Higher Education Studies; Vol. 13, No. 4; 2023
ISSN 1925-4741 E-ISSN 1925-475X
Published by Canadian Center of Science and Education

The Impact of College Students' Perceived Transformational Leadership on Learning Outcomes: The Serial Mediating Role of Academic Self-Efficacy and Achievement Goal Orientation

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Received: July 19, 2023 Accepted: August 24, 2023 Online Published: August 28, 2023

doi:10.5539/hes.v13n4p1 URL: https://doi.org/10.5539/hes.v13n4p1

Abstract

This study explores the relationship between college students' perceived transformational leadership and their learning outcomes based on social cognitive theory. Furthermore, it elucidates the mediating role of academic self-efficacy and achievement goal orientation. A questionnaire survey was conducted among 916 Chinese college students, and the findings indicate that college students' perceived transformational leadership significantly and positively influences their learning outcomes. Academic self-efficacy singly mediates the relationship between college students' perceived transformational leadership and learning outcomes. Achievement goal orientation also singly mediates this relationship. Additionally, academic self-efficacy and achievement goal orientation act as serial mediators between college students' perceived transformational leadership and learning outcomes. This study provides theoretical and empirical evidence for enhancing college students' learning outcomes.

Keywords: transformational leadership, learning outcomes, academic self-efficacy, achievement goal orientation, college students

1. Introduction

Previous research has confirmed that learning outcomes of college students, as an important criterion for talent assessment, are key factors in their competitive advantage (Castro et al., 2021; Wekerle et al., 2022). Therefore, how to enhance college students' learning outcomes has been a topic of academic concern (Tsang et al., 2021; Wei et al., 2021). Learning outcomes are defined as the expected knowledge or skills that learners should understand or demonstrate at the end of a learning phase (Tsang et al., 2021). Previous studies have explored factors influencing students' learning outcomes, including their individual characteristics, leadership styles, and school management systems (Zheng & Zhang, 2020; Supriyanto et al., 2020; Asim et al., 2021). Furthermore, some researchers argue that students' learning outcomes largely depend on the leadership style of their teachers (Rashid et al., 2020; Nguyen et al., 2019).

Transformational leadership has been widely recognized as an important leadership style among teachers (Balwant, 2016; Supriyanto et al., 2020; Tsang et al., 2022). A teacher's transformational leadership refers to possessing qualities such as collaboration, enthusiasm, empowerment, vision, and creativity, and being able to inspire students with a high level of motivation, performance, and values (Li & Liu, 2022). Furthermore, a teacher's transformational leadership can influence students' learning outcomes through effective classroom management that maximizes student engagement (Kwan, 2020). Moreover, a meta-analysis conducted by Balwant (2016) revealed that teachers with a transformational leadership style can effectively stimulate positive behaviors in students, such as learning motivation, satisfaction, perceived teacher credibility, and academic performance. Therefore, it is reasonable to argue that college students' perceived transformational leadership may have a significant positive impact on their learning outcomes.

In addition to the direct impact on learning outcomes, college students' perceived transformational leadership may involve a more complex evolutionary process. According to goal-setting theory, individuals with high self-efficacy are more committed to self-set goals and are inclined to employ better task strategies in pursuit of

those goals (Locke & Latham, 2002). Therefore, this study attempts to incorporate academic self-efficacy and achievement goal orientation into this influential process, proposing that college students' perceived transformational leadership first affects their academic self-efficacy and achievement goal orientation, which in turn impact their learning outcomes. Li (2023) found a significant positive influence of college students' perceived transformational leadership on their academic self-efficacy. Furthermore, college students' academic self-efficacy has been shown to have a significant positive impact on learning outcomes (Moradian et al., 2021). Additionally, research by Luo et al. (2020) suggests a significant positive influence of college students' perceived transformational leadership on students' goal orientation. Moreover, college students' perceived transformational leadership is an important predictor of learning outcomes (Soyer & Kirikkanat, 2019). Furthermore, college students' academic self-efficacy has a significant positive impact on mastery goal orientation (Jiang et al., 2017). There is also evidence that academic self-efficacy affects college students' learning outcomes through achievement goal orientation (Alhadabi & Karpinski, 2020). Therefore, it is reasonable to infer that academic self-efficacy and achievement goal orientation mediate the impact of college students' perceived transformational leadership on their learning outcomes.

Grounded in social cognitive theory, both environmental and individual factors are known to influence behavioral outcomes (Bandura, 1986). This study examines the relationship among four variables: college students' perceived transformational leadership as an environmental factor, academic self-efficacy and achievement goal orientation as individual factors and learning outcomes as the behavioral outcome. Specifically, the study examines the impact of college students' perceived transformational leadership on learning outcomes. It also explores the mediating role of academic self-efficacy and achievement goal orientation, both single mediating and serial mediating effects.

2. Literature Review

2.1 Transformational Leadership and Learning Outcomes

Transformational leadership refers to a leadership behavior in which a leader possesses charismatic qualities, inspires subordinates to work hard, and provides individualized consideration and intellectual stimulation to empower subordinates in achieving work goals (Bass, 1985). Bass (1985) identified four dimensions of transformational leadership: idealized influence, inspirational motivation, intellectual stimulation, and individual consideration. Idealized influence involves the leader articulating a sense of mission, emphasizing trust, fostering commitment to success, and earning respect and trust. Inspirational motivation entails creating optimism and enthusiasm, setting high expectations, and focusing subordinates' efforts on their work. Intellectual stimulation involves challenging followers to think in new ways and encouraging them to analyze and solve problems. Individual consideration involves recognizing followers as unique individuals, providing special attention to their needs, and offering support to help followers unleash their full potential (Bass, 1995). Moreover, Ng (2017) suggest that transformational leaders can enhance individuals' personal outcomes by motivating and inspiring them to achieve work goals. The relationship between transformational leadership and individual outcomes has received considerable attention in the field of organizational and management research. Research conducted by Aboramadan and Kundi (2020) demonstrated that transformational leadership is a key determinant of work outcomes. Specifically, the personal charisma, motivation, intellectual stimulation, and individual consideration displayed by transformational leaders influence subordinates' work attitudes and behaviors, leading to superior work outcomes (Nandedkar & Brown, 2018). Previous empirical studies have also found significant positive effects of transformational leadership on individual outcomes (Khan et al., 2020; Han et al., 2020; Kim & Park, 2020).

Harrison (2011) conducted research indicating that the concept of transformational leadership can be applied to the field of education. Teachers who exhibit transformational leadership play a significant role in shaping students' future development and guiding their entry into academic disciplines. Balwant et al. (2019) defined teacher transformational leadership as the guidance of students in achieving learning goals, stimulation of their intellectual capabilities, and use of differentiated instruction to address individual differences among students. Teachers who possess a transformational leadership style enhance student learning outcomes through expressing a compelling vision, providing support, and increasing students' interest in learning (Li & Liu, 2022; Ogbonnaya et al., 2020). Previous empirical research has confirmed the relationship between teacher transformational leadership and learning outcomes. For instance, a study by Supriyanto et al. (2020) demonstrated that teacher transformational leadership can evoke positive emotions, enhance engagement in learning, and improve learning outcomes among high school students. Moreover, research on college students has indicated that teachers who adopt a transformational leadership style motivate students to exceed their limitations in completing learning tasks. This leads to increased maturity, self-actualization, and significant improvements in learning outcomes

(Pounder, 2008; Rashid et al., 2020).Hence, this study proposes H1: College students' perceived transformational leadership has a significant positive effect on learning outcomes.

2.2 Academic Self-efficacy, College Students' Perceived Transformational Leadership, and Learning Outcomes

Bandura (1977) introduced the concept of self-efficacy, which is defined as an individual's belief in their ability to effectively organize and execute the actions required to achieve predetermined goals. Within the field of education, academic self-efficacy extends this concept and refers to learners' evaluations of their confidence in utilizing their knowledge and skills to successfully complete learning tasks (Honicke & Broadbent, 2016). Academic self-efficacy is a subjective assessment of an individual's ability to control their learning behavior and academic performance, and it has a positive influence on students' learning outcomes (Olivier et al., 2019). In educational research, students' academic self-efficacy is recognized as a significant factor that affects their learning achievements (Dogan, 2015). Strengthening academic self-efficacy can impact students' level of effort and persistence in learning tasks, thus enhancing their learning outcomes (Hayat et al., 2020; Hanham et al., 2021). Furthermore, students with high levels of academic self-efficacy approach learning tasks with a positive mindset, even in the face of failure, resulting in significant improvements in their learning outcomes (Bergey et al., 2019). Empirical evidence from a study conducted with college students showed that academic self-efficacy has a significant positive effect on learning outcomes (Moradian et al., 2021).

Furthermore, teacher transformational leadership is an antecedent variable that influences students' academic self-efficacy (Wang et al., 2023; Pachler et al., 2019). Educators who adopt a transformational leadership style are capable of providing emotional support to students and cultivating their recognition of their own abilities through intellectual stimulation, thereby enhancing their academic self-efficacy (Pachler et al., 2019; Wang et al., 2020; Öqvist & Malmström, 2018). In addition, Bozkurt et al. (2021) research indicates that academic self-efficacy plays a mediating role in the relationship between middle school students' perceived teachers' instructional leadership and their learning outcomes. Based on this, the present study hypothesizes that perceiving transformational leadership from teachers may have a positive impact on the academic self-efficacy of college students. Furthermore, academic self-efficacy is also believed to contribute to the improvement of college students' learning outcomes. Therefore,we propose Hypothesis 2:Academic self-efficacy mediates the association between college students' perceived transformational leadership and learning outcomes.

2.3 Achievement Goal Orientation, College Students' Perceived Transformational Leadership, and Learning Outcomes

Achievement goal orientation is a type of learning motivation (Seaton et al., 2017). It refers to individuals' perceived the reasons and purposes for pursuing achievement tasks, reflecting their overall orientation towards achieving goals (Pintrich, 2000). Li et al.'s (2021) study demonstrates that achievement goal orientation significantly influences learning outcomes. Educational research indicates that achievement goal orientation creates favorable conditions for improving learning outcomes and is crucial for academic success (Alhadabi & Karpinski, 2020). Enhancing achievement goal orientation allows students to effectively manage their study time, establish clear learning objectives, and enhance their overall learning outcomes (Sorić et al., 2017). Furthermore, it encourages students to develop a positive attitude towards learning, motivating them to actively engage in their studies to attain better learning outcomes (Skaalvik, 2018). Additionally, a study conducted by Soyer and Kirikkanat (2019) with university students as participants confirmed the positive influence of achievement goal orientation on their learning outcomes.

Several empirical studies have shown that teacher transformational leadership significantly impacts goal orientation (Luo et al., 2020; Mao et al., 2020; Clipa, 2018). Teacher transformational leadership motivates students to set meaningful goals, fosters their identification with those goals, and ignites their drive for self-improvement and self-actualization, thus promoting the enhancement of goal orientation (Lamm et al., 2017). Empirical research conducted with university students as participants has also demonstrated that teachers with a transformational leadership style can significantly enhance their goal orientation (Mao et al., 2020; Lou et al., 2020). Additionally, in past empirical research on learning outcomes, achievement goal orientation has often been examined as a mediating variable (Sosik et al., 2004; Lerang et al., 2019; Alhadabi & Karpinski, 2020). This suggests that college students' perceived transformational leadership may enhance their achievement goal orientation, thereby positively influencing their learning outcomes. Therefore, this study proposes H3: Achievement goal orientation mediates the association between college students' perceived transformational leadership and learning outcomes.

2.4 College Students' Perceived Transformational Leadership, Academic Self-efficacy, Achievement Goal Orientation, and Learning Outcomes

Based on the accumulated literature, although self-efficacy and achievement goal orientation may single mediate the relationship between perceived transformational leadership and learning outcomes among college students, further exploration is needed to determine if there is a serial mediating effect. Teachers who exhibit a transformational leadership style can assist students in building confidence and motivating them to pursue more challenging goals, which in turn enhances their academic self-efficacy (Pachler et al., 2019). Students with high academic self-efficacy are more likely to engage in tasks that are challenging in order to improve their abilities, and they demonstrate a willingness to exert greater effort to complete these tasks, which significantly influences their achievement goal orientation (Lazarides et al., 2018; Feyzioğlu, 2019). Furthermore, research by Jiang et al. (2017) confirmed that academic self-efficacy was a key factor that influenced achievement goal orientation. Similarly, Carter et al. (2018) found that employees with higher self-efficacy set higher goals, resulting in better job performance. Comparable findings have also been observed in educational research, where students with high self-efficacy tend to set higher mastery goals, engage in more challenging tasks, and employ proactive problem-solving strategies when faced with difficulties, ultimately leading to better learning outcomes (Honicke & Broadbent, 2016; Alhadabi & Karpinski, 2020). In summary, we hypothesize that college students' perceived transformational leadership may positively influence their academic self-efficacy, subsequently enhancing their achievement goal orientation, and ultimately promoting their learning outcomes. Therefore, this study proposes Hypothesis 4: Academic self-efficacy and achievement goal orientation mediate the relationship between perceived transformational leadership and learning outcomes among college students in a serial mediating effect.

In conclusion, although research in the field of education has found a positive influence of college students' perceived transformational leadership on learning outcomes, the underlying mechanisms still requires further investigation. Hence, based on social cognitive theory, this study employs academic self-efficacy and achievement goal orientation as mediating variables to uncover the impact mechanism of perceived transformational leadership on learning outcomes among college students (as shown in Figure 1).

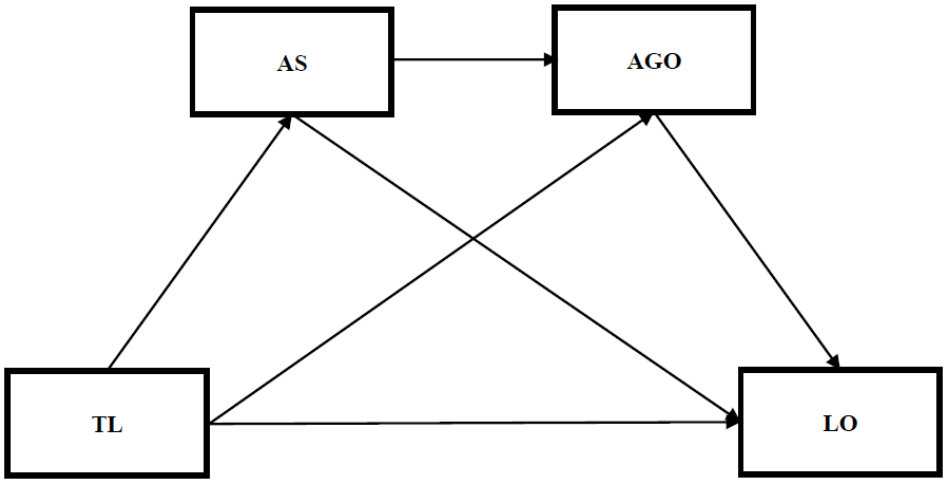

Figure 1. Research Framework

Note: TL= transformational leadership; ASE= academic self-efficacy; AGO= achievement goal orientation; LO=learning outcome

3. Research Method

3.1 Sample and Data Collection

Convenience sampling was employed in this study to conduct a questionnaire survey among college students in Hebei Province, China. A total of 950 questionnaires were distributed, and after excluding invalid responses, 916 valid questionnaires were obtained, resulting in a response rate of 96.4%. Table 1 presents the basic information of the participants.

Table 1. Demographic information of the participants

Demographic	Category	N	Percentage
Gender	Male	524	57.2%
	Female	392	42.8%
Grade	1	326	35.6%
	2	214	23.4%
	3	190	20.7%
	4	186	20.3%

3.2 Measures

The measurement tools used in this study include the Transformational Leadership Scale, the Academic Self-Efficacy Scale, the Achievement Goal Orientation Scale, and the Learning Outcome Scale. They are described in detail as follows:

3.2.1 The Transformational Leadership Scale

This study employed the transformational leadership scale devised by Bass and Avolio (2000), which has been previously utilized by Chinese researchers in transformational leadership studies (Liu & Huang, 2020; Li, 2023;Chen & Wu, 2020). Hence, this scale is well-suited for the present research. The scale consists of 16 items, encompassing four dimensions: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration. The measurement items were modified to align with the educational context. Sample items include "The teacher emphasizes the importance of a collective sense of mission" (idealized influence), "The teacher guides students in outlining their learning and career prospects" (inspirational motivation), "The teacher encourages students to consider problems from different perspectives" (intellectual stimulation), and "The teacher is willing to invest extra time in instructing students" (individualized consideration). With the aim of further ascertaining whether college students can genuinely perceive the exhibated transformational leadership of teachers. The Likert five-point scoring system was used, with the scoring modified based on the Multifactor Leadership Questionnaire by Bass and Avolio (1995), where 1="never," 2="rarely," 3="occasionally," 4="frequently," and 5="always." The adaptation aimed to assess the perceived level of transformational leadership displayed by teachers as perceived by college students. To align with the educational context of this study, the term "leader" was replaced with "teacher," and "subordinate" was replaced with "student" in the scale. Higher scores indicate a stronger perceived transformational leadership by college students. In this study, the Cronbach's α values for each dimension of the scale were 0.851, 0.851, 0.828, and 0.854, with an overall Cronbach's α value of 0.918, all exceeding 0.7, indicating good reliability of the scale (Nunally, 1978). Confirmatory factor analysis results showed: χ^2/df = 3.724, SRMR = 0.034, RMSEA = 0.055, CFI = 0.965, NFI = 0.952, GFI = 0.955, TLI = 0.957, indicating a good model fit (McDonald & Ho, 2002).

3.2.2 The Academic Self-efficacy Scale

This study employed the Academic Self-Efficacy Scale developed by Chinese researcher Liang (2004). The scale was specifically designed to measure the level of academic self-efficacy among university students within a Chinese university context. The scale consists of 22 items, categorized into two dimensions: self-efficacy in learning abilities and self-efficacy in learning behaviors. Sample items include "I believe in my ability to achieve good academic results" (self-efficacy in learning abilities) and "When studying, I often use self-questioning to test if I have mastered the content" (self-efficacy in learning behaviors). Utilizing a five-point Likert scale ranging from 1="strongly disagree" to 5="strongly agree," higher scores indicate a stronger sense of academic self-efficacy among college students. In this study, the Cronbach's α values for each dimension of the scale were found to be 0.942 and 0.946, respectively, with an overall Cronbach's α value of 0.957, all exceeding the threshold of 0.7, indicating good reliability of the scale. Confirmatory factor analysis results yielded the following indices: χ^2/df=3.530, SRMR=0.029, RMSEA=0.053, CFI=0.966, NFI=0.953, GFI=0.923, TLI=0.962, indicating a satisfactory fit between the model and the observed data.

3.2.3 The Achievement Goal Orientation Scale

This study utillized the Achievement Goal Orientation Scale developed by Chinese researcher Xu et al. (2000). The scale was specifically designed to measure the goal orientation of Chinese university students and consists of 12 items, encompassing two dimensions: performance goal orientation and mastery goal orientation. Sample items include "I prefer to engage in tasks at which I excel rather than those at which I perform poorly" (performance goal orientation) and "I am willing to engage in tasks that allow me to learn something new"

(mastery goal orientation). Using a five-point Likert scale ranging from 1="strongly disagree" to 5="strongly agree," higher scores indicate a stronger achievement goal orientation among college students. In this study, the Cronbach's α values for each dimension of the scale were found to be 0.887 and 0.902, respectively, with an overall Cronbach's α value of 0.918, all exceeding the threshold of 0.7, indicating good reliability of the scale. Confirmatory factor analysis results yielded the following indices: χ^2/df=4.203, SRMR=0.029, RMSEA=0.059, CFI=0.973, NFI=0.966, GFI=0.959, TLI=0.967, indicating a satisfactory fit between the model and the observed data.

3.2.4 The Learning Outcomes Scale

This study utilized the Learning Outcomes Scale developed by Chinese researchers Li et al. (2016). The scale was designed within the context of Chinese culture and has demonstrated good reliability and validity. The scale consists of 19 items, encompassing four dimensions: cognitive abilities, communication skills, self-management abilities, and interpersonal facilitation abilities. Sample items include "I can flexibly apply the knowledge I have learned" (cognitive abilities), "I can communicate clearly with others" (communication skills), "I can effectively manage my time" (self-management abilities), and "I always take the initiative to help other classmates" (interpersonal facilitation abilities). Using a five-point Likert scale ranging from 1="strongly disagree" to 5="strongly agree," higher scores indicate higher learning outcomes among college students. In this study, the Cronbach's α values for each dimension of the scale were found to be 0.856, 0.874, 0.868, and 0.870, respectively, with an overall Cronbach's α value of 0.932, all exceeding the threshold of 0.7, indicating good reliability of the scale. Confirmatory factor analysis results yielded the following indices: χ^2/df=4.039, SRMR=0.039, RMSEA=0.058, CFI=0.955, NFI=0.942, GFI=0.940, TLI=0.948, indicating a satisfactory fit between the model and the observed data.

3.3 The CMV (Common Method Variance) Test

In this study, the Harman's single-factor test was employed to examine the presence of common method bias. A total of 12 factors were obtained with eigenvalues greater than 1, and the first factor accounted for 32.256% of the variance, which did not exceed the reference value of 50% (Podsakoff et al., 2003). This indicates that there is no severe common method bias in the data.

3.4 Data Analysis

The collected data was subjected to reliability testing, descriptive statistics, and analysis of inter-variable correlations using SPSS. Additionally, confirmatory factor analysis was conducted using AMOS, and a latent variable structural equation model was used to examine the mediating effects.

4. Results

4.1 Descriptive Statistics and Correlation Analysis

Descriptive statistics and correlation analysis were performed on the dimensions of each variable in this study, as shown in Table 2. The results indicate that there is a significant positive correlation among the various dimensions of perceived transformational leadership, academic self-efficacy, achievement goal orientation, and learning outcomes, with correlation coefficients ranging from 0.248 to 0.643, all achieving a significant level of $p < .001$.

Table 2. Correlations between descriptive statistics and observed variables

variables	1	2	3	4	5	6	7	8	9	10	11	12
1	***.595***											
2	.571***	***.599***										
3	.509***	.508***	***.550***									
4	.553***	.573***	.513***	***.605***								
5	.376***	.339***	.321***	.351***	***.599***							
6	.345***	.302***	.313***	.319***	.643***	***.632***						
7	.357***	.354***	.345***	.378***	.429***	.469***	***.571***					
8	.292***	.305***	.283***	.306***	.401***	.444***	.605***	***.613***				
9	.282***	.344***	.388***	.234***	.442***	.439***	.419***	.427***	***.611***			
10	.248***	.305***	.358***	.209***	.412***	.441***	.420***	.459***	.550***	***.592***		
11	.305***	.362***	.427***	.270***	.456***	.453***	.443***	.466***	.635***	.546***	***.582***	
12	.308***	.379***	.386***	.260***	.470***	.461***	.424***	.474***	.613***	.552***	.586***	***.578***
M	3.936	3.802	3.687	3.751	3.679	3.492	3.067	3.022	3.724	3.547	3.604	3.723
SD	.733	.719	.689	.745	.689	.838	.988	1.137	.717	.849	.794	.623

Note1: 1=Idealized influence, 2=Inspirational motivation, 3=Intellectual stimulation, 4=Individualized consideration, 5=learning ability self-efficiency, 6=learning behavior self-efficiency, 7=performance goal orientation, 8=master goal orientation, 9=learning cognitive ability,

10=communication ability, 11=self- management ability, 12=interpersonal promotion ability
Note 2: $^{***}p<0.001$
Note 3: Bolded and italicized values in the table are the square root value of the AVE

4.2 Hypotheses Testing

4.2.1 Total Effect

In order to examine the influence of college students'perceived transformational leadership on learning outcomes, a total effect model was established. The model fit indices are as follows: χ^2/df=3.878, SRMR=0.041, RMSEA=0.056, CFI=0.982, NFI=0.976, GFI=0.981, TLI=0.973. The results indicate that perceived transformational leadership significantly and positively influences learning outcomes (β=0.594, p<0.001), supporting the hypothesis H1.

4.2.2 Mediating Effect

In this study, the mediating role of academic self-efficacy and achievement goal orientation was further examined based on the total effect model. The model fit indices are as follows: χ^2/df=3.326, SRMR=0.034, RMSEA=0.050, CFI=0.977, NFI=0.968, GFI=0.973, TLI=0.969, indicating good model fit. The results are shown in Figure 2. The results indicate that college students' perceived transformational leadership has a significant positive effect on learning outcomes (β=0.111, p<0.001). College students' perceived transformational leadership significantly and positively influences academic self-efficacy and achievement goal orientation (β=0.564, p<0.001; β=0.263, p<0.001). Academic self-efficacy and achievement goal orientation significantly and positively influence learning outcomes (β=0.378, p<0.001; β=0.411, p<0.001). Academic self-efficacy has a significant positive effect on achievement goal orientation (β=0.552, p<0.001).

Furthermore, this study used non-parametric percentile Bootstrap method (repeated sampling 5000 times) to test the mediating effect, with a confidence interval set at 95%. If the confidence interval does not include 0, it indicates a significant mediating effect (Hayes, 2013). In the paths of the influence of perceived transformational leadership on learning outcomes, path1 (TL→AS→LO), path2 (TL→AGO→LO), and path3 (TL→AS→AGO→LO) are all significant, as shown in Table 4. The mediating effect value of path1 is 0.214 [95% CI 0.154-0.279], the mediating effect value of path2 is 0.108 [95% CI 0.065-0.161], and the mediating effect value of path3 is 0.128 [95% CI 0.092-0.175]. This suggests that academic self-efficacy and achievement goal orientation not only have a singular mediating effect in the influence of perceived transformational leadership on learning outcomes but also have a serial mediating effect. In conclusion, the results of this study support hypotheses H2-H4.

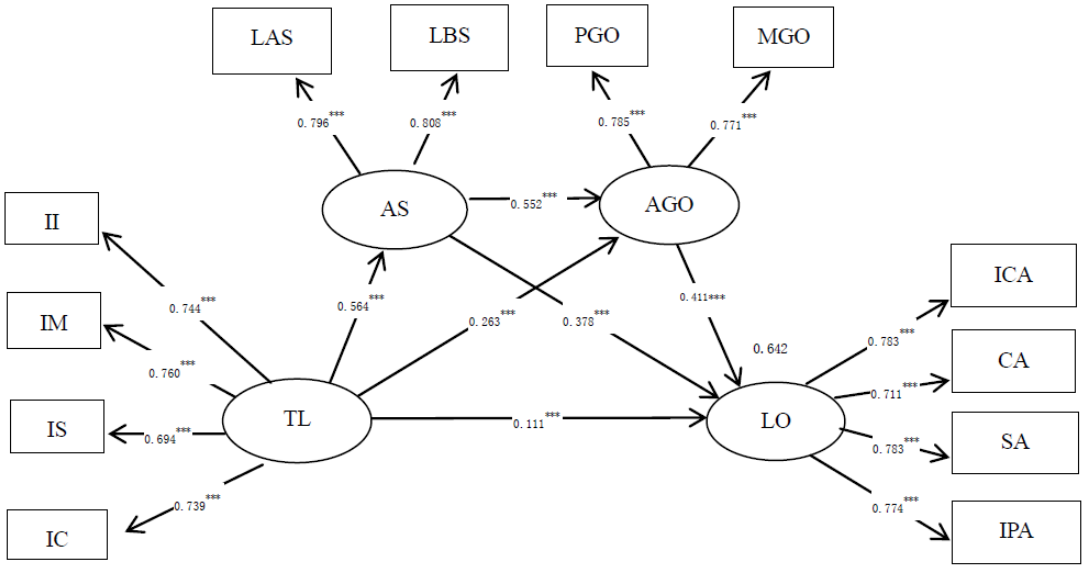

Figure 2. Standardized Relationship Path Diagram

Note1: TL=Transformational Leadership, II=Idealized Influence, IM=Inspirational Motivation, IS=Intellectual Stimulation, IC=Individualized Consideration; AS=Academic Self-efficacy, LAS=Learning Ability Self-efficiency, LBS=Learning Behavior Self-efficiency; AGO=Achievement Goal Orientation, PGO=Performance Goal Orientation, MGO=Master Goal Orientation; LO=Learning Outcomes, ICA=Learning

Cognitive Ability, CA=Communication Ability, SA=Self-management Ability, IPA=Interpersonal Promotion Ability

Note 2: $^{***}p<0.001$

Table 3. Mediating Effect with Bootstrapping

Path	Effect	95% LLCI	95% ULCI
Direct effect TL→LO	0.111^{***}	0.026	0.201
Indirect effect 1 TL→AS→LO	0.214^{***}	0.154	0.279
Indirect effect 2 TL→AGO→LO	0.108^{***}	0.065	0.161
Indirect effect 3 TL→AS→AGO→LO	0.128^{***}	0.092	0.175
Total Indirect effect	0.450^{***}	0.387	0.516
Total effect TL→LO	0.561^{***}	0.499	0.623

Note1. Bootstrapping random sampling 5,000 times; LLCI= Lower limit of confidence interval; ULCI= Upper limit of confidence interval

Note2: $^{***}p<0.001$.

5. Discussion

The study confirmed that college students' perceived transformational leadership significantly influences learning outcomes, thereby supporting Hypothesis 1. The findings of this study demonstrate the significant role of teachers' transformational leadership in shaping college students' learning outcomes, aligning with previous research (Pounder, 2008; Rashid et al., 2020) that supports the positive impact of perception of transformational leadership on learning outcomes among college students. There are two main reasons for this. First, teachers' transformational leadership offers personalized support to students, helping alleviate their anxiety and academic pressure, which in turn enables them to independently acquire new knowledge and improve their learning outcomes (Rashid et al., 2020). Furthermore, studies indicate that college students' perception of their teachers' transformational leadership not only stimulates them to employ innovative problem-solving strategies but also acts as a motivation to pursue breakthroughs in their studies, resulting in improved learning outcomes (Ogbonnaya et al., 2020). These findings underscore the positive impact of college students' perception of transformational leadership on their learning outcomes.

Moreover, the findings of this study demonstrate that academic self-efficacy plays a mediating role in the association between college students' perceived transformational leadership and their learning outcomes, thereby providing support for Hypothesis 2. These findings indirectly align with previous empirical research (Öqvist & Malmström, 2018; Pachler et al., 2019) that indicates a positive association between transformational leadership and academic self-efficacy. Moreover, research has consistently demonstrated that academic self-efficacy significantly influences college students' learning outcomes (Hayat et al., 2020; Hanham et al., 2021; Moradian et al., 2021). It is hypothesized that this impact is primarily attributed to the intellectual stimulation inherent in transformational leadership, which encourages students to actively engage in problem-solving strategies, thus augmenting their experiences of successfully applying their knowledge and skills and ultimately enhancing their academic self-efficacy (Wang et al., 2020). Additionally, research suggests that academic self-efficacy plays a crucial role in enhancing students' confidence in their learning capabilities, thereby promoting a proactive learning attitude and ultimately leading to improved learning outcomes (Bergey et al., 2019; Moradian et al., 2021).

Thirdly, the study revealed that achievement goal orientation has a mediating effect in the relationship between college students' perceived transformational leadership and their learning outcomes, thereby providing support for Hypothesis 3. Therefore, transformational leadership has the potential to enhance students' achievement goal orientation, consequently leading to improved learning outcomes. These findings indirectly align with previous empirical research (Lamm et al., 2017) that highlights the positive influence of transformational leadership on achievement goal orientation. Moreover, research acknowledges that achievement goal orientation plays a

crucial role in shaping college students' learning outcomes (Soyer & Kirikkanat, 2019; Skaalvik, 2018). By providing intellectual stimulation, transformational leadership motivates and guides students to explore new concepts, adopt innovative problem-solving approaches, and willingly tackle challenging tasks, ultimately enhancing their achievement goal orientation (Sosik et al., 2004). Likewise, college students characterized by high achievement goal orientation proactively seek out challenging tasks and face difficulties and failures with a positive mindset, resulting in improved learning outcomes (Soric et al., 2017).

The findings of this study demonstrate that academic self-efficacy and achievement goal orientation have a serial mediating effect in the relationship between college students' perceived transformational leadership and their learning outcomes, supporting Hypothesis 4. This suggests that when college students perceive transformational leadership, it positively influences their academic self-efficacy and contributes to changes in their achievement goal orientation, which then impacts their learning outcomes. According to social cognitive theory, individual behavior, in this case learning outcomes, is influenced by both environmental factors, such as transformational leadership, and individual factors, such as academic self-efficacy and achievement goal orientation. Additionally, individuals with high self-efficacy are more likely to develop effective task strategies to achieve their goals compared to those with low self-efficacy (Latham et al., 1994; Wood & Bandura, 1989). Therefore, when college students perceive their teachers exhibiting transformational leadership, it increases their academic self-efficacy, which further enhances their achievement goal orientation and ultimately promotes better learning outcomes.

6. Conclusion

This study introduced a serial mediating model to investigate the mechanism by which college students' perceived transformational leadership influences their learning outcomes. The results indicate that the perceived transformational leadership has a significant positive impact on learning outcomes among college students. Additionally, academic self-efficacy and achievement goal orientation each have a single mediating effect in the relationship between students' perceived transformational leadership and their learning outcomes. Moreover, academic self-efficacy and achievement goal orientation serve as serial mediators in the relationship between students' perception of transformational leadership and their learning outcomes.

7. Research Recommendation

Based on the study results, this research provides the following recommendations for college leaders and educators:

Firstly, cultivating transformational leadership behaviors among educators: Since college students' perceived transformational leadership significantly enhances their learning outcomes, it is crucial to foster these behaviors among educators. Higher education institutions can organize workshops, trainings, and lectures related to transformational leadership, providing teachers with relevant information and application strategies.

Secondly, motivating and guiding students towards academic self-efficacy: Academic self-efficacy has a mediating effect in the relationship between college students' perceived transformational leadership and their learning outcomes. Educators should motivate and guide students towards proper attributions, helping them gain positive experiences regarding their own abilities and ultimately improving their academic self-efficacy.

Thirdly, encouraging appropriate achievement goals and building confidence: Considering the mediating effect of achievement goal orientation in the relationship between college students' perceived transformational leadership and their learning outcomes, educators can encourage students to establish appropriate achievement goals based on their actual situations. Teachers can strengthen the implementation of these goals, continuously building confidence and helping students achieve positive learning outcomes.

Lastly, paying attention to academic self-efficacy and creating a goal-oriented learning environment: Academic self-efficacy and achievement goal orientation act as serial mediators in the relationship between college students' perceived transformational leadership and their learning outcomes. Educators should pay special attention to the role of academic self-efficacy and encourage the development of students' beliefs in their academic self-efficacy. Colleges should provide support for building high-quality relationships between teachers and students, with teachers understanding students' learning situations and characteristics. This includes offering more support and care while striving to create a goal-oriented learning environment. These measures not only promote the improvement of students' academic self-efficacy but also enhance their learning outcomes. Moreover, teachers can effectively improve learning outcomes by setting challenging learning tasks that enhance students' achievement goal orientation.

8. Limitations and Future Research Directions

This study has confirmed the impact of college students' perceived transformational leadership on learning

outcomes and revealed the underlying mechanisms. However, there are some limitations that need to be considered. Firstly, this study solely investigated university students from Hebei Province in China, which may potentially limits its generalizability in non-Western contexts. Future research endeavors could encompass a broader spectrum by including samples from various countries and diverse cultural backgrounds, thereby enhancing the universal applicability of the study.

Secondly, this study employed a cross-sectional design, which can establish associations between variables but cannot determine causal relationships. Future research could utilize longitudinal designs to establish causal relationships. Lastly, this study found that academic self-efficacy and achievement goal orientation singly mediate the relationship between college students' perceived transformational leadership and learning outcomes. These findings suggest that other potential mediating factors, such as learning engagement (Collie et al., 2017) and academic emotions (Muntaner-Mas et al., 2017), may also be involved in this mechanism. It is recommended that future researchers incorporate additional mediating factors to further expand upon the findings of this study.

Acknowledgments

We thank all study participants. CL has drafted the manuscript. JH served as the research advisor. JH and CL made important contributions to conception, data collection, data analysis, and manuscript revision.

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