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The Mediating Effect of Learning Motivation and Moderating Effects of Sports Confidence in the Relationship between Self-Leadership and Self-Efficacy among College Students

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Abstract

This study aimed to examine the mediating effect of learning motivation and moderating effects of sports confidence in the relationship between self-leadership and self-efficacy among college students, considering the increasing importance of physical activity in their daily lives. The participants consisted of 312 college students (168 males, 144 females) residing in Seoul and Daejeon. The collected data were analyzed using descriptive statistics, confirmatory factor analysis, correlation analysis, structural equation modeling (SEM), and moderation effect analysis. The analytical results were as follows: First, no significant differences were found in self-leadership, learning motivation, and self-efficacy across gender, grades, and type of exercise, except for learning motivation, which manifested a significant difference by gender. Second, self-leadership had a direct and significant effect on self-efficacy. Third, learning motivation significantly mediated the relationship between self-leadership and self-efficacy. Fourth, the moderating effect of sports confidence was significant in the relationship between self-leadership and self-efficacy, and between learning motivation and self-efficacy, but not in the relationship between self-leadership and learning motivation. The findings of the study exhibited that college students with higher levels of sports confidence manifested a stronger effect of learning motivation on self-efficacy, suggesting that confidence developed through sports can amplify the positive impact of learning motivation. These findings also highlighted the importance of fostering both self-directed learning skills and sports confidence to enhance students' self-efficacy and psychological development.

Key words: college student, self-leadership, sports confidence, learning motivation, self-efficacy

Introduction

The college students of the MZ generation inherently possess self-directed motivation toward physical activity and academic learning. They tend to exhibit a strong will to develop a sense of self-control and self-respecting self-efficacy through their passion and deep engagement in these activities. This tendency has been revealed through public opinion surveys (Lee, 2023) and supported by empirical studies as well (Chae et al., 2020; Kim & Park, 2021; Jung, 2024). Specifically, college students of the MZ generation tend to cultivate self-efficacy by forming self-directed motivation, immersing themselves in physical activity and academic learning, setting their own goals, acting on them, and accumulating a sense of achievement

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through small success (Kim & Lee, 2020; Shin & Cho, 2024). Among college students, there is growing recognition that physical activity and academic study are not mutually exclusive but can coexist harmoniously (S. Kim, 2022). Thus, this study aimed to confirm prior research findings suggesting that self-directed college students' motivation for learning and habitual engagement in physical activity are crucial factors in the formation of their self-efficacy. Accordingly, this study hypothesized that in the structural relationship in which college students' self-leadership influences self-efficacy through the mediation of learning motivation, confidence in physical activity (i.e., sports confidence) would serve as a moderating factor. Therefore, the present study aims to examine the mediating effect of learning motivation and the moderating effect of sports confidence among college students, thereby providing a theoretical foundation for understanding and supporting the roles of learning and physical activity in fostering students' self-directed lives.

Bandura (1997) defined as a concept grounded in social cognitive theory or alternatively social learning theory, referring to an individual's belief in their capacity to successfully perform specific tasks or handle particular situations. Schunk (1985) described self-efficacy as a person's judgment or belief about their ability to perform tasks within a specific domain of activity, while Gellatly and Meyer (1992) viewed it as a general belief in one's ability related to task performance.

According to Jeong (2010), self-efficacy consists of three sub-factors: confidence, self-regulation, and preference for task difficulty. For college students, not only recognizing the importance of academics but also believing that they can enhance their academic focus and achievement through self-management by engaging in physical activity serves as an important psychological factor (Lee & Kim, 2016; Lee, 2018). Such belief, grounded in personal effort and passion, contributes to strengthening their confidence in their own abilities. Particularly, it is important to strengthen one's belief and confidence in personal abilities through consistent effort and passion. To sustain enthusiasm for both academic work and physical activity, intrinsic motivation, which arises from within and drives self-determined behavior, plays a critical role (Deci & Ryan, 2020). Thus, engaging in both physical activity and academic pursuits can play a key role in enhancing college students' self-efficacy, and this outcome has been supported by various previous studies (Jeong, 2010; Lee, 2011; Li et al., 2022).

Ahn and Cho (2015), in their study of students participating in general physical education courses, reported that enjoyment of the class and the formation of interpersonal relationships play an essential role in enhancing self-efficacy. Similarly, Park and Ko (2017) argued that college students' participation in sports activities provides performance accomplishment experiences, thereby improving their self-efficacy. These prior studies demonstrate that self-efficacy is formed based on individuals' beliefs and perceptions of their abilities in the process of achieving goals related to both academics and physical activity. This suggests that self-efficacy is not merely simple confidence, but a critical psychological factor that reflects one's understanding of and adaptation to the environment.

The self-leadership was first introduced by Manz (1986), who defined it as the ability to develop the motivation and skills necessary for individuals to regulate their own behavior and achieve their goals, based on self-regulation theory and social cognitive theory. He further conceptualized self-leadership as a comprehensive form of self-influence, which not only involves leading oneself to perform intrinsically motivating tasks, but also managing oneself to carry out tasks that are not inherently motivating. Neck and Manz (1992) defined self-leadership as the process of leading oneself to set goals, generate motivation, and achieve performance outcomes.

The self-leadership consists of three core components: behavior-focused strategies, natural reward strategies, and constructive through strategies (Prussia et al., 1998). These three components positively influence an individual's ability to maintain motivation in the pursuit of self-set goals (Neck & Houghton, 2006). Furthermore, these components have been reported to positively

affect college students' career motivation and career decision-making self-efficacy (Lee & Choi, 2015).

The relationship between self-leadership and self-efficacy is expressed through individuals' ability to take initiative, set goals with intrinsic motivation, and persist toward those goals with a belief that 'they can succeed', even in the face of failure or setbacks. Previous studies exploring the relationship between these two constructs have consistently demonstrated a positive association between self-leadership and self-efficacy across various contexts and populations. Ahn and Min (2020) analyzed the effects of self-leadership on innovative behavior and self-efficacy among college students majoring in dance, and reported that self-leadership positively influences belief in one's ability to successfully carry out tasks or goals through self-regulation and control, thereby serving as a salient factor in enhancing self-efficacy.

The sports confidence is a cognitive construct specific to athletic contexts, referring to an individual's personal identity or belief in their ability to successfully perform a given sport (Vealey, 1986). Sports confidence also contributes to psychological stability during athletic performance, and high levels of sports confidence promote sustained effort and motivation toward goal achievement. Furthermore, sports confidence not only enhances athletic performance, but also has a positive impact on various aspects of an individual's overall life (Gucciardi & Jones, 2012).

According to Choi (2010), sports confidence consists of three sub components: physical and mental preparation, coach leadership, and demonstration of ability. This refers to the confidence formed through one's level of preparation for competition, the guidance and support provided by the coach, and the demonstration of ability during actual performance. These three components reflect the multidimensional nature of sports confidence, which, during the college years, functions as a factor that positively influences students' academics, athletic engagement, and overall life experiences.

The importance of sports confidence has been well established through a range of prior studies. Chang and Ahn (2016), sports confidence functions as a critical psychological resource for college students participating in general physical education classes, and physical self-confidence contributes to receiving positive feedback from peer. This process suggests that sports confidence may strengthen students' motivation to take on challenging tasks. Chun et al. (2022) found that sport confidence serves as a key mediating factor in reducing competitive anxiety during games, thereby enhancing athletic performance. Based on prior studies, sport confidence can be understood not only as a factor in achieving individual goals but also as an essential psychological resource that helps college students overcome various challenges in both academic and daily life.

Previous studies suggest that sports confidence may serve as a moderating variable in the relationship between self-leadership and self-efficacy. Yoon (2021) confirmed a significant moderating effect of sports confidence in the relationship between self- management and exercise immersion among adult participants in personal training programs. This indirectly suggests that sports confidence, as a factor related to self- management and self-efficacy like self- leadership, functions as a key moderator in the relationship between self-efficacy and exercise involvement (Shin & Cho, 2024). These studies support the notion that sports confidence may act as a moderating variable that strengthens the relationship between self-leadership and self-efficacy, and further suggest the potential for such moderating effects to exist among college students as well.

Lastly, the learning motivation, which is set as a mediating variable, plays a crucial role in initiating, sustaining, and directing learning activities (Ha & Ha, 2011). Learners independently select tasks, make continuous efforts to solve them, and demonstrate persistence to successfully complete assigned tasks even in diverse learning environment (Bandura, 1986; Jo & Lee, 2012). According to Park (2022), learning motivation functions as a driving force through which internalized motives within individuals trigger learning behaviors, guide goal-setting, and reinforce actions in educational settings. Consequently, learning motivation serves as a key factor in encouraging learners to actively engage in assigned learning tasks.

Although scholars may differ in the emphasis and components they associate with learning motivation, it is generally classified into intrinsic motivation and extrinsic motivation. In this study, learning motivation was categorized into intrinsic and extrinsic motivation based on the framework proposed by Park (2022). Intrinsic motivation refers to the enjoyment and sense of achievement derived from the learning process itself, serving as a driving force for actions perceived as meaningful or necessary in one's life, rather than being driven by direct rewards. Extrinsic motivation refers to learning behaviors that are reinforce by external factors such as rewards, achievement, or recognition, and further promoted by the outcomes they produce.

The learning motivation plays an important role not only in academic achievement but also throughout various aspects of college life. Learning motivation, comprising intrinsic and extrinsic components, is a critical factor influencing student engagement and academic achievement. According to Lee and Kim (2014), an active attitude toward participation and task completion is essential for enhancing learning motivation. Furthermore, previous studies have reported that learning motivation positively affects class satisfaction, satisfaction with one's major, and career preparation behaviors (Tang, 2018; K. Kim, 2022). Specifically, college students of the MZ generation tend to prefer individualized motivation and self-directed learning over traditional learning methods. Hence, it is important to examine how their learning motivation influences college adjustment and overall quality of life.

The learning motivation functions as a key factor that encourages students to set long-term goals and make continuous efforts to achieve them. According to previous studies, learning motivation serves as a mediating variable in the relationship between self-leadership and self-efficacy, and strong interrelationship among these constructs has been reported. Lee and Choi (2015), in a study of college students, found that self-leadership directly influences career motivation and career decision-making self-efficacy, and also exerts a significant indirect effect through career motivation. This suggests that self-leadership may influence self-efficacy through career motivation, a construct closely related to learning motivation. In addition, Hong et al. (2024) confirmed in a study of health science students that self-leadership has a significant effect on learning persistence intention, with learning motivation exhibiting a partial mediating effect in this relationship. These findings indicate that learning motivation can function as an important mediating factor that buttresses the relationship between self-leadership and self-efficacy. Thus, when students make sustained efforts in the learning process based on self-belief and intrinsic motivation, learning motivation can serve as a core element that deepens the relationship between self-leadership and self-efficacy.

Taken together, the findings from previous studies suggest that college students' self-leadership not only has a direct effect on self-efficacy, but also positively impacts specific academic goals or career paths through the mediating and moderating effects of learning motivation and sports confidence. Similar results have also been reported in earlier studies. Kim (2016), in a study of golf athletes, found that self-leadership positively affects both self-management and sports confidence, and that self-management also positively influences sports confidence. In addition, Lee and Jung (2018) reported that college students' levels of self-leadership and college life satisfaction positively affect self-directed learning ability and academic self-efficacy.

However, empirical research simultaneously examining the mediating and moderating effects of learning motivation and sports confidence in the relationship between self-leadership and self-efficacy remains limited. That is, previous studies have primarily analyzed partial relationships by treating variables such as career motivation, academic achievement, learning engagement, and college life satisfaction as either independent or dependent variables, or have focused exclusively on either mediating or moderating effects. To overcome the limitation from previous studies, therefore, the present study is intended to empirically investigate whether learning motivation and sports confidence function as a mediating and moderating variable, respectively, in the relationship between

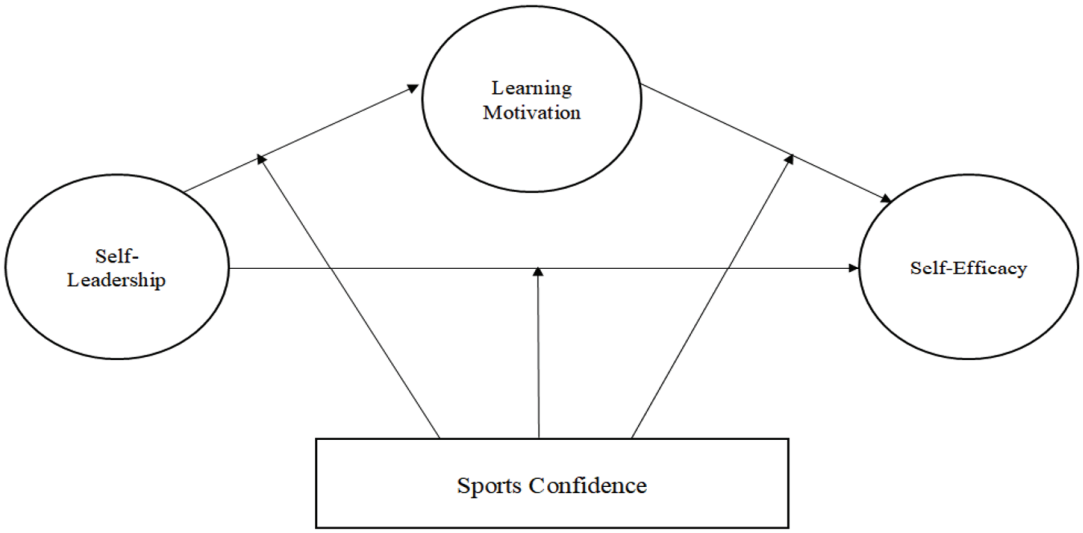


Figure 1. Meditation and Moderation Model in This Research.

self-leadership and self-efficacy. Through this analysis, the study seeks to provide an integrated understanding of the structural relationships among these variables and offer specific insights into the effects of learning motivation and sports confidence on the enhancement of self-efficacy among college students. To achieve these research objectives, the following model and hypotheses were established.

Hypothesis 1: There will be significant differences in the study variables according to background variables.

Hypothesis 2: Self-leadership and learning motivation will have a direct effect on self-efficacy

Hypothesis 3: Learning motivation will mediate the relationship between self-leadership and self-efficacy

Hypothesis 4: Sports confidence will moderate the relationship between self-leadership and self-efficacy

Hypothesis 5: Sports confidence will moderate the relationship between self-leadership and learning motivation.

Hypothesis 6: Sports confidence will moderate the relationship between learning motivation and self-efficacy.

Methods

Participants

This study was conducted with college students attending four-year universities located in Daejeon and Seoul. The survey was administered to students who expressed their willingness to participate, either by providing direct consent or by agreeing after receiving approval from their academic advisor. The questionnaire was distributed and collected using Google Forms. A total of 312 students responded to the survey, and their responses were utilized for statistical analysis. Detailed demographic information of the participants is presented in Table 1.

Measures

The survey instrument utilized in this study consisted of a total of 57 items, including 5 items on personal background, 20 items on self-leadership, 9 items on sports confidence, 9 items on learning motivation, and 14 items on self-efficacy.

Self-Leadership

The self-leadership measurement tool was based on items developed by Prussia et al. (1998), with

Table 1. Demographic Characteristics of the Participants

Characteristics	Category	Frequency (n)	Percentage (%)
Gender	Male	168	53.8
	Female	144	46.2
Grade	Freshman	57	18.3
	Sophomore	58	18.6
	Junior	67	21.5
	Senior	130	41.7
Type of Exercise	Ball Games	105	33.7
	Multiple Sports	132	42.3
	Cardio	68	21.8
	None	7	2.2
Frequency of Exercise	Nearly every day	98	31.4
	1~3 times per week	166	53.2
	Every other week	48	15.4
Study Hours (per week)	More than 21 hours	74	23.7
	7~20 hours	129	41.3
	Less than 6 hours	109	34.9
	Total	312	100.0

modifications and adaptations made in reference to prior studies by Song and Yang (2008) and Park et al. (2011) to fit the purpose of this study. Responses were measured using a 5-point Likert scale (1= strongly disagree, 5= strongly agree), and the scale consisted of 20 items in total. The scale comprises three sub-factors: behavior-focused strategies (6 items), natural reward strategies (6 items), and constructive thought strategies (8 items).

Sports Confidence

To measure sports confidence, Choi (2010) revised and supplemented the scale originally validated by Kim (1999), referencing items used in the study by Yang (2009), to suit the collegiate athletic context and the characteristics of the study participants. The sports confidence scale consists of 9 items and includes three sub-factors: physical and mental preparation (3 items), coaching leadership (3 items), and demonstration of ability (3 items).

Learning Motivation

To measure learning motivation, Park (2022) utilized a tool based on the Motivated Strategies for Learning Questionnaire (MSLQ) developed by Pintrich et al. (1990), which had been adapted into Korean by Kim (2011). Based on this tool, the items were reorganized to align with the purpose of the present study and to suit the learning context of university students. The learning motivation scale consists of 9 items and includes two sub-factors: intrinsic motivation (5 items) and extrinsic motivation (4 items).

Self-Efficacy

The self-efficacy scale was adapted from the questionnaire developed by Sherer et al. (1982) and revised by Jeong (2010), who referenced items used in the studies of Hong (1995), Cha (1996), Kim (2002), and Kim (2003), to suit the purpose of the present study. Responses were measured on a 5-point Likert scale (1= strongly disagree, 5= strongly agree), and the scale consisted of 17 items in total. The scale comprises three

Table 2. Validity and Reliability of the Instrument

Construct	Indicators	Items	AVE	CR	Cronbach α
Self-leadership	Behavioral-Focused Strategies	6	.438	.938	.747
	Natural-reward strategies	6			.854
	Constructive thinking strategies	8			.836
	Total	20			.896
Sports Confidence	Physical·Mental Preparation	3	.689	.952	.873
	Coaching Leadership	3			.863
	Demonstration of Ability	3			.826
	Total	9			.897
Learning Motivation	Intrinsic Motivation	5	.532	.910	.826
	Extrinsic Motivation	4			.838
	Total	9			.842
Self-Efficacy	Confidence	5	.427	.906	.842
	Self-Regulatory Efficacy	3			.739
	Preference for Task Difficulty	6			.860
	Total	14			.902
Total		52			

sub-factors: confidence(5 items), self-regulatory efficacy (3 items), and preference for task difficulty (6 items).

Validity and Reliability of Measures

To assess the content validity of the survey used in this study, two measurement experts and one Ph.D. in physical education reviewed the extracted items based on existing knowledge and theoretical frameworks. In addition, the reviewed questionnaire was subjected to confirmatory factor analysis to verify its construct validity. The reliability of each factor was analyzed using Cronbach's α coefficient, and the results are presented in Table 2.

The confirmatory factor analysis confirmed that the research variables consisted of three sub-factors for self-leadership, three for sports confidence, two for learning motivation, and three for self-efficacy. To assess the validity of each variable, Average Variance Extracted (AVE) and Construct Reliability (CR) were examined. AVE and CR are methods for evaluating the convergent validity of a model and serve as important indicators of its reliability (Park, 2012). AVE measures the variance captured by the indicators of a specific construct and indicates how well the construct is represented by its corresponding items. CR indicates the degree to which the indicators within a construct are consistently related to one another.

The analysis manifested that AVE values ranged from .427 to .689, indicating an acceptable level overall, although the AVE values for self-leadership and self-efficacy were below .5. Meanwhile, CR values ranged from .906 to .952, demonstrating a high level of internal consistency. According to Fornell and Larcker (1981), the recommended thresholds for AVE and CR are .5 and .6, respectively. Researchers have suggested that even if AVE is below .5, convergent validity can still be considered adequate when CR exceeds .6 (Huang et al., 2013).

Since sports confidence was designated as a moderating variable in this study, it was excluded from the overall measurement model fit analysis (Little,

Table 3. Discriminant validity

	Correlation (ρ^2), [ρ - 2×S.E., ρ + 2×S.E. ≠ 1]		
	Self-Leadership	Learning Motivation	Self-Efficacy
Self-Leadership	1.000		
Learning Motivation	.379 (.144), [.425, .333]**	1.000	
Self-Efficacy	.606 (.367), [.66, .552]**	.416 (.173), [.476, .356]**	1.000

**p<.01

Bovaird, & Widaman, 2006; Béland et al., 2022). The model fit indices for the overall measurement model were x^2= 66.260, df= 17, CFI= .910, TLI= .946, and RMSEA= .097, with a total of 44 items retained. This study evaluated the measurement model fit based on the criteria proposed by Hu and Bentler (1999). According to their guidelines, model fit is considered acceptable when the absolute fit index x^2 is significant (p<.05), RMSEA is below .10, and the incremental fit indices TLI and CFI are both above .90; the results of this study met all these criteria. The Cronbach's α coefficients ranged from .739 to .902, indicating that the measurement instruments used in this study demonstrated adequate reliability.

In this study, the sports confidence was excluded from the discriminant validity analysis as it was designated as a moderating variable. <Table 3> presents the results of discriminant validity verification using two methods: the Fornell-Larcker criterion and the correlation coefficient with standard error. First, the Fornell-Larcker criterion was applied to determine whether the average variance extracted (AVE) values for each variable exceeded the squared values of the inter-construct correlations. The highest correlation was observed between self-leadership and self-efficacy, with a value of .606. When squared, this correlation yields .367, which is less than the AVE values for self-leadership(.438) and self-efficacy(.427), thereby supporting discriminant validity. Second, the method using correlation coefficients and standard errors was applied, in which discriminant validity is confirmed if the range of ±2 standard errors from the correlation coefficient(ρ) does not include the value 1. As all calculated confidence intervals excluded the value 1, the correlations between constructs were deemed significant, confirming the presence of discriminant validity.

Data Analysis

The data in this study were analyzed using SPSS 29 and AMOS 29 software, performing frequency analysis, confirmatory factor analysis, reliability analysis using Cronbach's α coefficient, and correlation analysis. To verify the validity of the measurement tools, convergent validity was assessed through AVE and CR analyses, and discriminant validity was evaluated using the Fornell-Larcker criterion. To examine differences in self-leadership, learning motivation, and self-efficacy based on demographic variables (gender, grade, and sport type), t-tests and one-way ANOVA were conducted. To test the structural relationships among the variables, structural equation modeling (SEM) was employed. Within the SEM framework, bootstrapping was conducted to verify the mediating effect of learning motivation, and hierarchical regression analysis based on the modeling Kenny approach was used to examine the moderating effect of sports confidence.

Results

Descriptive Statistics and Correlation Analysis

Prior to analyzing the structural relationships among

Table 4. The means, standard deviations, and correlation coefficients of research variables

	1	2	3
1	1		
2	.379**	1	
3	.606**	.416**	1
Mean	79.154	34.401	51.837
Standard Deviation	10.514	6.119	9.502
Skewness	-.174	-.367	.087
Kurtosis	-.027	-.029	-.676

1. Self-leadership, 2. Learning motivation, 3. Self-efficacy
**p<.01

the main variables of this study (self-leadership, learning motivation, and self-efficacy), basic descriptive statistics and correlations were examined. Sports confidence was designated as a moderating variable and was therefore excluded from this analysis. The mean, standard deviation, skewness, and kurtosis values were calculated for the collected data. The analysis manifested that skewness ranged from −.367 to .087 and kurtosis ranged from −.676 to −.027; since the absolute values of skewness were below 2 and those of kurtosis were below 7, the assumption of multivariate normality required for structural equation modeling was satisfied (Kline, 2015). The correlation coefficients among the latent variables ranged from .217 to .400, indicating statistically significant positive correlations at the .01 level among all variables. The results of the descriptive statistics and correlation analysis are presented in Table 4.

Group Differences by Background Characteristics

In this study, independent samples t-tests and one-way ANOVAs were conducted to examine whether there were significant differences in the main variables (self-leadership, learning motivation, and self-efficacy) according to college students' gender, grade, and sport type. The results showed a significant gender difference in learning motivation(t= -2.774, p<.01), with female students(M= 35.4) reporting higher levels than male students(M= 33.4). In contrast, no significant gender differences were found in self-leadership and self-efficacy. Furthermore, aside from the gender-based t-tests, no significant differences were found in the main variables based on grade or sport type. Therefore, Hypothesis 1 was partially supported, as only the gender-based difference in learning motivation was statistically significant. The results are presented in Table 5.

Structural Equation Modeling Results

Structural Model Fit Assessment

This study first tested the model fit to analyze the structural relationships among college students' self-leadership, sports confidence, learning motivation, and self-efficacy, and then verified the research hypotheses based on the model. Sports confidence, designated as a moderating variable, was set as an external factor in the structural model and thus excluded from the current analysis. As shown in <Table 6>, the model fit analysis revealed that the significance level of χ^2 was below .05. The primary fit indices, CFI= .946, TLI= .910, RMSEA= .097, indicated that the structural model demonstrated an acceptable level of model fit.

Direct Effect

The results of analyzing the estimated path coefficients to verify the causal relationships in the structural model are presented in <Table 7>. A closer

Table 5. Analysis of differences in key variables by gender, grade, and sport type

Dependent Variables	Background Variables	Groups	N	M	SD	*t* / *F*	Post-hoc (Duncan)
Self-Leadership	Gender	Male	168	78.5	11.07	-1.111	
		Female	144	79.9	9.81		
	Grade	Freshman	57	80.58	11.35	.724	n.s.
		Sophomore	58	77.69	10.25		
		Junior	67	79.25	10.89		
		Senior	130	79.13	10.08		
Learning Motivation	Gender	Male	168	33.5	6.13	-2.744**	
		Female	144	35.4	5.96		
	Grade	Freshman	57	35.79	5.61	1.948	n.s.
		Sophomore	58	33.22	6.44		
		Junior	67	34.85	6.07		
		Senior	130	34.08	6.14		
Self-Efficacy	Gender	Male	168	52.8	9.43	1.865	
		Female	144	50.8	9.50		
	Grade	Freshman	57	53.49	9.74	2.508	n.s.
		Sophomore	58	49.34	8.96		
		Junior	67	53.27	9.50		
		Senior	130	51.48	9.50		
Self-Leadership	Sport Type	Ball Games	105	78.12	11.36	1.501	n.s.
		Multiple Sports	132	78.90	9.49		
		Cardio	68	81.43	10.08		
		None	7	77.29	11.12		
Learning Motivation	Sport Type	Ball Games	105	33.77	6.14	.588	n.s.
		Multiple Sports	132	34.76	6.17		
		Cardio	68	34.59	6.21		
		None	7	35.29	3.73		
Self-Efficacy	Sport Type	Ball Games	105	52.06	9.13	.907	n.s.
		Multiple Sports	132	51.04	9.59		
		Cardio	68	53.24	9.81		
		None	7	50.00	10.47		

**p<.01

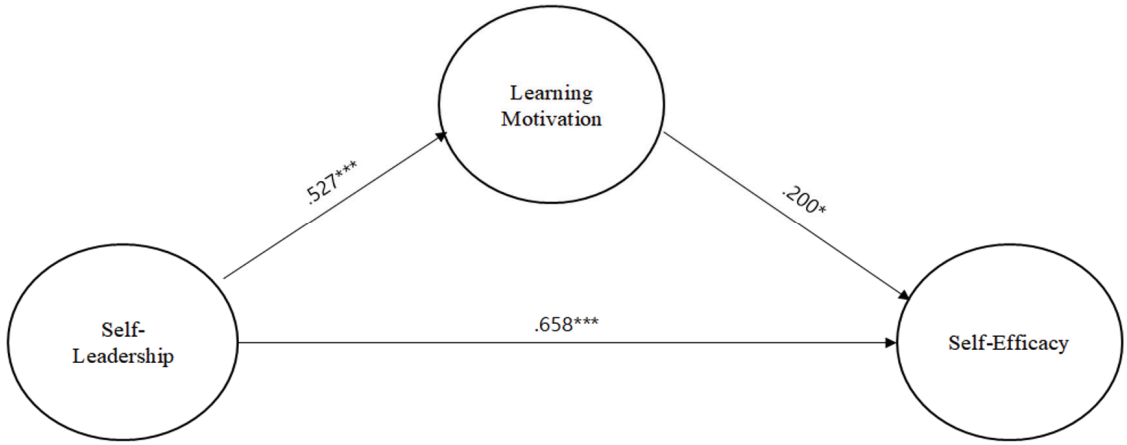
Table 6. The adequacy of the structural model fit

Fit Indices	χ^2	*df*	*p*	CFI	TLI	RMSEA
Research model	66.260	17	.000	.946	.910	.097

Table 7. Estimation of path coefficients

Paths	*B*	*β*	*S.E.*	*C.R.*	*p*	Acceptance of hypotheses
Self-leadership → Self-efficacy	.874	.658	.109	8.045***	.000	Accepted
Self-leadership → Learning motivation	.675	.527	.091	7.450***	.000	Accepted
Learning motivation → Self-efficacy	.208	.200	.085	2.436*	.015	Accepted

*p<.05, ***p<.001



* Significant at level $p < .05$
*** Significant at level $p < .001$

Figure 2. Structural equation model with standardized direct effects in the mediating effects of learning motivation in the relationship between self-leadership and self-efficacy.

examination of the specific relationships revealed that self-leadership had a significant positive effect on self-efficacy(β= .658, p<.001) and learning motivation (β= .527, p<.001), and that learning motivation significantly and positively influenced self-efficacy(β= .200, p<.05). Therefore, Hypothesis 2 was accepted.

According to <Figure 2>, college students' self-leadership had a significant effect on both learning motivation and self-efficacy. Hence, learning motivation appears to serve as a salient mediator in the relationship between self-leadership and self-efficacy among college students.

Mediating Effects of Learning Motivation

Bootstrapping was conducted to examine whether the effect of self-leadership through the single mediation of learning motivation was statistically significant. The number of bootstrap samples was set to 500, and the confidence interval was set at 95%. The analysis results are presented in <Table 8> and <Table 9>.

To examine the relationship between self-leadership and self-efficacy, the direct effect, indirect effect, and the total effect were analyzed (Table 8). The results showed that both the direct effect(.658) and total effect(.764) were statistically significant, whereas the indirect effect(.106) was found to be not significant. However, the bootstrapping analysis revealed a 95% confidence interval of [.020, .242], which did not include zero, indicating that the indirect effect was also statistically significant.

These results suggest that learning motivation may serve as a mediating variable in the relationship between

Table 8. The direct, indirect, and total effects of the key variables

IV	DV	Direct effect (β)	Indirect effect (β)	Total effect (β)	95% CI
Self-leadership	Learning motivation	.527***		.527***	
	Self-efficacy	.658**	.106	.764***	[.020, .242]
Learning motivation	Self-efficacy	.665***	.000	.665***	

IV: Independent Variable, DV: Dependent Variable, CI: Confidence Interval
*p<.05, ***p<.001

Table 9. Testing the single mediation effect of learning motivation

Paths	Indirect effect (B)	S.E.	95% CI	Acceptance of hypothesis
Self-leadership → Learning motivation → Self-efficacy	.140	.071	[.023, .323]	Accepted

CI: Confidence Interval

self-leadership and self-efficacy, contributing to the enhancement of self-efficacy. The analysis manifested that both the direct and total effects of self-leadership and learning motivation on self-efficacy were statistically significant. In contrast, the indirect effect between self-leadership and self-efficacy was not statistically significant; however, the bootstrapping analysis indicated that this indirect effect may still be significant. Accordingly, this study conducted a bootstrapping analysis to examine the single mediating effect of learning motivation in greater detail, and the results are presented in <Table 9>.

Analysis Results of the Moderating Role of Sports Confidence

First, to examine the moderating effect of sports confidence on the relationship between self-leadership and self-efficacy, a hierarchical regression analysis was conducted. The results are presented in <Table 10>. In Step 1, the effect of the independent variable, self-leadership, on self-efficacy was tested. In Step 2, the moderating variable, sports confidence, was added to the model. In Step 3, the interaction term between the independent variable and the moderating variable was included. To address potential multicollinearity issues, both the independent and moderating variables were standardized prior to analysis.

As a result, all three regression models, Step 1(F= 180.372, p<.001), Step 2(F= 94.606, p<.001), and Step 3(F= 66.015, p<.001), were found to be statistically significant. The explanatory power of the regression model was 37%(adjusted R^2= 36.6%) in Step 1, 38% (adjusted R^2= 37.6%) in Step 2, and 39.1%(adjusted R^2= 38.5%) in Step 3. Meanwhile, the Durbin-Watson statistic was 2.044, which is close to 2, indicating no violation of the assumption of independence of residuals. Additionally, all Variance Inflation Factor (VIF) values were below 10, suggesting that multicollinearity was not a concern.

The significance test of the regression coefficients revealed that in Step 1, self-leadership(β= .606, p<.001) had a significant positive effect. In other words, higher levels of self-leadership were associated with higher

Table 10. Moderating effect of sports confidence on the relationship between self-leadership and self-efficacy

Model	Variables	*B*	*S.E.*	β	*t*	*F*	R^2 ($_{adj}R^2$)
1	(Intercept)	51.837	.428		120.996***	180.372***	.368 (.366)
	SL	5.763	.429	.606	13.430***		
2	(Intercept)	51.837	.425		121.960***	94.606***	.380 (.376)
	SL	5.314	.464	.559	11.458***		
	SC	1.132	.464	.119	2.441*		
3	(Intercept)	51.423	.455		113.005***	66.015***	.391 (.385)
	SL	5.308	.460	.559	11.535***		
	SC	1.065	.461	.112	2.311*		
	SLxSC	1.046	.432	.108	2.420*		

SL: Self-Leadership, SC: Sports Confidence
*p<.05, ***p<.001

levels of self-efficacy. In Step 2, sports confidence(β= .119, p<.05) was found to have a significant effect on self-efficacy. In Step 3, the interaction term between self-leadership and sports confidence was also found to be significantly positive(β= .108, p<.05). Therefore, sports confidence was found to play a positive moderating role in the relationship between self-leadership and self-efficacy, enhancing the positive effect of self-leadership on self-efficacy. Accordingly, Hypothesis 4 was accepted.

Next, to examine the moderating effect of sports confidence on the relationship between self-leadership and learning motivation, a hierarchical regression analysis was conducted. The results are presented in <Table 11>. In Step 1, the effect of the independent variable, self-leadership, on learning motivation was tested. In Step 2, the moderating variable, sports confidence, was added to the model. In Step 3, the interaction term between the independent variable and the moderating variable was included. To address potential multicollinearity issues, both the independent and moderating variables were standardized prior to analysis.

As a result, all three regression models, Step 1(F= 51.921, p<.001), Step 2(F= 26.996, p<.001), and Step 3 (F= 18.057, p<.001), were found to be statistically significant. The explanatory power of the regression model was 14.3% (adjusted R^2= 14.1%) in Step 1, 14.9%(adjusted R^2= 14.3%) in Step 2, and 15% (adjusted R^2= 14.1%) in Step 3. Meanwhile, the Durbin-Watson statistic was 1.812, which is close to 2, indicating no violation of the assumption of independence of residuals. Additionally, all Variance Inflation Factor (VIF) values were below 10, suggesting that multicollinearity was not a concern.

The significance test of the regression coefficients showed that in Step 1, self-leadership(β=.379, p<.001) had a significant positive effect. In other words, higher levels of self-leadership were associated with higher levels of learning motivation. In Step 2, sports confidence was found to have no significant effect on learning motivation. In Step 3, the interaction term between self-leadership and sports confidence did not have a significant effect on learning motivation. Thus, sports confidence did not play a positive moderating role in the relationship between self-leadership and learning motivation. In other words, sports confidence cannot be considered a moderator in the effect of self-leadership on learning motivation. Accordingly, Hypothesis 5 was rejected.

Finally, to examine the moderating effect of sports confidence on the relationship between learning motivation and self-efficacy, a hierarchical regression analysis was conducted. The results are presented in <Table 12>. In Step 1, the effect of the independent variable, learning motivation, on self-efficacy was tested. In Step 2, the moderating variable, sports confidence, was added to the model. In Step 3, the

Table 11. Moderating effect of sports confidence on the relationship between self-leadership and learning motivation

Model	Variables	*B*	*S.E.*	β	*t*	*F*	R^2 ($_{adj}R^2$)
1	(Intercept)	34.401	.321		107.132***	51.921***	.143 (.141)
	SL	2.317	.322	.379	7.206***		
2	(Intercept)	34.401	.321		107.290***	26.996***	.149 (.143)
	SL	2.125	.350	.347	6.075***		
	SC	.484	.350	.079	1.384		
3	(Intercept)	34.429	.346		99.116***	18.057***	.150 (.141)
	SL	2.124	.350	.347	6.065***		
	SC	.473	.351	.077	1.348		
	SLxSC	.180	.329	.029	.548		

SL: Self-Leadership, SC: Sports Confidence
***p<.001

Table 12. Moderating effect of sports confidence on the relationship between learning motivation and self-efficacy

Model	Variables	*B*	*S.E.*	*β*	*t*	*F*	R^2 ($_{adj}R^2$)
1	(Intercept)	51.837	.490		105.811***	65.010***	.173 (.141)
	LM	3.956	.491	.416	8.063***		
2	(Intercept)	51.837	.471		110.123***	48.597***	.239 (.234)
	LM	3.414	.483	.359	7.069***		
	SC	2.499	.483	.263	5.175***		
3	(Intercept)	51.630	.480		107.613***	34.036***	.249 (.242)
	LM	3.211	.491	.338	6.536***		
	SC	2.487	.481	.262	5.173***		
	LMxSC	.955	.479	.101	1.994*		

LM: Learning Motivation, SC: Sports Confidence
*p<.05, ***p<.001

interaction term between the independent variable and the moderating variable was included. To address potential multicollinearity issues, both the independent and moderating variables were standardized prior to analysis.

As a result, all three regression models, Step 1(F=65.010, p<.001), Step 2(F= 48.597, p<.001), and Step 3(F=34.036, p<.001), were found to be statistically significant. The explanatory power of the regression model was 17.3% (adjusted R^2= 14.1%) in Step 1, 23.9% (adjusted R^2= 23.4%) in Step 2, and 24.9% (adjusted R^2= 24.2%) in Step 3. Meanwhile, the Durbin-Watson statistic was 2.050, which is close to 2, indicating no violation of the assumption of independence of residuals. In addition, all Variance Inflation Factor(VIF) values were below 10, suggesting that multicollinearity was not a concern.

The significance test of the regression coefficients showed that in Step 1, learning motivation(β= .416, p<.001) had a significant positive effect. In other words, higher levels of learning motivation were associated with higher levels of self-efficacy. In Step 2, sports confidence(β= .263, p<.001) was found to have a significant effect on self-efficacy. In Step 3, the interaction term between learning motivation and sports confidence was also found to be significantly positive(β = .101, p<.05). Thus, sports confidence was shown to play a positive moderating role in the relationship between learning motivation and self-efficacy. It was confirmed that sports confidence enhanced the positive effect of learning motivation on self-efficacy. Hence, Hypothesis 6 was accepted.

Discussion

This study was conducted to empirically examine the mediating effect of learning motivation and the moderating effect of sports confidence in the relationship between self-leadership and self-efficacy among college students. To this end, an online survey was administered to college students in Daejeon and Seoul, and the collected data were analyzed using Structural Equation Modeling (SEM). The findings are discussed in relation to previous studies as follows.

First, an analysis of differences in self-leadership, learning motivation, and self-efficacy according to background variables, such as gender, grade, and sport type participation, revealed no statistically significant differences, except those female students showed significantly higher levels of learning motivation than male students. This finding aligns with the general tendency for female students to exhibit greater intrinsic motivation and conscientiousness toward academic tasks, and is consistent with previous studies (Deci & Ryan, 2000; Luitel, 2024). On the other hand, the absence of significant differences in self-leadership and

self-efficacy based on background variables suggests that factors such as self-regulation strategies and levels of intrinsic motivation may play a more critical role than individual demographic characteristics among college students.

Second, self-leadership was found to have a positive effect on college students' self-efficacy. This supports the existing theoretical framework (Bandura, 1997; Neck & Houghton, 2006), which suggests that the process of planning, regulating, and self-motivating one's behavior reinforces an individual's belief in their own capabilities. Particularly, since college students often face uncertainty regarding academics and career paths, the ability to set goals and regulate behavior through self-reinforcement demonstrates that self-leadership serves as an important factor in enhancing self-efficacy.

Third, learning motivation was found to have a direct effect on the enhancement of self-efficacy among college students. This finding is consistent with a range of recent research. Lee and Kim (2014) reported a positive correlation between learning motivation and academic self-efficacy among college students, indicating that learning motivation is a key predictor in enhancing students' self-efficacy. Basileo et al. (2024) identified a significant positive correlation between self-efficacy and autonomous motivation among German middle school students, suggesting that when learners believe in their abilities and engage in learning autonomously, their self-efficacy improves.

Fourth, learning motivation was found to mediate the relationship between self-leadership and self-efficacy. This supports the existing theoretical framework (Bandura, 1997; Deci & Ryan, 2000), which posits that learning motivation strengthens individuals' self-regulation strategies, thereby enhancing their self-efficacy. Particularly, a study by Chang and Tsai (2022) found that emotional intelligence indirectly influenced academic achievement through learning motivation and self-efficacy. This finding aligns with the results of the present study, as it highlights how learning motivation enhances intrinsic motivation and improves self-efficacy. Therefore, learning motivation serves as a key mediating factor in the effect of self-leadership on self-efficacy.

Fifth, sports confidence was found to moderate the relationship between self-leadership and self-efficacy. Specifically, students with higher levels of sports confidence manifested a stronger effect of self-leadership on self-efficacy, suggesting that confidence developed through sports participation enhances the effectiveness of self-regulation strategies such as self-leadership. Callow and Hardy (2001) reported that athletes with high sports confidence more frequently used imagery related to motivation and self-regulation, which had a positive impact on enhancing their self-efficacy. Furthermore, Woodman and Hardy (2003) identified self-confidence as a key psychological variable that significantly influences athletic performance and self-perception, highlighting sports confidence as a crucial factor in strengthening self-efficacy. In addition, a meta-analysis by Kim and Cruz (2021) confirmed that mental self-management has a moderately positive effect on sport-related self-confidence. Thus, sports confidence functions as an important moderating variable that strengthens the relationship between self-leadership and self-efficacy, and has been identified as a key factor contributing to college students' psychological growth and enhanced self-awareness.

Sixth, sports confidence was found not to moderate the relationship between self-leadership and learning motivation. This indicates that sports confidence does not play a significant moderating role in the relationship between self-leadership and learning motivation. This finding suggests that sports confidence may have a greater impact in relation to more generalized psychological factors, such as self-efficacy or emotional stability, rather than interacting directly with learning motivation. According to Murcia et al. (2009), in academic contexts, the relationship between autonomous motivation and intrinsic learning motivation was more closely associated than that with sports confidence. They suggested that sports confidence is more likely to influence self-efficacy or emotional stability than learning motivation. Additionally, Zhang et al. (2012) reported that college students' learning motivation is more strongly

influenced by intrinsic motivational factors such as self-determination and achievement goal orientation. This emphasizes that the development of learning motivation is based more on task-related expectations, interest, or intrinsic motivation for achievement, rather than confidence derived from athletic performance. Therefore, the findings of this study suggest that college students' learning motivation is primarily shaped by their intrinsic motivational structure, and that sports confidence is more likely to influence broader psychological capacities, such as self-efficacy or achievement-related self-perceptions, rather than the relationship between self-leadership and learning motivation.

Seventh, sports confidence was found to moderate the relationship between learning motivation and self-efficacy. Particularly, students with higher levels of sports confidence showed a stronger effect of learning motivation on self-efficacy, suggesting that confidence developed through sports participation can amplify the effects of learning motivation and contribute to enhanced self-efficacy. Li et al. (2022) found that college students' participation in sports positively influenced both self-efficacy and academic achievement, with self-efficacy mediating the relationship between the two. This indicates that sport-related psychological resources can play a beneficial role in the processes of learning and achievement. Additionally, Liu and Li (2023) demonstrated that sports confidence partially mediated the relationship between exercise motivation and subjective exercise experience among college students, and that feelings of inadequacy moderated this relationship. They confirmed that sports confidence can lead to more powerful positive outcomes by interacting with individuals' intrinsic motivation and psychological perceptions. Ultimately, sports confidence functions as a key moderating variable that strengthens the relationship between learning motivation and self-efficacy, underscoring its importance in promoting psychological growth and self-awareness among college students.

This study found that learning motivation plays a mediating role in the relationship between self-leadership and self-efficacy, while sports confidence serves as a significant moderating variable in this relationship. Although the findings are consistent with prior studies, the identification of sports confidence as a moderator that enhances self-efficacy offers a novel contribution to the literature. Specifically, self-directed college students with higher levels of sports confidence were more likely to enhance their self-efficacy through, supporting the theoretical view that sports confidence functions as a psychological resource (Vealey, 1986; Gucciardi & Jones, 2012). Furthermore, the study confirmed that engaging in sports activities to boost confidence does not conflict with learning motivation; rather, it positively contributes to the improvement of self-efficacy in academic settings. These findings offer valuable practical implications for college students in educational and counseling contexts by highlighting the importance of fostering both learning motivation and sports confidence to support their psychological development and academic success. They also provide a meaningful foundation for future research and the development of targeted intervention programs.

Conclusions and Suggestions for Further Research

This study aimed to examine the mediating effect of learning motivation in the relationship between self-leadership and self-efficacy, and to identify the moderating role of sports confidence in the relationships of these variables among college students in Seoul and Daejeon. The goal was to explore strategies for enhancing self-efficacy to help college students effectively balance both physical activity and academic learning. Based on the analysis of the data collected in line with the study's objectives and methodology, the following conclusions were drawn.

First, the findings indicate that self-leadership strategies, in which college students autonomously set goals and regulate their actions, along with intrinsic learning motivation, have a positive effect on the enhancement of self-efficacy. This suggests that self-directedness and intrinsic motivation serve as key psychological foundations for self-efficacy. The

significance of this finding lies in its expansion of the fragmented relationships suggested in previous studies (Bandura, 1986; Lee & Kim, 2014) into a more integrated structural framework. In contrast, sports confidence was found not to moderate the relationship between self-leadership and learning motivation, implying that one's level of confidence does not directly influence the link between self-directed behavior and motivation. This indicates that in academic contexts, task-oriented self-regulation and learning strategies may play a more critical role than confidence gained through sports activities.

Second, the finding that learning motivation mediates the relationship between self-leadership and self-efficacy suggests that college students with strong self-leadership are more likely to enhance their self-efficacy when they are highly motivated and actively engaged in academic activities, such as investing time in studying, diligently completing assignments, and participating in collaborative learning. In other words, students who place high importance on academics and possess clear goals are more likely to strengthen the connection between self-leadership and self-efficacy through increased learning motivation (Hong et al., 2024).

Third, unlike previous claims suggesting that sports confidence may conflict with learning motivation (Kim, 2016), the present study found that sports confidence functions as a moderating variable that interacts positively with learning motivation to enhance self-efficacy. Specifically, students with higher levels of sports confidence manifested a stronger influence of learning motivation on self-efficacy. This finding suggests that the confidence developed through sports activities can enhance the effectiveness of learning motivation and, in turn, contribute to improved self-efficacy. It also offers meaningful implications for educational and counseling settings.

These results highlight the need to consider not only the development of self-leadership and the reinforcement of intrinsic learning motivation, but also the importance of fostering confidence through participation in sports as part of strategies to enhance college students' self-efficacy. Accordingly, future educational and counseling practices should aim to create a balanced environment that supports both academic learning and physical activity, and to implement integrated programs that promote psychological competence.

Based on the conclusions discussed above, the following suggestions are proposed for future research.

First, further research is needed to empirically examine how sports participation influences college students' overall quality of life and academic performance. While the present study focused on identifying the moderating effect of sports confidence on self-efficacy, it did not fully address how broader aspects of sports participation, including sports confidence, affect various dimensions of college life. Particularly, understanding how engagement in sports contributes to more comprehensive indicators of well-being, such as life satisfaction and academic achievement, requires a more systematic analytical approach. Future studies should therefore employ multidimensional measurement tools that incorporate factors, such as the frequency, type, and qualitative experiences of sports participation, to more precisely explore the relationship between sports confidence and overall college life.

Second, to gain a more comprehensive understanding of college students' self-efficacy, future research should go beyond quantitative methods and incorporate qualitative approaches. Although this study statistically analyzed the mediating effect of learning motivation and the moderating effect of sports confidence in the relationship between self-leadership and self-efficacy, the use of quantitative data alone was limited in capturing the participants' internal psychological states and processes. To address this limitation, future studies should include qualitative methods, such as interviews, case studies, and in-depth interviews, and adopt a mixed-methods design to ensure both breadth and depth in analysis.

Third, further research is needed to develop systematic strategies and practical interventions for enhancing self-efficacy among college students. This study aimed to analyze the effect of self-leadership on self-efficacy through the mediating and moderating

roles of learning motivation and sports confidence. However, both self-leadership and self-efficacy may differ in their initial levels depending on individual dispositions, and these psychological traits can fluctuate according to situational or contextual factors. An individual's psychological state is not fixed; it can be influenced by mindset, emotional state, mood, surrounding environment, interpersonal relationships, and specific events or turning points. In light of these considerations, longitudinal studies that track changes in self-leadership and self-efficacy, along with analyses of response patterns across various contexts, are warranted.

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Conflict of Interest

The authors declare no conflict of interest.

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