.

Participants and Methods: The current research recruited a sample of 428 primary school students, aged 9–12, from China (214 females, mean age = 9.64 ± 1.21) to participate in a longitudinal study. Participants underwent two follow-up assessments of growth mindset and self-control over a six-month period.

Results: The correlation analysis revealed significant associations between growth mindset at T1 and self-control at T2, as well as between self-control at T1 and growth mindset at T2 ($r = 0.23$ to 0.25 , $ps < 0.01$). Cross-lagged analysis found that growth mindset at T1 positively predicted self-control at T2 ($\beta = 0.11$, $p = 0.04$), while self-control at T1 did not significantly predict growth mindset at T2.

Conclusion: The results suggest that growth mindset exerts a direct impact on self-control among primary school students. This finding extends the scope of research concerning growth mindset and provides important theoretical inspiration and practical guidance for educators, parents and counselling professionals in assisting students to enhance self-control.

Keywords: primary school students, growth mindset, self-control, longitudinal study, cross-lagged analysis

Introduction

Over the past few decades, research has identified a range of personal characteristics, including self-esteem, self-efficacy, grit, growth mindset, and self-control, which predict students' academic and personal success.^{1,2} Growth mindset and self-control, in particular, have garnered attention from researchers and practitioners alike, due to their recognition of the the substantial predictive prowess these attributes possess for both academic achievement³ and comprehensive life outcomes, transcending the boundaries of the classroom.⁴ When intentionally nurtured and developed, these qualities act as powerful tools that empower students to bounce back from setbacks,⁵ adapt to changing circumstances, and strive for continuous improvement and success.⁶

Growth mindset is defined as the belief that abilities can be developed through effort, along with guidance and support from others.⁷ As a domain-specific concept, previous research has explored growth mindset across different domains. For instance, there is the growth mindset of intelligence, which posits the belief in the development of intellectual ability,⁸ the stress-is-enhancing mindset, which proposes that stress can positively influence performance, health, and wellbeing,⁹ the growth mindset of emotions, which views emotions as malleable and capable of change.^{10,11}

and the growth mindset of mental health, which acknowledges the malleability of anxiety.¹² Additionally, some theories bolster the idea that life meaning can be influenced by growth mindset.¹³ The significant impact of growth mindset in these domains has been demonstrated for both student populations and adults. Although previous research has extensively explored the implications of growth mindset across diverse contexts, its examination within the realm of self-control remains notably limited. Over the past decade, research on the mindset of self-control has predominantly focused on the implicit theory of willpower.¹⁴ This theory underscores the varying beliefs held by individuals regarding their ability of self-control (also called willpower), with some perceiving it as a limited resource (also known as limited resource theory of willpower) and others as a nonlimited resource (or the nonlimited resource theory of willpower).¹⁵ The nonlimited resource theory of willpower, however, overlooks the potential for self-control abilities to evolve and develop over time.¹⁶ In contrast, the growth mindset of self-control emphasizes the malleability of one's abilities, emphasizing that these abilities can be enhanced through intervention. This perspective is more conducive to interventions aimed at bolstering self-control skills. Nevertheless, research on the growth mindset of self-control remains limited, with only one laboratory study conducted among college students demonstrating its impact on individual effort and persistence.¹⁶ Consequently, additional evidence from longitudinal studies is warranted to further clarify this relationship.

While existing limited literature has examined the impact of growth mindset on self-control, relatively little is known whether self-control, as a positive psychological trait, impacts the development of growth mindset. It is important to explore the bidirectional relationship between growth mindset and self-control, which contributes to a deeper understanding of the relationship underlying the development of these crucial psychological attributes. Given the significance of childhood and adolescence in the development of growth mindset and self-control, this study aimed to examine the bidirectional relationship between these constructs among Chinese primary school students.¹⁷

From Growth Mindset to Self-Control

Growth mindset, as defined by Dweck, refers to the implicit belief that abilities are malleable and can be changed substantially,¹⁸ which means that mindset can influence what people aim for and how they pursue it.¹⁹ Implicit theory creates a framework for meaning and that growth mindset plays a crucial role in this "system of meaning", which is considered the starting point.²⁰ Specifically, as a core component of a "meaning system", growth mindset can change the way individuals set goals, attribute failure, perceive effort, and pursue different strategies to overcome difficulties.²¹ Cross-sectional studies have found that growth mindset influences adolescents' learning goals, positive beliefs about effort, causal attributes, and strategies.²² Moreover, laboratory studies have confirmed that growth mindset influences individuals' positive beliefs about effort,²³ and the positive beliefs of effort can modify the allocation of effort, resulting in the willingness to undertake challenging tasks and the perseverance required to complete them, thereby enhancing individual self-control.¹⁶

Additionally, previous research on beliefs about self-control has found that failures in self-control are often due to people's beliefs about their self-control resources, rather than an actual lack of resources,²⁴ which also highlights the significant impact of belief on self-control. Previous studies have found that individuals' belief in self-control can influence their self-control abilities. Laboratory studies have found that individuals adhering to the nonlimited resource theory of willpower maintain high levels of self-control performance, regardless of whether they consume glucose or not.²⁴ Furthermore, a longitudinal study supports the idea that a nonlimited theory predicts positive self-control outcomes, such as better time management, less procrastination, healthy eating habits, and reduced impulsive spending among students who faced high self-regulatory demands in their everyday lives.²⁵ Additionally, recent research has shed light on the benefits for those who trust in the nonlimited resource of willpower, potentially encouraging them to persist in the next self-control task without a break,²⁶ and maintain higher self-control performance on successive high self-control demand tasks.²⁷

Previous research has thoroughly explored the impact of beliefs pertaining to self-control, particularly the belief that self-control is unlimited. Nevertheless, the belief in the malleability of self-control distinguishes itself from this perspective. Currently, there is very limited preliminary research suggesting a potential link between growth mindset and self-control. For instance, an intervention study revealed that growth mindset can enhance individuals' persistence in daily life.¹⁶ Additionally, two laboratory studies demonstrated that growth mindset reduced effort avoidance, leading

participants to increase persistence on tasks.¹⁶ However, it remains unclear whether self-control is impacted by beliefs over time. Therefore, more evidence is needed to solidify the predicting effect of growth mindset on self-control.

Accordingly, the present study proposed Hypothesis 1: “the belief promotes capability”, that is, for Time 1 (T1) growth mindset positively predicts Time 2 (T2) self-control.

From Self-Control to Growth Mindset

Self-control reflects an individual’s capacity to overcome internal conflicts and distractions,^{3,28} and it serves as a fundamental aspect in understanding human behavior.²⁹ As a predictor of key life outcomes, individuals with a greater capacity for self-control are anticipated to achieve higher educational attainment, exhibit healthier lifestyles,³⁰ and experience greater life satisfaction.²⁹ Furthermore, self-control is crucial for forecasting achievements during the transition to adulthood.³¹ Previous research has found that individuals with high levels of self-control are more likely to engage in positive practices within the realm of self-control practice,³² accumulate successful experiences through practice,^{33,34} and change perceptions of one’s abilities,³⁵ all of which contribute to the formation of a growth mindset towards self-control.

Additionally, growth mindset as a mental representation of the nature of self and the world,¹⁸ is rooted in people’s life experiences related to satisfying their basic psychological needs (autonomy, relatedness, competence). Prior studies have found that autonomy orientation serves as a precursor to the development of a growth mindset and fosters its cultivation among adolescents.^{36,37} Individuals with high levels of self-control move toward goals autonomously,³² and autonomy, in turn, reinforces individuals’ growth mindset. This insight offers a possible explanation for how self-control exerts an influence on the formation of growth mindset.

There exists a dearth of direct research examining the influence of self-control on growth mindset. Nevertheless, grit, similar to self-control, requires perseverance in the face of adversity to achieve a worthwhile goal, and previous studies have revealed that grit serves as a predictor of incremental rank-order advancements in growth mindset among both Chinese and American student samples.^{2,38} This hints at the possibility that self-control may similarly influence the development of a growth mindset.

Based on the evidence mentioned above, it is plausible to posit that self-control may exert the impact on growth mindset. However, it is noteworthy that direct research exploring the specific relationship between self-control and growth mindset is still lacking.

Accordingly, the present study proposed Hypothesis 2: “capability shapes the belief”, that is, Time 1 (T1) self-control positively predicts Time 2 (T2) growth mindset.

The Present Study

To summarize, the current study employed cross-lagged designs to investigate the bidirectional relationships between growth mindset and self-control among Chinese primary school students. We proposed and tested a possible model that depicted the possible bidirectional relationship underlying the relations between growth mindset and self-control (cross-lagged paths from growth mindset to self-control plus cross-lagged paths from self-control to growth mindset). **Figure 1** displays the research hypothesis model.

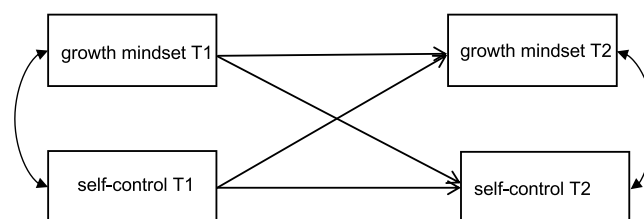


Figure 1 Proposed model of the relationships between growth mindset and self-control.

Method

Participants

The study employed a convenience sampling method, recruiting participants from a public school located in the urban area of Shijingshan District, Beijing, China. As a comprehensive 15-year educational system that encompasses kindergarten, primary school, junior high school, and high school, this school offers a robust and stable participant pool, thereby facilitating the smooth and continuous conduct of longitudinal research. The study employed a cluster sampling approach to recruit students from grade 3 to grade 6, drawing upon prior research that highlights the criticality of this developmental stage.²¹

In January 2023, 510 students participated in the first wave (Time 1) of measurement, out of which 428 students also took part in the follow-up wave (Time 2) conducted in July. Thus, the final sample comprised 428 students (214 boys and 214 girls) who completed measurements at both time points. Within the final sample, the mean age of the participants was 9.64 years old ($SD = 1.21$), with a distribution across different grade levels, including grade three (147 students), grade four (122 students), grade five (86 students), and grade six (73 students).

The results of the chi-square test and independent samples t -tests indicated that there are no significant differences between the retained and attrited samples in terms of gender ($\chi^2 = 0, p > 0.05$), grade level ($\chi^2 = 6.17, p > 0.05$), T1 self-control ($|t| = 0.65, p > 0.05$), and T1 growth mindset ($|t| = 0.86, p > 0.05$). The results suggested that participant attrition exhibited an unstructured pattern.

Procedure

This study was approved by the Ethics Committee of Beijing Normal University. First, researchers introduced recruitment letters to the school and invited teachers to distribute them among students. Subsequently, written informed consent was secured from the students' parents. The study then involved two key stages over a six-month period: in January 2023, the first measurement of growth mindset and self-control was conducted. During this phase, students self-reported their growth mindset and self-control data, guided by researchers, who directed them to the computer room to complete an online questionnaire. Prior to the questionnaire, the researcher thoroughly explained the completion procedure and emphasized that there were no correct or incorrect answers. The questionnaires were administered using Wenjuanxing (<https://www.wjx.cn/>), and participants were able to access the survey via a provided link. Six months later, in July 2023, a second measurement was administered, where students reassessed their growth mindset and self-control.

Measures

Growth Mindset

Growth mindset was measured using the scale adapted from the Intellectual Growth Mindset Scale,³⁹ in which the central concept of "intelligence" was substituted by "self-control" to better align with the specific research context. This adapted scale comprised six items, each rated on a 6-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree). For example, "Your self-control is something about you that you can't change very much" (reversed-coded), "No matter who you are, you can significantly change your self-control". Reverse-scored items were recoded, and the average score was calculated after summing up all the items, where higher scores indicated a stronger growth mindset. The scale has consistently demonstrated good validity and reliability in existing research,⁴⁰ and it has also exhibited high reliability when applied to Chinese primary school students.² In the current research, the scale had good reliability at T1 and T2 with Cronbach alpha coefficients of 0.81 and 0.79, respectively.

Self-Control

Self-control was assessed using the version of the 13-item Brief Self Control Scale,⁴¹ rated on a 5-point scale (1 = *not at all*, 5 = *very much*) and adapted from the scale originally developed by Tangney, Baumeister, and Boone.⁴² For example, "I am good at resisting temptation", "Pleasure and fun sometimes keep me from getting work done" (reversed-coded). Reverse-scored items were recoded, and the average score was calculated after summing up all the items, where higher scores indicated greater self-control capacity. The scale has demonstrated good validity and reliability when applied to

Chinese primary school students.⁴³ In the current research, the scale had good reliability at T1 and T2 with Cronbach alpha coefficients of 0.80 and 0.75, respectively.

Data Analysis

We initially used SPSS 26 to conduct descriptive and correlation analysis on the major variables, encompassing growth mindset, self-control, and the covariates, subsequently employing Mplus 7.4 to validate the proposed cross-lagged models. Specifically, the study delved into the longitudinal interplay between growth mindset and self-control. To explore potential lagged effects, autoregressive effects for both growth mindset and self-control were incorporated, as well as correlations between T1 growth mindset and T1 self-control, and between T2 growth mindset and T2 self-control.

Following the guidelines of Hu and Bentler,⁴⁴ the following fit indices were utilized to evaluate the goodness of fit for the model: CFI (≥ 0.90 indicates acceptable fit; ≥ 0.95 indicates good fit), TLI (≥ 0.90 indicates acceptable fit; ≥ 0.95 indicates good fit), RMSEA (≤ 0.06 indicates good fit; ≤ 0.10 indicates acceptable fit), SRMR (≤ 0.08 indicates good fit).

Results

Preliminary Analysis

Table 1 displayed the means, standard deviations, and correlations among all variables. The results indicated a moderate correlation between T1 and T2 growth mindsets ($r = 0.33$, $p < 0.01$) and between T1 and T2 self-control ($r = 0.33$, $p < 0.01$), suggesting moderate stability in both growth mindset and self-control over time. Furthermore, the results demonstrated a significant positive correlation between T1 growth mindset and T2 self-control ($r = 0.25$, $p < 0.01$). Additionally, there was a significant positive correlation between T1 self-control and T2 growth mindset ($r = 0.23$, $p < 0.01$). Thus, the correlations among the primary variables align with the expectations of the study.

Cross-Lagged Path Analyses of Growth Mindset and Self-Control

The results revealed that the cross-lagged model fitted well: $\chi^2 = 209$, $df = 5$, $CFI = 1.00$, $TLI = 1.00$, $RSMEA = 0$, $SRMR = 0$. As shown in Figure 2, the autoregressive path analysis results indicated that for the same variables at different time points, the autoregressive effect of each variable was significant. That is, T1 growth mindset significantly predicted T2 growth mindset ($\beta = 0.29$, $p < 0.001$), and T1 self-control significantly predicted T2 self-control ($\beta = 0.28$, $p < 0.001$). The results suggested that over time, both growth mindset and self-control demonstrated good stability.

The cross-lagged path analysis results showed that T1 growth mindset had a significant predictive effect on T2 self-control ($\beta = 0.11$, $p = 0.04$), supporting Hypothesis 1, namely “the belief promotes capability”, indicating that growth mindset positively predicts self-control. In addition, the predictive effect of T1 self-control on T2 growth mindset was not significant ($\beta = 0.08$, $p = 0.13$), failing to support Hypothesis 2, namely “ability shapes the belief”, suggesting that self-control does not positively predict growth mindset.

Table 1 Descriptive Statistics and Correlations Among Major Variables

Variables	M	SD	1	2	3	4
1. growth mindset T1	4.39	0.94	–			
2. growth mindset T2	4.45	1.06	0.33**	–		
3. self-control T1	3.71	0.62	0.52**	0.23**	–	
4. self-control T2	3.86	0.57	0.25**	0.51**	0.33**	–

Note: ** $p < 0.01$.

Abbreviations: T1, time 1; T2, time 2.

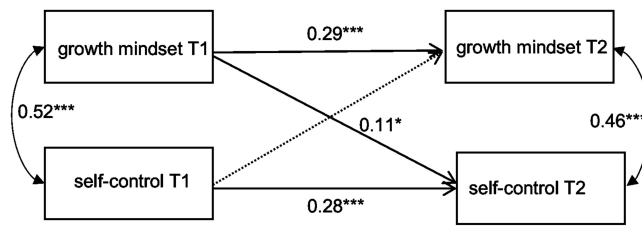


Figure 2 Results for the bidirectional effects between growth mindset and self-control.

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

Abbreviations: T1, time 1; T2, time 2.

Discussion

Growth mindset and self-control develop early in life, yet research indicates that they are subject to change later in life and tend to increase throughout adolescence.^{17,45} The present study employed a longitudinal design to investigate the reciprocal relationship between growth mindset and self-control in a cohort of primary school students, providing valuable perspectives on the complex processes underlying the formation of these fundamental psychological characteristics. The findings found that both growth mindset and self-control demonstrated a lagged effect, indicating their stability over the six-month period. Moreover, the results partially validated the hypothesis, suggesting a positive effect of T1 growth mindset on T2 self-control among primary school students. However, T1 self-control did not appear to predict T2 growth mindset.

The Impact of Growth Mindset on Self-Control

The present study found that growth mindset uniquely positively predicted the subsequent self-control among Chinese primary school students, which means that beliefs in malleable abilities may promote the development of self-control capabilities. This finding aligned with previous research results, which indicated that individuals' beliefs about self-control can influence their subsequent self-control.^{27,46} In addition, people with a growth mindset exhibit higher levels of self-regulation, both in the lab and in their daily lives.^{16,47}

Growth mindset, as the core of a person's "meaning system", not only shapes how individuals conceive and set their goals but also fundamentally alters their perception of challenges, encouraging them to view obstacles as opportunities for growth and learning.²² When individuals possess growth mindset, they actively seek and pursue diverse strategies, continually adapting to find new paths to success.⁴⁸ On one hand, individuals with growth mindset have a positive perception of effort.¹⁶ This positive mindset makes them more willing to actively confront challenges because they believe that through effort, difficulties can be overcome.²² As individuals continuously challenge themselves and overcome obstacles, their self-control abilities gradually strengthen.^{16,49} On the other hand, individuals with growth mindset believe that abilities can be continuously enhanced through learning. They tend to adopt a more proactive approach in seeking out and acquiring strategies and practices for self-control, which positively correlate with improved self-control performance.^{34,50,51} Therefore, individuals with growth mindset are more likely to proactively employ self-regulatory strategies and practices, thereby enhancing their self-control abilities.

The Impact of Self-Control on Growth Mindset

However, the present study found that self-control did not predict subsequent growth mindset. Unlike previous research findings, which suggested that children may be persuaded that perseverance will pave the way to success, thereby convincing them that abilities can be changed.² Similarly, prior research has identified achievement as a catalyst for fostering growth mindset,⁵² it means that individuals with a high level of self-control are more likely to achieve success, which may subsequently reinforce their belief that their capacity for self-control can be cultivated over time. The finding raises a question: why can beliefs promote capability, but it has not been found that capability can shape beliefs? One possible explanation is that a better self-control ability implies, to some extent, a reduction in opportunities for individuals to cultivate growth mindset. Specifically, previous studies suggest that individuals with high levels of self-control are not necessarily better at resisting temptation.^{33,53} They may focus on minimizing (or avoiding) the likelihood of temptation occurring, rather than relying on their ability to resist it,⁵⁴ which may result in them encountering fewer instances of needing to exert self-control. This implies that individuals with strong self-control may

lack the experience of successfully exerting self-control through effort, thereby diminishing opportunities for them to develop a belief in the growth of their self-control. However, such experiences are the most effective means of enhancing an individual's belief in their capabilities.⁵⁵

Future Directions

In general, the current study found the importance of growth mindset in the domain of self-control through longitudinal research. The finding has important implications for educational practices aimed at enhancing self-control, highlighting the priority for educators to cultivate a growth mindset in students to enhance their potential for self-control abilities. Previous research has corroborated the efficacy of growth mindset interventions across various domains.⁴⁶ In the education context, growth mindset interventions, by fostering a belief that abilities are malleable, not only enhance academic achievement—as evidenced by a short (less than one hour) online growth mindset intervention that improved grades among lower-achieving students⁵⁶—but also contribute to better mental health, as individuals learn to navigate stress, anxiety, and adversity with greater optimism and adaptability.⁵⁷ Consequently, future inquiries can delve further into intervention strategies targeting self-control by growth mindset and rigorously evaluate their effectiveness. Furthermore, advancements in technology are profoundly impacting various sectors,^{58,59} particularly the field of education, where they exert a widespread influence on students' self-awareness and beyond.⁶⁰ This poses parallel challenges to students' self-perception, potentially influencing their self-control and shaping their growth mindset. Given the profound impact of technological developments on human beings, future research exploring the relationship between growth mindset and self-control could take this aspect into account.

Limitations of the current investigation highlight avenues for future research. A major constraint is our reliance on self-reported measures obtained from students, which are susceptible to response bias. Particularly concerning the measurement of self-control, the limited existing research on self-control has predominantly relied on self-report to predict life outcomes. While teacher and parent reports are often utilized, they may be prone to contextual effects and may not adequately capture students' self-control outside of the classroom.⁵¹ Therefore, future studies should replicate our findings using diverse methodologies, such as behavioral measures, and involve multiple informants, including teachers, parents, and peers.

Conclusion

The longitudinal design employed in the current study provides valuable insights into the dynamic interplay between growth mindset and self-control over time. Specifically, it establishes a robust framework illustrating the impact of growth mindset on subsequent self-control among primary school students. Overall, the current study represents the first attempt to investigate the unique contributions of growth mindset to self-control among Chinese primary school students, thus extending the scope of research on growth mindset. This study breaks new ground by highlighting the unique contributions of the growth mindset to the self-control of primary school students. It underscores the significance of nurturing the growth mindset that embraces challenges and sees failures as opportunities for growth in the face of challenges, all of which are crucial for the cultivation of robust self-control abilities. Moreover, the current study offers crucial theoretical insights for educators, parents, and counseling professionals emphasizing the importance of nurturing a growth mindset to bolster students' self-control. The results have implications for educational policy, classroom strategies, and parenting practices, advocating for an environment that fosters a growth mindset to enhance self-control in students.

Ethics Statement

This study was approved by the Ethics Committee of Beijing Normal University. The procedures used in this study adhere to the tenets of the Declaration of Helsinki. Every participant provided informed consent and agreed to the utilization of their information for scholarly research and publishing. Every participant remained unnamed, and their information was safeguarded.

Disclosure

The authors report no conflicts of interest in this work.

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