Research article

Does attending elite colleges matter in the relationship between self-esteem and general self-efficacy of students in China?

Wenjie Zhang [a], Wenjuan Gao [b,c], Xinqiao Liu [d,*]

[a] Graduate School of Education, Peking University, Beijing 100871, China
[b] Institute of Higher Education, Beihang University, Beijing 100191, China
[c] School of Public Administration, Beihang University, Beijing 100191, China
[d] School of Education, Tianjin University, Tianjin 300350, China

HIGHLIGHTS

- The general self-efficacy of college students fluctuated over the four years.
- Self-esteem and general self-efficacy were significantly positively correlated.
- The two variables were evidenced to have reciprocal interactions with each other.
- The relationships were heterogeneous regarding the elite university attendance.
- Colleges should take targeted interventions to build general self-efficacy.

ARTICLE INFO

ABSTRACT

This study analyzed the reciprocal relationship between self-esteem and general self-efficacy among students from both the elite and non-elite universities in China. Descriptive statistics showed that the levels of general self-efficacy remained stable among Chinese college students albeit with minor fluctuations, while their self-esteem continuously declined during the four academic years; students from elite universities had higher self-esteem than their counterparts from non-elite universities. Moreover, the general self-efficacy of students was significantly and positively correlated with their self-esteem at college. Using a four-wave cross-lagged model, we found that the self-esteem and general self-efficacy among elite university students reinforced each other from the freshman to the junior years, whereas the self-esteem of their equivalents from non-elite universities mono-directionally predicted their subsequent general self-efficacy levels from the sophomore to the senior years. The study adds to the literature by (1) exploring the directionality of the relationship between self-esteem and generalized self-efficacy with four-wave panel data, and (2) discussing the heterogeneity of the relationship among sub-groups of the college students. The study proposed that institutions of different tiers should take targeted interventions to boost students' self-esteem and general self-efficacy.

1. Introduction

Mounting research has focused on the relationship between self-esteem and general self-efficacy. Self-esteem and general self-efficacy, two crucial concepts in social psychology, are closely related to self-evaluations (Judge et al., 1997, 1998; Judge and Bono, 2001) and have profound influences on one's mental health, behavior, performance, and many other dimensions (Bandura, 1997; Harter, 2006; Kernis, 1995). Despite the strong relationship between the two concepts, most studies regard them as independent and distinguishable notions. Self-esteem and general self-efficacy have been differentiated in terms of three aspects: (1) Self-esteem is conceptualized as "a person's general feeling of worth" (Rosenberg, 1965, p. 31), which emphasizes the overall evaluation of one's value, and is related to affective traits. Conversely, self-efficacy originated from the social cognitive theory (Bandura, 1997), which was then extended to a global level. General self-efficacy stands for "one's estimate of one's capabilities to mobilize the motivation, cognitive resources, and courses of action needed to exercise general control over

* Corresponding author.
E-mail address: xinqiaoliu@pku.edu.cn (X. Liu).

events in one's life" (Judge et al., 1998, p. 19), which focuses on whether there exists the capability of handling the obstructions along the path (Schwarzer et al., 2005), and motivational traits (Chen et al., 2004). (2) In terms of origins and characteristics, self-esteem is associated with factors such as inherited genes, parenting style, and the secure attachment endowed by parents through early childhood, et cetera; thus, it appears to be relatively stable (Harter, 2006). In contrast, general self-efficacy relies more on challenges and opportunities in certain scenarios, which can be changeable on different occasions and times. (3) Self-esteem has more significant effects on well-being, whereas general self-efficacy better predicts one's behavior and performance (Bandura, 1997; Baumeister, 1993). For instance, self-efficacy is a strong indicator of academic performance but self-esteem is not (D'Amico and Cardaci, 2003; Diseth et al., 2014).

Prior literature has extensively examined the effects of self-esteem on general self-efficacy and investigated the underlying theoretical mechanisms. Self-esteem can exert its influence on general self-efficacy through the cognitive patterns and coping strategies that individuals adopt when facing pressure and failure in life. Specifically, the strategies can be categorized into problem-centered and emotion-centered (Folkman and Lazarus, 1985). Individuals with high self-esteem are likely to embrace problem-centered strategies which allow them to actively solve problems and avoid or reduce possible negative impacts of adverse events. In this way, their psychological states maintain to be stable with high levels of self-efficacy. By contrast, individuals with low self-esteem tend to adopt emotion-centered strategies with overgeneralization following failure. They are overwhelmed with negative emotions in the face of unfavorable events, and over-attribute possible failures to themselves, which may further bring in emotional dumping and self-denial with low levels of self-efficacy (Kernis et al., 1989; Campbell, 1990; Brown and Mankowski, 1993; Brown and Dutton, 1995; Dodgson and Wood, 1998; Moreland & Sweeney, 1984). Ample empirical evidence confirmed the pivotal role of self-esteem in building self-efficacy. Lane et al. (2002) explored the effect of self-esteem on self-efficacy among athletes, and found that compared with individuals with high self-esteem, the self-efficacy of individuals with low self-esteem was significantly lower, and further analysis revealed that individuals in the high self-esteem group took more adaptive coping strategies, whereas their low-esteem counterparts were more inclined to use maladaptive coping strategies such as self-blame and self-abandonment. Caprara et al. (2013) asserted that when individuals transition from adolescence to early adulthood, their level of self-esteem can consistently and steadily predict subsequent self-efficacy. Wang et al. (2018) demonstrated a significant mediating effect of self-efficacy between middle school students' self-esteem and school bullying. Zhang et al. (2018) analyzed over 1000 undergraduates majoring in health, and proved that the self-esteem of college students affected self-efficacy by involving their self-regulation ability and fear of failure, which in turn affects academic procrastination. Yang et al. (2019) verified that self-esteem played a significant mediating role in the relationship between self-control and self-efficacy among patients with substance use disorders.

Though the effects of self-esteem on general self-efficacy have been widely recognized, it was controversial when it came to the impacts of general self-efficacy on self-esteem. Some studies insisted that general self-efficacy serves as an essential influencing factor of self-esteem by establishing a convincing theoretical framework. Self-esteem is conceptualized as two dimensions, i.e. worth-based self-esteem and efficacy-based self-esteem. Worth-based self-esteem takes the form of social approval by emphasizing the evaluation of others in the social context, while efficacy-based self-esteem focuses on individuals' own perceptions of their influence on others (Franks and Marolla, 1976; Gecas, 1982; Gecas and Schwalbe, 1983; Staples et al., 1984). The influence of general self-efficacy on self-esteem was regarded as the process of individuals' self-verification in the social environment (Burke and Stets, 1998, 1999; Cast and Burke, 2002). To be more specific, individuals are usually embedded in different social structures rather than being independent, and the feelings of self-acceptance or satisfaction may emanate from their

capability of following socially established norms and assuming certain sociable roles. For instance, employees of an enterprise can be required to work efficiently and avoid absenteeism, and those who manage to achieve these goals may have higher levels of self-esteem based on their performance. Thus, individuals' self-esteem originates from their experience of personal efficacy or efficacious efforts. Apart from the theoretical exploration, a growing body of empirical analysis verifies the paths of self-efficacy affecting self-esteem, such as the chain mediating mechanism of self-efficacy–self-esteem between physical image and exercise participation (Ouyang et al., 2020), the mediation effect of self-esteem between self-efficacy and anxiety (Dahlbeck and Lightsey, 2008), the partial mediating role of self-esteem between self-efficacy and job burnout among the staff of special education (Fu et al., 2021), and the predicting function of self-efficacy on the self-esteem of medical staff (Pérez-Fuentes et al., 2019) Other studies have confirmed the positive effects of general self-efficacy on self-esteem among backpackers in the Chinese and western contexts (Chen et al., 2019).

Nevertheless, Bandura (1997) pointed out that general self-efficacy is not necessarily crucial for self-esteem. The importance of general self-efficacy on self-esteem largely depends on whether individuals can link their success or failure to their feeling of worth. If individuals do not regard their capabilities as a standard for judging their worth, then low capabilities do not lead to low self-esteem. However, relevant empirical studies are insufficient as it is difficult to divide a group of the same nature into two sub-groups (people who link their success/failure to their feeling of worth and people who do not). The pyramid structure of Chinese institutions of higher education, in this way, may provide a strong tool to verify the relations between self-esteem and general self-efficacy. Colleges and universities in China can be distinctively categorized into elite and non-elite colleges taking into account the administrative division and the selection system with the Chinese College Entrance Examination (CEE). According to the official data from the Ministry of Education of the People's Republic of China, as of the year 2021, there are 3,012 institutions of higher education in China, including 1,238 undergraduate colleges and universities, and 1,486 higher vocational schools. The undergraduate colleges can be further divided into three tiers by their strengths and policy support from the government. The first tier of colleges and universities are 39 elite universities in Project 985, which are selected to be equivalent to the US Ivy League and obtain substantial funding from the central government. The second tier refers to 73 universities belonging to Project 211, which also receive considerable public funding and support. The third tier refers to other colleges and universities in China. Students with high scores in the CEE are privileged to be admitted into top universities, and they are more likely to link their success to their feeling of worth; meanwhile, students enrolled in non-elite colleges obtained little encouragement regarding their academic achievement, thus they may find it hard to link their success/failure to their feeling of worth.

The review of relevant studies indicated that the relationship between self-esteem and general self-efficacy has been extensively explored with no unanimous decision. Moreover, there is a dearth of longitudinal exploration of their reciprocal relations. Given these research gaps, what is the directionality of the prospective relationship between self-esteem and general self-efficacy? Does the directionality vary among different sub-groups? This study contributed by comparing the prospective associations between self-esteem and general self-efficacy of students from elite and non-elite universities in China. We formulated the following hypothesis concerning the extant literature:

Hypothesis I. Students' self-esteem and general self-efficacy fluctuate during the college period rather than being static.

Hypothesis II. A significant positive relationship exists between self-esteem and general self-efficacy of students.

Hypothesis III. Self-esteem generally has significant lagged influences on the general self-efficacy of college students. By contrast, the general

Table 1. Descriptive statistics of self-esteem and general self-efficacy for college students across years.

Groups	Year	Variables	N.	Mean	Standard Deviation	Min	Max	Skewness	Kurtosis	T-test
All	Year 1	Self-esteem	1501	38.260	6.114	12	50	-0.856	3.511	
		General self-efficacy	1501	28.753	4.915	12	40	0.048	2.739	
	Year 2	Self-esteem	1501	37.802	5.882	13	50	-0.725	3.544	
		General self-efficacy	1501	28.640	4.849	10	40	0.012	3.019	
	Year 3	Self-esteem	1501	36.973	5.911	16	50	-0.404	2.702	
		General self-efficacy	1501	28.799	4.602	10	40	0.035	4.094	
	Year 4	Self-esteem	1501	36.212	5.611	10	50	-0.056	2.551	
		General self-efficacy	1501	28.637	4.762	10	40	-0.016	3.898	
Self-esteem	Year 1	Elite colleges	890	**38.378**	6.054	12	49	-0.854	3.534	-0.895
		Non-elite colleges	611	**38.090**	6.203	14	50	-0.856	3.469	
	Year 2	Elite colleges	890	37.792	5.955	13	50	-0.715	3.548	0.079
		Non-elite colleges	611	37.817	5.778	15	49	-0.741	3.528	
	Year 3	Elite colleges	890	37.000	5.921	16	50	-0.345	2.635	-0.211
		Non-elite colleges	611	36.935	5.902	16	49	-0.491	2.796	
	Year 4	Elite colleges	890	**36.380**	5.633	10	50	-0.120	2.833	-1.400
		Non-elite colleges	611	**35.967**	5.576	21	49	0.036	2.146	
General self-efficacy	Year 1	Elite colleges	890	28.772	4.918	13	40	0.121	2.518	-0.181
		Non-elite colleges	611	28.725	4.915	12	40	-0.059	3.056	
	Year 2	Elite colleges	890	28.478	4.87	10	40	-0.021	3.284	1.570
		Non-elite colleges	611	28.877	4.814	14	40	0.066	2.596	
	Year 3	Elite colleges	890	28.787	4.674	10	40	-0.013	4.177	0.132
		Non-elite colleges	611	28.818	4.5	10	40	0.115	3.936	
	Year 4	Elite colleges	890	28.618	4.727	10	40	-0.049	4.127	0.186
		Non-elite colleges	611	28.664	4.816	10	40	0.029	3.583	

Note: *5% significance level.

Table 2. Correlation analysis of self-esteem and general self-efficacy for college students across years.

Groups	Year	Variables	1	2	3	4	5	6	7	8
All	Year 1	1.Self-esteem	1							
		2.General self-efficacy	0.536*	1						
	Year 2	3.Self-esteem	0.615*	0.400*	1					
		4.General self-efficacy	0.420*	0.605*	0.517*	1				
	Year 3	5.Self-esteem	0.555*	0.363*	0.632*	0.403*	1			
		6.General self-efficacy	0.370*	0.497*	0.393*	0.517*	0.535*	1		
	Year 4	7.Self-esteem	0.421*	0.249*	0.500*	0.309*	0.575*	0.334*	1	
		8.General self-efficacy	0.271*	0.384*	0.299*	0.451*	0.348***	0.470*	0.436*	1
Elite colleges	Year 1	1.Self-esteem	1							
		2.General self-efficacy	0.546*	1						
	Year 2	3.Self-esteem	0.613*	0.401*	1					
		4.General self-efficacy	0.442*	0.592*	0.552*	1				
	Year 3	5.Self-esteem	0.560*	0.362*	0.636*	0.445*	1			
		6.General self-efficacy	0.365*	0.494*	0.376*	0.504*	0.539*	1		
	Year 4	7.Self-esteem	0.410*	0.240*	0.501*	0.334*	0.562*	0.329*	1	
		8.General self-efficacy	0.282*	0.422*	0.291*	0.446*	0.325*	0.445*	0.443*	1
Non-elite colleges	Year 1	1.Self-esteem	1							
		2.General self-efficacy	0.521*	1						
	Year 2	3.Self-esteem	0.617*	0.400*	1					
		4.General self-efficacy	0.393*	0.626*	0.465*	1				
	Year 3	5.Self-esteem	0.548*	0.365*	0.626*	0.342*	1			
		6.General self-efficacy	0.378*	0.502*	0.421*	0.538*	0.529*	1		
	Year 4	7.Self-esteem	0.437*	0.264*	0.500*	0.277*	0.595*	0.343*	1	
		8.General self-efficacy	0.257*	0.330*	0.312*	0.459*	0.381*	0.507*	0.427*	1

Note: (1) The table reports the Pearson correlation coefficients; (2)*5% significance level.

self-efficacy of students in elite colleges significantly predicts their subsequent self-esteem yet this prospective effect may not be significant for non-elite college students.

The remainder of this paper is structured as follows: Section 2 describes the participants and procedures as well as the measures. Section 3 presents the empirical results including descriptive statistics, correlation analysis,

and cross-lagged panel analysis. Section 4 further analyzes and discusses the research findings. Section 5 points out the limitations of the study and possible directions for future research. Section 6 revisits the main conclusions of the study, and clearly identifies the practical implications.

2. Methods

2.1. Participants and procedures

The collected data consists of the full-time undergraduate students admitted into colleges in the year 2008 who participated in the Beijing College Students Panel Survey (BCSPS). Using the probability proportional to size (PPS) sampling method, the data depicted the general population of college students in Beijing, and detailed descriptions of the sampling method have been elaborated in previous relevant research (Liu et al., 2022;Luo et al., 2022; Gao et al., 2022; Gao et al., 2020; Liu, Ping & Gao, 2019b; Liu, Gao & Ping, 2019a). Students of the sample were selected from 10 public universities in Beijing, which were mainly grouped into two tiers, i.e. the elite and non-elite schools. The elite universities refer to Peking University, Tsinghua University, Renmin University of China, Beihang University, and Beijing Institute of Technology; whilst the non-elite universities include Beijing Language and Culture University, North China University of Technology, Beijing University of Agriculture, Beijing Institute of Petroleum and Chemical Technology, and Capital University of Economics and Trade. After ruling out invalid questionnaires, the effective sample size for analysis was 1501, with 890 from elite universities and 611 from non-elite universities.

Given that the data was from a publicly available dataset, which has been de-identified by removing all individual information of the participants, ethical approval may be exempted according to the local legislation and institutional requirements. Meanwhile, informed consents were obtained from students regarding their research participation.

2.2. Measures

General self-efficacy. The general self-efficacy scale (GSE) designed by Schwarzer and Jerusalem (1995), a widely acknowledged 10-item scale assessing the general self-efficacy of individuals, was applied in this study. The Chinese version of the scale was adopted given that the measure has been localized in China with acceptable reliability and validity (Leung and Leung, 2011; Schwarzer et al., 1997; Zeng et al., 2020; Zhang and Schwarzer, 1995). Participants responded to each item on a 1 (*Not at all true*) to 4 (*Exactly true*) scale, and their answers were added up to yield the general self-efficacy index, which ranging from 10 to 40 and high scores indicated high levels of general self-efficacy. The reliability of measurements was within an acceptable range, with Cronbach's alpha coefficients 0.861, 0.868, 0.896, and 0.911 in the four academic years respectively.

Self-esteem. Rosenberg's (1965) self-esteem scale was used to evaluate the self-esteem among college students. The study also adopted the Chinese version of the scale, which has been widely verified to be reliable and valid in previous studies (Kong et al., 2012; Kong and You, 2013; Li et al., 2015; Lyu et al., 2019; Zhao et al., 2012). Students were asked to indicate how strongly they agree or disagree with the 10 items concerning their overall feelings about themselves, each rating from 1
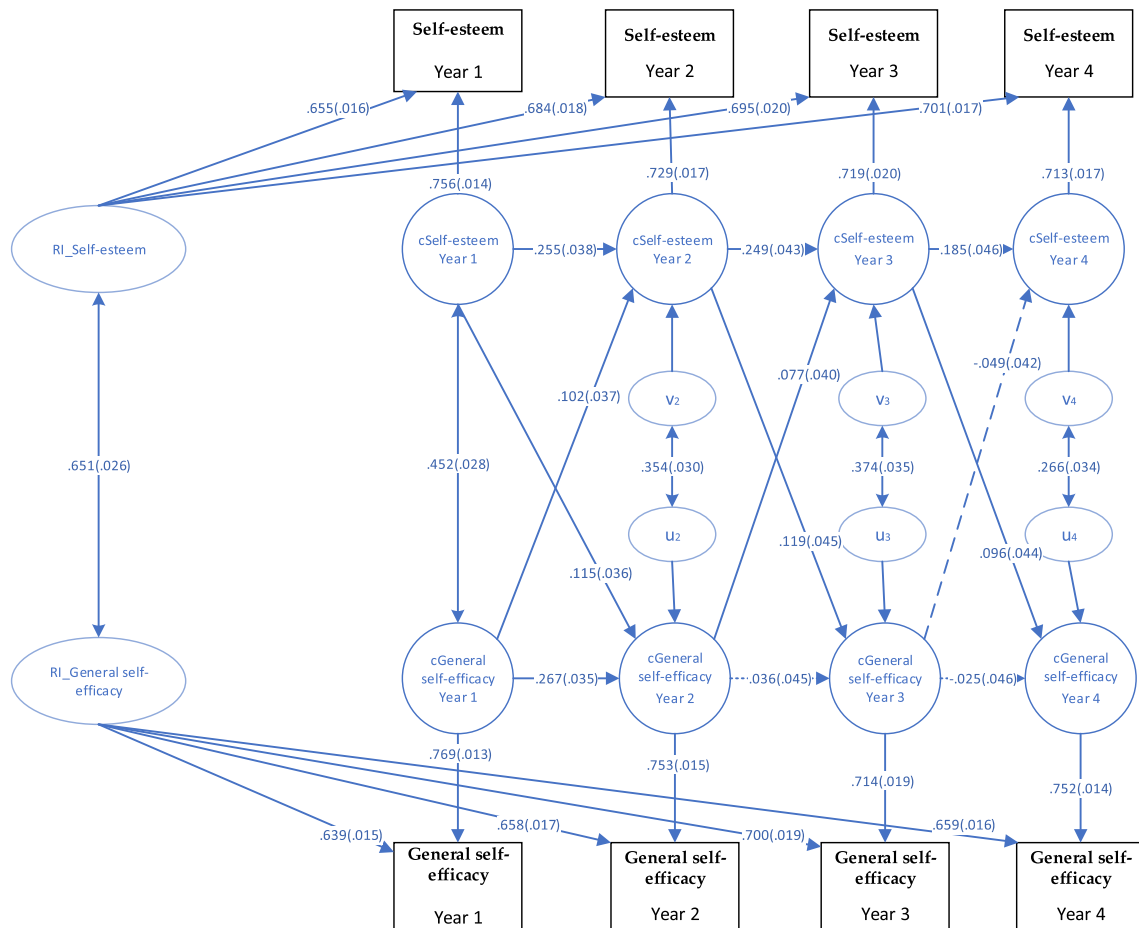

Figure 1. A four-wave cross-lagged panel model with random intercepts (Total sample). Note: RI_ Self-esteem represents random intercept for self-esteem, and RI_ General self-efficacy stands for random intercept for general self-efficacy in the figure (as well as in Fig.2 and Fig.3). The solid lines in the three figures indicate statistically significant relationships, while the dashed lines suggest that the relationships are not statistically significant.

(*Strongly Disagree*) to 5 (*Strongly Agree*). Additionally, the scores of five reversely-assessed items have been adjusted to the same direction as the other five items so that after totaling all the responses, higher scores denote higher levels of self-esteem for students. The total score of self-esteem varies from 10 to 50. The Cronbach's alpha coefficients were 0.881, 0.888, 0.885, and 0.887 respectively from the freshman to the senior year.

3. Results

3.1. Descriptive statistics of self-esteem and general self-efficacy among college students

The distributions of self-esteem and general self-efficacy across tiers and years are presented in Table 1. Students of elite colleges differed from those of non-elite colleges in terms of their self-esteem and general self-efficacy levels over the four academic years, though not statistically significant with t-tests. The average scores of general self-efficacy of the total sample fluctuated over 28.5, which were 28.753, 28.640, 28.799, and 28.637 respectively in the four academic years. Nevertheless, the changing trends differed with the tiers of universities, with students in elite universities having higher general self-efficacy in the freshman and junior years, while non-elite college students scored higher in the first three years before falling slightly in the fourth year. Additionally, the mean score of self-esteem of the total sample was above 36 yet with a monotonically decreasing trend from 38.26 in the first year to 36.212 in the fourth year. Likewise, the self-esteem levels of students in both elite colleges and non-elite colleges experienced steady declines from 38.378 and 38.090 in the freshman year to 36.380 and 35.967 in the senior year

respectively. Besides, elite college students showed higher self-esteem levels than non-elite college students, though not statistically significant. These results verified *Hypothesis I* in general.

3.2. Correlation analysis of self-esteem and general self-efficacy among college students

The Pearson correlation coefficients between self-esteem and general self-efficacy are shown in Table 2. In all four academic years, self-esteem and general self-efficacy were significantly and positively correlated for either the total sample or sub-samples ($p < 0.001$). Additionally, self-esteem and general self-efficacy of different years were all significantly and positively intercorrelated ($p < 0.001$). Thus, *Hypothesis II* was proved in either the total sample or the students from different tiers of universities.

3.3. Cross-lagged panel analysis between self-esteem and general self-efficacy

This study built a four-wave random intercepts cross-lagged model to investigate the directional impacts of self-esteem and general self-efficacy. The relationship between self-esteem and general self-efficacy for the total sample was represented in Figure 1, and Model 1 properly fit the data (RMSEA = 0.049; CFI = 0.994; TLI = 0.980; SRMR = 0.042). The self-esteem levels of students remained stable throughout the four academic years, with the autoregressive standardized pathway coefficients ranging between 0.185 and 0.255 ($p < 0.01$). However, the general self-efficacy levels of students only showed strong autocorrelation between year 1 and year 2, with the autoregressive standardized
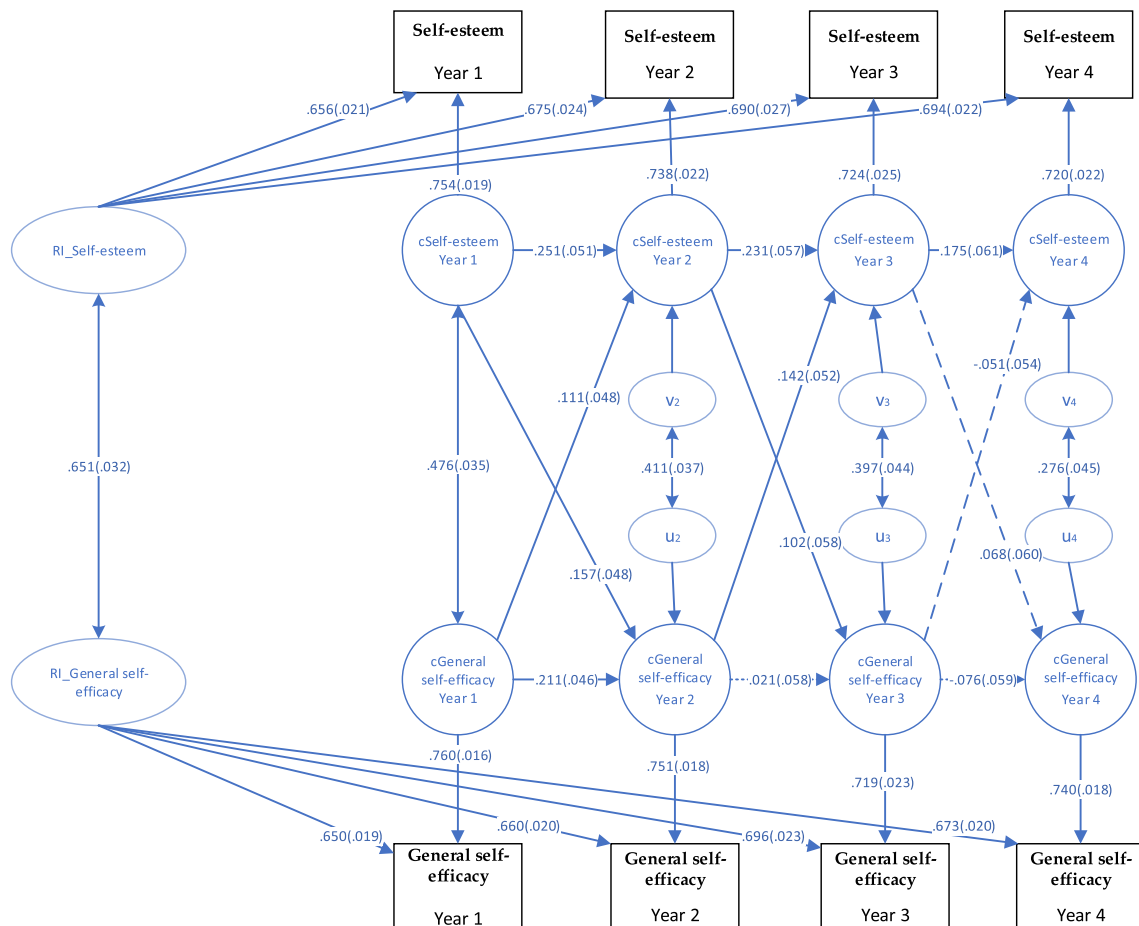

Figure 2. A four-wave cross-lagged panel model with random intercepts (Elite colleges).

pathway coefficient = 0.267 (p < 0.01); while the autocorrelation of general self-efficacy was weak from year 2 to year 4. As autoregressive effects being controlled, self-esteem persistently had significantly positive prospective effects on general self-efficacy, with standardized pathway coefficients slightly dropping from 0.115 to 0.096 (p < 0.01). Meanwhile, students' general self-efficacy exerted subsequent impacts on their self-esteem from the freshman to the junior years (p < 0.01).

Model 2 and Model 3 were constructed using elite college samples and non-elite college samples separately to examine the possible institute differences in the directional relationship between self-esteem and general self-efficacy. The fitting indicators of Model 2 (RMSEA = 0.048, CFI = 0.994; TLI = 0.982, SRMR = 0.041) and Model 3 (RMSEA = 0.063, CFI = 0.990, TLI = 0.968, SRMR = 0.046) were both satisfactory. As shown in Figure 2, the self-esteem levels among elite colleges students kept durable during college, with the autoregressive standardized pathway coefficients ranging from 0.175 to 0.251 (p < 0.01). Nevertheless, the autocorrelation coefficients of general self-efficacy were only positive in the first two years, with the autoregressive standardized pathway coefficients = 0.211 (p < 0.01). Similarly, the autocorrelation coefficients of self-esteem of non-elite college students ranged from 0.213 to 0.267 (p < 0.01) in Figure 3, yet only the general self-efficacy of the first two phases showed significant positive autocorrelation, with the autoregressive standardized pathway coefficients = 0.344 (p < 0.01). After controlling the autoregressive effects, it can be observed that there were distinct differences in the reciprocal relationships between self-esteem and general self-efficacy regarding students' elite university attendance. The self-esteem and general self-efficacy among elite university students reinforced each other from the freshman to the junior years (p < 0.05), whereas the self-esteem of their counterparts from non-elite

universities exerted monodirectional prospective impacts on their general self-efficacy from the sophomore to the senior years (p < 0.05), which verified *Hypothesis III* proposed in the present study.

4. Discussion

The main contribution of the paper was to analyze the reciprocal relationship between self-esteem and general self-efficacy among students from both the elite and non-elite universities in China.

Descriptive statistics showed that students' self-esteem continuously declined during the four academic years. This was consistent with relevant research which indicated that individual self-esteem significantly drops between age 16 and 24 (Caprara et al., 2013; Gao et al., 2022). Nonetheless, other studies found that self-esteem levels rise during adolescence and keep going up at a slower pace during young adulthood (Erol and Orth, 2011). We assume that the transition stage from adolescence to adulthood brings in more demanding tasks for individuals (Arnett, 2000, 2014). College students, in particular, need to be confronted with academic challenges and social adaptation after entering college and may experience emotional changes after being independent of their families (Baker and Siryk, 1984). Although they are required to depend more on themselves rather than seeking external support from families and friends, it is still impossible for them to shoulder responsibilities entirely on their own like adults (Arnett, 2000). The challenges and uncertainties during emerging adulthood may result in anxiety, tension, or even mental disorders (Rodgers and Tennison, 2009; Smith, 2015). These discomforts can further lead to the reconstruction of self-cognition, and even bring in personality disorders (Ausubel, 1952; 1996; 2002), during which they start to rebuild their own identities and
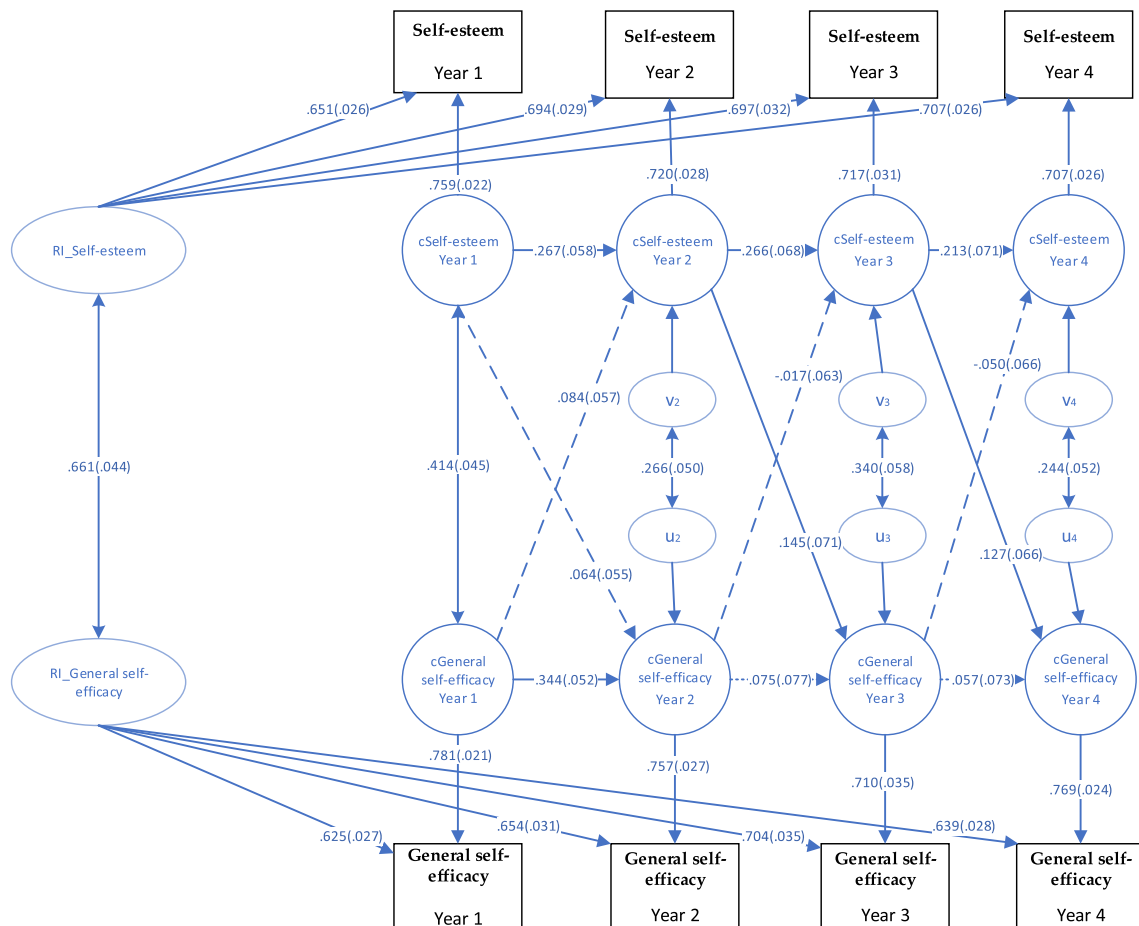

Figure 3. A four-wave cross-lagged panel model with random intercepts (Non-elite colleges).

realize their limitations; and the process of self-reflection and self-criticism causes the loss of the feeling of worth.

Meanwhile, the average levels of general self-efficacy remained stable among Chinese college students albeit with minor fluctuations, yet it showed significant autocorrelation only in the first two years, which corresponded with previous studies revealing that general self-efficacy varies with contexts (Chen et al., 2004; Harter, 2006). The inconsistent trait in general self-efficacy of college students may be attributed to the atmospheres of different years. In particular, students in the junior year need to plan for their futures after graduation, which may force them to step out of their comfort zones and feel anxious about the uncertainty of the future. More challenging learning tasks and possible difficulties or even discrimination in the job market post grave threats for students at this phase, which undoubtedly undermine their self-worth compared with levels in the previous two years (Gao et al., 2022).

The cross-lagged analyses indicated that the self-esteem and general self-efficacy among elite university students reinforced each other from the freshman to the junior years, whereas the self-esteem of their peers from non-elite universities monodirectionally predicted their subsequent general self-efficacy levels from the sophomore to the senior years. First, it confirms that self-esteem has strong effects on general self-efficacy (Lane et al., 2002; Caprara et al., 2013; Wang et al., 2018; Zhang et al., 2018; Yang et al., 2019). Second, the findings of the uncertainty and instability in the reciprocal relations between the two variables were in accordance with some relevant studies to some extent. For example, Marcionetti and Rossier (2021) found that self-esteem had prospective effects on general self-efficacy, but the effects were not consistent all the time; meanwhile, general self-efficacy did not significantly predict self-esteem. Lightsey et al. (2006) evidenced the lagged impacts of general self-efficacy on self-esteem, yet not vice versa. It should be noted that the two groups in our study are heterogenous regarding both their characteristics and status. Students from elite universities are outstanding in academic performance and are generally more self-disciplined. The accomplishment of their tasks, in return, boosts their general self-efficacy, and their self-recognition often relies on their strengthened capabilities. By contrast, students in non-elite colleges are more likely to hold weaker general self-efficacy compared with their elite counterparts, particularly under the exam-oriented atmosphere in China. Thus, their self-worth hardly arises from their academic performances, which are in urgent need to be bolstered with proper interventions.

5. Limitation

First, this paper used self-evaluation reports on the self-esteem and general self-efficacy of students. Given that the evaluation of self-esteem and general self-efficacy of surveyed participants might be influenced by the surroundings or their emotional status then, the instability of autoregression of general self-efficacy demands further discussion. Second, the cross-lagged panel model is not fully capable of conveying reliable causal relationships, thus future investigation using randomized controlled experiments might be called for to further describe the relationship between self-esteem and general self-efficacy.

6. Conclusions

First, the levels of general self-efficacy remained stable among Chinese college students, though with minor fluctuations during the four academic years. Meanwhile, the self-esteem of students continuously declined over time, and students from elite universities had higher self-esteem than their counterparts from non-elite universities.

Second, the general self-efficacy of students was significantly and positively correlated with their self-esteem at college.

Third, there were distinct differences in the reciprocal relationships regarding students' elite university attendance. The self-esteem and general self-efficacy among elite university students reinforced each other from the freshman to the junior years, whereas the self-esteem of their

equivalents from non-elite universities monodirectionally predicted their subsequent general self-efficacy levels from the sophomore to the senior years.

The study adds to the literature by exploring the directionality of the relationship between self-esteem and generalized self-efficacy with a four-wave random intercepts cross-lagged model, and discussing the heterogeneity of the relationship among college students from institutions of different tiers.

The findings of the present study imply that the institutions of higher education should take targeted interventions on the mental health of college students. First, colleges and universities should strive to bolster the self-esteem of students. Previous studies showed that low self-esteem is one of the crucial risk factors that may lead to problems such as psychological disorders, substance abuse, antisocial behavior, and economic distress (Trzesniewski et al., 2006). Given that the self-cognition of college students remains unstable and their levels of self-esteem decline over time, it might be helpful to offer them certain psychological courses. Through professional training such as meditation, and cognitive intervention therapy, students can regard themselves in a positive way confronted with changes and uncertainties at this stage. In this way, their self-esteem may keep stable and possible mental problems can be prevented. A meta-analysis study indicated that interventions on the self-esteem of children and adolescents can effectively improve their subsequent behavior, personality, and academic performance, which might be more efficacious than interventions on their behaviors and social skills (Haney & Durlak, 1998). It verifies the significance of the preventive interventions on self-esteem for college students. Second, institutions of different tiers should take specific measures respectively. In particular, students from non-elite colleges and universities may be more difficult to obtain high levels of self-esteem through increasing general self-efficacy. Thus, it is of significance to improve their self-esteem so as to exert practical impacts on their prospective general self-efficacy during college life.

Declarations

Data availability statement

Data will be made available on request.

Declaration of interests statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

References

Arnett, J.J., 2000. Emerging adulthood: a theory of development from the late teens through the twenties. Am. Psychol. 55 (5), 469.

Arnett, J.J., 2014. Presidential address: the emergence of emerging adulthood: a personal history. Emerg. Adulthood 2 (3), 155–162.

Ausubel, D.P., 1952. Ego Development and the Personality Disorders. Grune & Stratton, New York, NY.

Ausubel, D.P., 1996. Ego Development and Psychopathology. Transaction Publishers, New Brunswick, NJ.

Ausubel, D.P., 2002. Theory and Problems of Adolescent Development, third ed. Writers Club Press, New York, NY.

Baker, R.W., Siryk, B., 1984. Measuring adjustment to college. J. Counsel. Psychol. 31 (2), 179.

Bandura, A., 1997. Self-efficacy: the Exercise of Control. W. H. Freeman, New York, p. p3.

Baumeister, R., 1993. Self-esteem: the Puzzle of Low Self-Regard. Plenum, New York.

Brown, J.D., Dutton, K.A., 1995. The thrill of victory, the complexity of defeat: self-esteem and people's emotional reactions to success and failure. J. Pers. Soc. Psychol. 68 (4), 712.

Brown, J.D., Mankowski, T.A., 1993. Self-esteem, mood, and self-evaluation: changes in mood and the way you see you. J. Pers. Soc. Psychol. 64 (3), 421.

Burke, P.J., Stets, J.E., 1998. Identity Theory and Social Identity Theory: Two Theories or One? American Sociological Association.

Burke, P.J., Stets, J.E., 1999. Trust and commitment through self-verification. Soc. Psychol. Q. 347–366.

Campbell, J.D., 1990. Self-esteem and clarity of the self-concept. J. Pers. Soc. Psychol. 59 (3), 538.

Caprara, G.V., Alessandri, G., Barbaranelli, C., Vecchione, M., 2013. The longitudinal relations between self-esteem and affective self-regulatory efficacy. J. Res. Pers. 47 (6), 859–870.

Cast, A.D., Burke, P.J., 2002. A theory of self-esteem. Soc. Forces 80 (3), 1041–1068.

Chen, G., Gully, S.M., Eden, D., 2004. General self-efficacy and self-esteem: toward theoretical and empirical distinction between correlated self-evaluations. J. Organ. Behav.: Int. J. Indus. Occupat. Organ. Psychol. Behav. 25 (3), 375–395.

Chen, G., Huang, S., Hu, X., 2019. Backpacker personal development, generalized self-efficacy, and self-esteem: testing a structural model. J. Trav. Res. 58 (4), 680–694.

Dahlbeck, D.T., Lightsey Jr., O.R., 2008. Generalized self-efficacy, coping, and self-esteem as predictors of psychological adjustment among children with disabilities or chronic illnesses. Child Health Care 37 (4), 293–315.

D'Amico, A., Cardaci, M., 2003. Relations among perceived self-efficacy, self-esteem, and school achievement. Psychol. Rep. 92 (3), 745–754.

Diseth, Å., Meland, E., Breidablik, H.J., 2014. Self-beliefs among students: grade level and gender differences in self-esteem, self-efficacy and implicit theories of intelligence. Learn. Indiv Differ 35, 1–8.

Dodgson, P.G., Wood, J.V., 1998. Self-esteem and the cognitive accessibility of strengths and weaknesses after failure. J. Pers. Soc. Psychol. 75 (1), 178.

Erol, R.Y., Orth, U., 2011. Self-esteem development from age 14 to 30 years: a longitudinal study. J. Pers. Soc. Psychol. 101 (3), 607.

Folkman, S., Lazarus, R.S., 1985. If it changes it must be a process: study of emotion and coping during three stages of a college examination. J. Pers. Soc. Psychol. 48 (1), 150.

Franks, D.D., Marolla, J., 1976. Efficacious action and social approval as interacting dimensions of self-esteem: a tentative formulation through construct validation. Sociometry 324–341.

Fu, W., Tang, W., Xue, E., Li, J., Shan, C., 2021. The mediation effect of self-esteem on job-burnout and self-efficacy of special education teachers in Western China. Int. J. Dev. Disabil. 67 (4), 273–282.

Gao, W., Luo, Y., Cao, X., Liu, X., 2022. Gender differences in the relationship between self-esteem and depression among college students: a cross-lagged study from China. J. Res. Pers. 104202.

Gao, W., Ping, S., Liu, X., 2020. Gender differences in depression, anxiety, and stress among college students: a longitudinal study from China. J. Affect. Disord. 263, 292–300.

Gecas, V., 1982. The self-concept. Annu. Rev. Sociol. 8 (1), 1–33.

Gecas, V., Schwalbe, M.L., 1983. Beyond the looking-glass self: social structure and efficacy-based self-esteem. Soc. Psychol. Q. 77–88.

Haney, P., Durlak, J.A., 1998. Changing self-esteem in children and adolescents: a meta-analytical review. J. Clin. Child Psychol. 27 (4), 423–433.

Harter, S., 2006. The self. In: Eisenberg, N., Damon, W., Lerner, R.M. (Eds.), Handbook of Child Psychology: Social, Emotional, and Personality Development, sixth ed.3. John Wiley, Hoboken, NJ, pp. 505–570.

Judge, T.A., Bono, J.E., 2001. Relationship of core self-evaluations traits—self-esteem, generalized self-efficacy, locus of control, and emotional stability—with job satisfaction and job performance: a meta-analysis. J. Appl. Psychol. 86 (1), 80.

Judge, T.A., Locke, E.A., Durham, C.C., Kluger, A.N., 1998. Dispositional effects on job and life satisfaction: the role of core evaluations. J. Appl. Psychol. 83 (1), 17.

Judge, T., Locke, E., Durham, C., 1997. The dispositional causes of job satisfaction: a core evaluations approach. Res. Organ. Behav. 19, 151–188.

Kernis, M.H. (Ed.), 1995. Efficacy, agency, and Self-Esteem. Plenum, New York.

Kernis, M.H., Brockner, J., Frankel, B.S., 1989. Self-esteem and reactions to failure: the mediating role of overgeneralization. J. Pers. Soc. Psychol. 57 (4), 707.

Kong, F., You, X., 2013. Loneliness and self-esteem as mediators between social support and life satisfaction in late adolescence. Soc. Indicat. Res. 110 (1), 271–279.

Kong, F., Zhao, J., You, X., 2012. Emotional intelligence and life satisfaction in Chinese university students: the mediating role of self-esteem and social support. Pers. Indiv. Differ. 53 (8), 1039–1043.

Lane, A.M., Jones, L., Stevens, M.J., 2002. Coping with failure: the effects of self-esteem and coping on changes in self-efficacy. J. Sport Behav. 25 (4), 331.

Leung, D.Y., Leung, A.Y., 2011. Factor structure and gender invariance of the Chinese General Self-Efficacy Scale among soon-to-be-aged adults. J. Adv. Nurs. 67 (6), 1383–1392.

Li, J.B., Delvecchio, E., Di Riso, D., Salcuni, S., Mazzeschi, C., 2015. Self-esteem and its association with depression among Chinese, Italian, and Costa Rican adolescents: a cross-cultural study. Pers. Indiv. Differ. 82, 20–25.

Lightsey Jr., O.R., Burke, M., Ervin, A., Henderson, D., Yee, C., 2006. Generalized self-efficacy, self-esteem, and negative affect. Canad. J. Behav. Sci. Revue Canadienne des sciences du comportement 38 (1), 72.

Liu, Xinqiao, Cao, Xiaojie, Gao, Wenjuan, 2022. Does low self-esteem predict anxiety among Chinese college students? Psychol. Res. Behav. Manag. 15, 1481–1487.

Liu, X., Gao, X., Ping, S., 2019a. Post-1990s college students academic sustainability: the role of negative emotions, achievement goals, and self-efficacy on academic performance. Sustainability 11 (3), 775.

Liu, X., Ping, S., Gao, W., 2019b. Changes in undergraduate students' psychological well-being as they experience university life. Int. J. Environ. Res. Publ. Health 16 (16), 2864.

Luo, Y., Gao, W., Liu, X., 2022. Longitudinal relationship between self-esteem and academic self-efficacy among college students in China: evidence from a cross-lagged model. Front. Psychol. 13, 877343.

Lyu, H., Du, G., Rios, K., 2019. The relationship between future time perspective and self-esteem: a cross-cultural study of Chinese and American college students. Front. Psychol. 10, 1518.

Marcionetti, J., Rossier, J., 2021. A longitudinal study of relations among adolescents' self-esteem, general self-efficacy, career adaptability, and life satisfaction. J. Career Dev. 48 (4), 475–490.

Moreland, R.L., Sweeney, P.D., 1984. Self-expectancies and reactions to evaluations of personal performance. J. Pers. 52 (2), 156–176.

Ouyang, Y., Wang, K., Zhang, T., Peng, L., Song, G., Luo, J., 2020. The influence of sports participation on body image, self-efficacy, and self-esteem in college students. Front. Psychol. 10, 3039.

Pérez-Fuentes, M.D.C., Jurado, M.D.M.M., Gázquez Linares, J.J., 2019. Explanatory value of general self-efficacy, empathy and emotional intelligence in overall self-esteem of healthcare professionals. Soc. Work. Publ. Health 34 (4), 318–329.

Rodgers, L.S., Tennison, L.R., 2009. A preliminary assessment of adjustment disorder among first-year college students. Arch. Psychiatr. Nurs. 23 (3), 220–230.

Rosenberg, M., 1965. Society and the Adolescent Self-Image. Princeton University Press, Princeton, NJ, p. p31.

Schwarzer, R., Jerusalem, M., 1995. Generalized self-efficacy scale. In: Weinman, J., Wright, S., Johnston, M. (Eds.), Measures in Health Psychology: A User's Portfolio. Causal and Control Beliefs. NFER-NELSON, Windsor, UK, pp. 35–37.

Schwarzer, R., Bäßler, J., Kwiatek, P., Schröder, K., Zhang, J.X., 1997. The assessment of optimistic self-beliefs: comparison of the German, Spanish, and Chinese versions of the general self-efficacy scale. Appl. Psychol. 46 (1), 69–88.

Schwarzer, R., Boehmer, S., Luszczynska, A., Mohamed, N.E., Knoll, N., 2005. Dispositional self-efficacy as a personal resource factor in coping after surgery. Pers. Indiv. Differ. 39 (4), 807–818.

Smith, M.E., 2015. Staying connected: supportive communication during the college transition. In: Bruess, Carol J. (Ed.), Family Communication in the Age of Digital and Social Media. Peter Lang Publishers, New York, pp. 184–205.

Staples, C.L., Schwalbe, M.L., Gecas, V., 1984. Social class, occupational conditions, and efficacy-based self-esteem. Socio. Perspect. 27 (1), 85–109.

Trzesniewski, K.H., Donnellan, M.B., Moffitt, T.E., Robins, R.W., Poulton, R., Caspi, A., 2006. Low self-esteem during adolescence predicts poor health, criminal behavior, and limited economic prospects during adulthood. Dev. Psychol. 42 (2), 381.

Wang, X., Zhang, Y., Hui, Z., Bai, W., Terry, P.D., Ma, M., et al., 2018. The mediating effect of regulatory emotional self-efficacy on the association between self-esteem and school bullying in middle school students: a cross-sectional study. Int. J. Environ. Res. Publ. Health 15 (5), 991.

Yang, C., Zhou, Y., Cao, Q., Xia, M., An, J., 2019. The relationship between self-control and self-efficacy among patients with substance use disorders: resilience and self-esteem as mediators. Front. Psychiatr. 10, 388.

Zeng, G., Fung, S.F., Li, J., Hussain, N., Yu, P., 2020. Evaluating the psychometric properties and factor structure of the general self-efficacy scale in China. Curr. Psychol. 1–11.

Zhang, J.X., Schwarzer, R., 1995. Measuring optimistic self-beliefs: a Chinese adaptation of the general self-efficacy scale. Psychologia: Int. J. Psychol. Orient.

Zhang, Y., Dong, S., Fang, W., Chai, X., Mei, J., Fan, X., 2018. Self-efficacy for self-regulation and fear of failure as mediators between self-esteem and academic procrastination among undergraduates in health professions. Adv. Health Sci. Educ. 23 (4), 817–830.

Zhao, J., Kong, F., Wang, Y., 2012. Self-esteem and humor style as mediators of the effects of shyness on loneliness among Chinese college students. Pers. Indiv. Differ. 52 (6), 686–690.