International Journal of Evaluation and Research in Education (IJERE)
Vol. 15, No. 1, February 2026, pp. 469~478
ISSN: 2252-8822, DOI: 10.11591/ijere.v15i1.36185

Student leadership in Chinese higher education student union: the role of organizational climate and student engagement

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Article Info

Article history:

Received Jun 23, 2025
Revised Nov 16, 2025
Accepted Dec 17, 2025

Keywords:

China
Organizational climate
PLS-SEM
Student engagement
Student leadership

ABSTRACT

Student leadership (SL) is a key driver for personal growth, organizational effectiveness, and campus governance. However, in China, less attention has been paid to the development of SL, especially within student unions, which play a central role in governance and representation. Therefore, this research explores the effect of organizational climate (OC) and student engagement (SE) on SL in college student unions and examines the moderating effect of SE. A quantitative survey was conducted, targeting 17,200 student union members in Shanxi Province, China. Data was collected from 500 respondents using online questionnaires through a convenience sampling technique. The direct effect and moderating effect were analyzed by partial least squares-structural equation modeling (PLS-SEM), which was chosen due to its suitability for analyzing complex models. The findings revealed that both OC and SE have a positive effect on SL. Moreover, SE significantly moderates the relationship between OC and SL. This research advances social cognitive theory in the Chinese higher education context. It enhances the understanding of how college climate and individual factors interact to shape SL. Practically, it suggests the importance of fostering a supportive OC and stimulating SE in SL development.

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1. INTRODUCTION

The increasing emphasis on comprehensive talent development and the constant evolution of the job market make college students face growing challenges and rising expectations [1]. In this context, leadership has become a crucial competency that college students must possess. Previous studies show that Chinese students who held leadership roles achieved about a 7% higher starting salary compared to their peers [2]. Meanwhile, longitudinal data from the China college students longitudinal survey (CCSLS) underscores that leadership experience predicts improved academic performance both immediately and over time [3]. Thus, the development of student leadership (SL) has accordingly emerged as a key area of academic research [4]. However, despite the growing body of literature, there is still a lack of systematic and in-depth investigation into how to enhance SL effectively. Addressing this research gap is essential not only for promoting students' all-around development but also for cultivating more young talents with leadership potential and a strong sense of social responsibility [1].

SL is a key domain of student development that refers to a set of interrelated abilities that enable students to improve themselves, influence others, and work collaboratively toward shared goals [5]. However, the existing studies about leadership development focus more on leaders' and teachers' leadership in educational settings; limited studies looked into SL, especially where it concerns formal student

organizations [6]. Among these, the student union organization as a platform is a significant form of leadership for students' self-governance, service, and representation [7]. Through active participation, members of student unions are engaging in leadership development and acting as representatives for a larger group of students. Therefore, identifying the key factors that influence the leadership of student union members is a pressing direction for future research.

In recent years, research has increasingly focused on the relationship between organizational climate (OC) and individual development [8]–[10]. OC can be defined as the collective perceptions and evaluations of the organization's overall environment by its members [11]. A negative climate can negatively affect motivation and foster disengagement and deterioration, and can have negative effects on students' mental health and learning [9]. Alternatively, a positive OC has a meaningful influence on student development [11], such as psychological well-being [8], motivation [10], sense of belonging [9], and behavioral performance [12]. These are all foundational to effective leadership behaviors. Therefore, these findings suggest that OC may contribute to student development [11]. However, few research has directly examined the influence of OC on SL, especially within the context of college student unions [13].

Furthermore, individual factor-student engagement (SE), serve as key determinants in both student academic achievement and broader student development [14]. SE is defined as a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption [15]. Participation in organizations can provide students with opportunities to develop their communication [16], self-efficacy, sense of responsibility [17], collaboration, decision-making, and social interaction [18]. Taken together, students with a high level of engagement are more likely to take on key roles in teams and demonstrate stronger leadership potential. This highlights the need to investigate the relationship between SE and SL. However, few studies empirically test the moderating effect of SE in formal student union contexts in China.

In sum, less attention has been paid to the development of SL in the student union, and limited empirical studies have been conducted about the relationships between organizational and individual factors and SL. A deep understanding of how SL developed in the student union should be paid more attention to. Actually, according to social cognitive theory, the interaction between organizational and individual factors provides a more comprehensive explanation for student development outcomes. Engaged students are more likely to benefit from a positive OC, participating in student union events, working with fellow students, and trying for leadership experiences [19]. If students are not engaged, they may ignore the positive aspects of the climate and, therefore, weaken the climate's impact on their leadership development [19], [20]. SE acts as the mechanism through which OC fosters leadership growth. Understanding this interplay may reveal more nuanced mechanisms. However, empirical studies examining this moderating effect remain limited. Against this backdrop, this research is guided by the following research questions:

i) Does OC positively impact SL in the student union? (RQ1)
ii) Does SE positively impact SL in the student union? (RQ2)
iii) Does SE moderate the relationship between OC and SL among the student union? (RQ3)

To answer these questions, the researchers collected survey data from 21 colleges in Shanxi Province, China, using partial least squares-structural equation modeling (PLS-SEM) to analyze the data. This research's novelty lies in its focus on formal student union contexts in China and empirically tests a moderating mechanism (engagement). Meanwhile, this research examines both direct and moderating effects, thus offering a stronger theoretical and practical contribution. Theoretically, this research advances social cognitive theory in the Chinese higher education context, empirically tests the moderating role of SE, and fills a significant gap in understanding SL within student union organizations. Practically, it suggests the importance of fostering a supportive OC and stimulating SE in SL development.

2. METHOD

2.1. Research design

This research employed a quantitative approach with a correlational survey research design to examine the relationships between OC, SE, and SL. Data were collected cross-sectionally from the college student unions in Shanxi Province, China. We use structural questionnaires to measure related variables and then analyze correlations between them.

2.2. Population and sampling

There are 21 colleges in Shanxi Province, China, with an estimated population of 17,200 student union members. Due to the geographical dispersion and the limited accessibility to all members directly, this research employed a convenience sampling technique. Meanwhile, Hill [21] recommended that the sample size for quantitative research ranges between 30 and 500. The target sample size of 500 was set to capture the diversity and representativeness of the student union population in Shanxi Province. For data collection,

we distributed the online questionnaire directly through institutional mailing lists and social media platforms. These participants were then asked to refer other eligible student union members within their networks. There are a total of 378 valid responses, resulting in a response rate of 75.6%.

2.3. Instruments

This research has three main instruments: the OC scale, SE scale, and the SL scale, which can be seen in Table 1 (see Appendix). All three instruments use a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree) used to distinguish participant experiences. The OC scale is adapted from Bock *et al*. [22] with 15 items to depict affiliation climate, innovativeness climate, and fairness climate within the student union. The SE is measured by the Utrecht Work Engagement Scale (UWES-17) [15] consisting of 17 items in total. The SL scale was based on the work of Posner and Kouzes [23] with 20 items across five dimensions. These three instruments have been used in previous studies within the student union context, showing good reliability and validity with similar samples. In addition, this research has two rounds of instrument validation. For the first round, to keep the instruments' contextual validity, this research employed experts to guarantee that the constructs measured and overall scales were representative. Based on the expert suggestions, several items were modified for the student union context. For the second round of validation, we conducted a pilot study with a sample of 54 university students to confirm the reliability and validity of these instruments. The sample size in the pilot study was generated based on Bujang *et al*. [24] who suggest that a sample size between 30 and 50 would be enough for the pilot study. The pilot study confirmed the strong reliability and validity of the instruments; the finalized instruments were then used in the primary data collection phase.

2.4. Data analysis procedure

Before the primary study data analysis, we conducted Harman's single-factor test to check whether this research suffers from the issues of common method variance (CMV). The results showed that the first unrotated factor accounted for less than 40% of the total variance, indicating that CMV was not a significant concern. We analyzed the data through SmartPLS 4.0 to examine the relationships among key variables, addressing RQ1, RQ2, and RQ3. We choose PLS-SEM for a variety of essential reasons. On the one hand, the data collected in this research were not normally distributed, and PLS-SEM can accommodate non-normal data [25]. On the other hand, PLS-SEM is more suitable for research models with prediction constructions. Therefore, SmartPLS 4.0 is a friendly software that allows users to analyze moderation effects through a stable and straightforward process. The data analysis procedure consisted of three stages: assessment of the measurement model, structural model, and path significance. The assessment of the measurement model aims to confirm the reliability and validity of the model. The assessment of structural aims to address the research questions through a multicollinearity test and evaluate the model's predictive power. For path significance, the relationships between college student union OC, SE, and SL were examined. Subsequently, we use an interaction term between OC and SE to assess the moderating effect of SE. The model was drawn by SmartPLS 4.0, as shown in Figure 1.

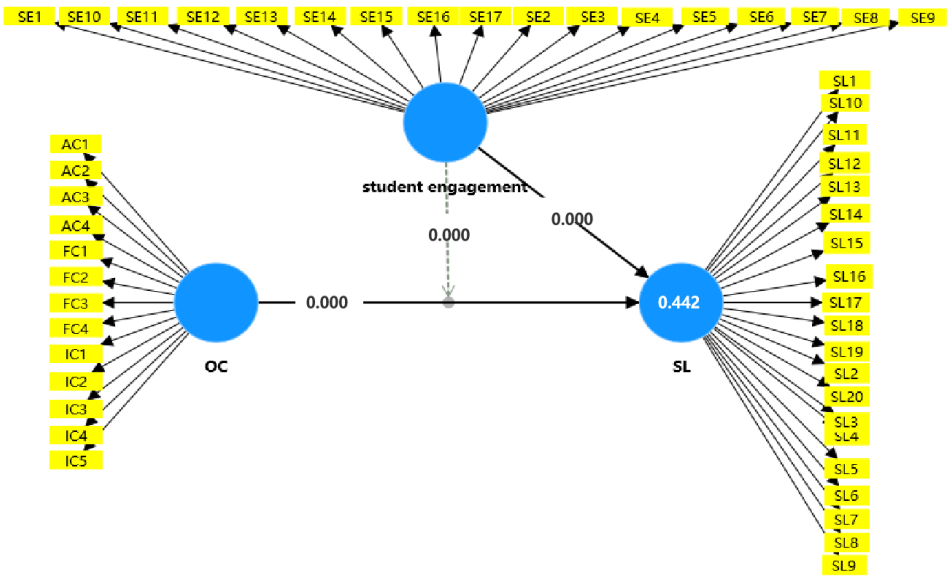

Figure 1. Structural equation model

3. RESULTS AND DISCUSSION

3.1. Assessment of measurement model

The measurement model was evaluated to confirm the reliability and validity, focusing on indicator reliability, internal consistency, convergent validity, and discriminant validity. The indicator reliability was assessed by examining the indicator loading, and these items are all above 0.708, meeting the acceptable threshold. To evaluate internal consistency, both composite reliability and Cronbach's alpha were above 0.70, indicating strong internal consistency. The assessment of convergent validity aimed to determine whether items within the same construct exhibited substantial correlations. This was done by assessing the indicator loading and average variance extracted (AVE). As shown in Table 2, all the AVE values exceeded the recommended minimum of 0.50, suggesting that these items represent the constructs [25].

Discriminant validity was evaluated using the heterotrait-monotrait (HTMT) ratio, which is considered a strictly defined indicator of whether these constructs are distinct. According to Gold *et al*. [26], if the HTMT ratio is below 0.85, the constructs are distinguishable empirically. The values presented in Table 3 show that the HTMT ratios between OC, SE, and SL were all below the 0.85 threshold, inferring that discriminant validity was sufficiently established for the constructs in the proposed model. Overall, it could be concluded that the measurement model meets the acceptable criteria for reliability and validity.

Table 2. Reliability and validity analysis for the measurement model

Constructs	Cronbach's alpha	Composite reliability	AVE
OC	0.928	0.937	0.536
SE	0.944	0.950	0.526
SL	0.950	0.941	0.511

Table 3. HTMT discriminant analysis for the measurement model

Constructs	OC	SE	SL
OC			
SE	0.724		
SL	0.634	0.641	

3.2. Assessment of structural model

Evaluating the structural model consists of multicollinearity diagnostics, coefficient of determination (R^2), effect size (f^2), and predictive relevance (Q^2). The results of the structural model and path significance are shown in Table 4.

Table 4. Path coefficients for OC, SE, and SL

Relationship	Std Beta	Std Error	t-value	p-value	BCI LL	BCI UL	VIF	f^2
OC-->SL	0.628	0.045	11.384	0.000	0.540	0.718	2.183	0.323
SE-->SL	0.750	0.066	13.919	0.000	0.579	0.692	2.607	0.562
SE*OC-->SL	0.348	0.052	6.733	0.000	0.245	0.448	2.014	0.121

3.2.1. Collinearity analysis

Collinearity diagnostics were conducted to investigate whether multicollinearity exists among OC, SE, and SL in this model. The variance inflation factors (VIF) were estimated for each construct. Although some researchers adopt 5.0 as a threshold, VIF values greater than 3.0 are considered indicative of potential multicollinearity issues in this research [25]. In this research, the VIF values for OC (2.183), SE (2.607), and their interaction term with SL (2.014) were all below 3.0, confirming that multicollinearity was not a problem in this model.

3.2.2. The coefficient of determination (R^2)

Evaluating the value of R^2 is essential for determining the explanatory power of the structural model. It reflects how well the independent constructs account for variance in the dependent construct. In this research, the R^2 value suggests that college student OC explains approximately 44.2% of the variation in SL, which includes the combined effects of OC, SE, and their interaction term. Based on Chin criteria [27], this level of explanatory power is considered medium.

3.2.3. Assessment of the effect size (f^2)

The f^2 value indicates the impact of college student union OC or SE on SL, with larger values reflecting a stronger effect size. Table 4 summarizes the f^2 values obtained in this research. Following Chin guidelines [27], where f^2 values of 0.02, 0.15, and 0.35 represent small, medium, and large effects, respectively, the impact of OC on SL is considered moderate, while the impact of SE on SL is considered large. In addition, the moderating effect of SE on the relationship between OC and SL is considered small.

3.2.4. Assessment of the predictive power (Q^2)

A key objective of PLS is to assess the model's predictive capability. This research used the Q^2 value, which is typically used to measure predictive power. The Q^2 analysis was performed by employing the "blindfolding" process with a distance value of 7 in SmartPLS. The predictive power Q^2 value for SL is 0.472, which exceeds 0.35, a large predictive power [25]. Thus, the model has a large predictive relevance.

3.3. Model path significance

According to Sarstedt *et al*. [28], the structural model relationships were assessed by reporting path coefficients, standard errors, t-values, and p-values, based on bootstrapping with 10,000 resamples using SmartPLS [29]. In response to the concerns by Greenland *et al*. [30], regarding the overreliance on p-values, confidence intervals, and effect sizes were also considered to evaluate the hypotheses more comprehensively.

3.3.1. The relationship between organizational climate and student leadership

The results in Table 4 show a statistically significant positive relationship between OC and SL, with a p-value less than 0.001. The 95% bias-corrected confidence interval lower limit (BCI LL=0.540) and bias-corrected confidence interval upper limit (BCI UL=0.718) does not contain zero, further confirming the significance of the positive relationship. This finding highlight that a positive OC can enhance SL among student unions in colleges in Shanxi Province, China. This research supports Ezeaku and Okoye [31], who concluded that an inclusive OC provides students with opportunities to participate in organizational governance and decision-making, thus enhancing their sense of responsibility and leadership capacity. Moreover, a supportive and cohesive OC provides a solid platform for ongoing SL practice [32]. Student unions also offer opportunities for student leaders to develop the project management and event planning skills needed to lead effectively, and often, develop key decision-making skills, communication skills, and problem-solving skills. An OC promotes collaboration, inclusiveness, and the pursuit of shared goals. Therefore, such an OC allows the students to learn about listening, negotiating, and motivating other people in teams in a way that further supports their leadership practice [8].

This finding can be understood in the Chinese context. In China, OC often comes from the acknowledgement of the hierarchical relationship, moral expectations, and the value of harmony and collective interest [33]. This cultural value explains why student leaders engage more positively in climates that emphasize cohesion, respect for authority, and the pursuit of collective interest. This is in line with Jie [33], who examined the contribution of OC to the development of college SL in China. A positive OC fosters strong feelings of collectivism, self-efficacy, and emotional commitment among students, thereby promoting leadership development. However, some scholars argue that OC may not directly impact SL, but rather exerts its influence through mediating variables. These inconsistent findings may stem from the interplay of individual student factors, such as personality and motivation, or contextual factors, such as educational level and cultural background. Despite these inconsistencies, the present findings offer empirical support for enhancing student organizations and promoting student development in Chinese colleges.

3.3.2. The relationship between student engagement and student leadership

The results in Table 4 address RQ2, it shows that there is a statistically significant positive relationship between SE and SL, with a p-value less than 0.001. The confidence interval (BCI LL=0.579, BCI UL=0.692) does not include zero, further confirming the relationship. These results suggest that SE is a key factor influencing the development of SL among student unions in colleges in Shanxi Province, China. This finding is consistent with a study that higher engagement levels in academic, social, and co-curricular practices promote students' developing leadership skills [18]. This finding also supports Martínez *et al*. [17] who argued that highly engaged students often exhibit stronger intrinsic motivation and self-efficacy, which in turn contribute to the development of self-leadership and influence over others. Such positive psychological states and behavioral tendencies provide a solid foundation for the growth of leadership capacity. These similar findings can be explained by the fact that participation in student unions enhances task engagement and fosters a sense of responsibility, which contributes to the development of key characteristics associated with SL. A Chinese researcher explained this positive relationship: leadership is encouraged by practice and observation, and SE is important in offering real-world experiences [34]. Active engagement in organizing campus events, coordinating student activities, and interacting with university authorities mirrors traditional apprentice-like learning models that are deeply rooted in Chinese education culture [34].

However, it is worth noting that some studies have presented contrasting findings. For instance, Shin and Bolkan [35] observed that SE does not impact SL development. Such inconsistent findings may be due to contextual limitations. Even when students exhibit high levels of engagement, if the organization lacks clear objectives, well-defined roles, or structured feedback mechanisms, their efforts may result in "ineffective busyness", where engagement fails to translate into meaningful leadership development. Therefore, while institutions and student organizations should continue to promote SE, they must also focus

on building environments that are goal-oriented, structurally sound, and provide consistent developmental feedback. This ensures that SE is meaningfully aligned with pathways that facilitate skill growth.

3.3.3. The moderating effect of student engagement on the relationship between organizational climate and student leadership

The results in Table 4 show that SE significantly moderates the relationship between OC and SL (β=0.348, t=6.733, p<0.001). Furthermore, the 95% (BCI LL=0.245, BCI UL=0.448) does not include zero, indicating a statistically significant moderating effect. Meanwhile, Figure 2 displays that when SE is high, the positive impact of OC on SL becomes stronger.

This finding confirms that the effect of OC on SL becomes stronger when students exhibit higher levels of engagement. This finding is in line with Norabuena-Figueroa *et al*. [8] who emphasized that SE can maximize the effect of OC on student outcomes. Similarly, Viđak *et al*. [9] highlighted that even when the OC is highly positive, students with low levels of engagement may still struggle to utilize the available resources to enhance their leadership development. Meanwhile, the moderating effect indicates an interaction of individual and contextual variables, which is consistent with social cognitive theory. Social cognitive theory posits that individual behavior is shaped by the dynamic interaction of personal, behavioral, and environmental factors [36]. In this research, OC represents the environmental factor, while SE serves as an individual-level factor. Consequently, SE enhances the strength of the relationship between OC and SL. This triadic interaction is evident in student union contexts, where members' leadership behavior is shaped by the surrounding OC, as well as their motivation and capacity to engage.

In the Chinese context, this is particularly distinctive, as leadership behaviors are influenced not only by institutional structures but also by personal initiative and relational awareness [37]. Students who are more actively involved are better able to navigate the hierarchical, relationship-oriented nature of student unions, leveraging the OC to enhance their leadership development. These students are generally more sensitive to OC, making the moderation of SE more prominent. These findings not only validate the applicability of social cognitive theory among college SL in China but also provide empirical evidence for student development research.

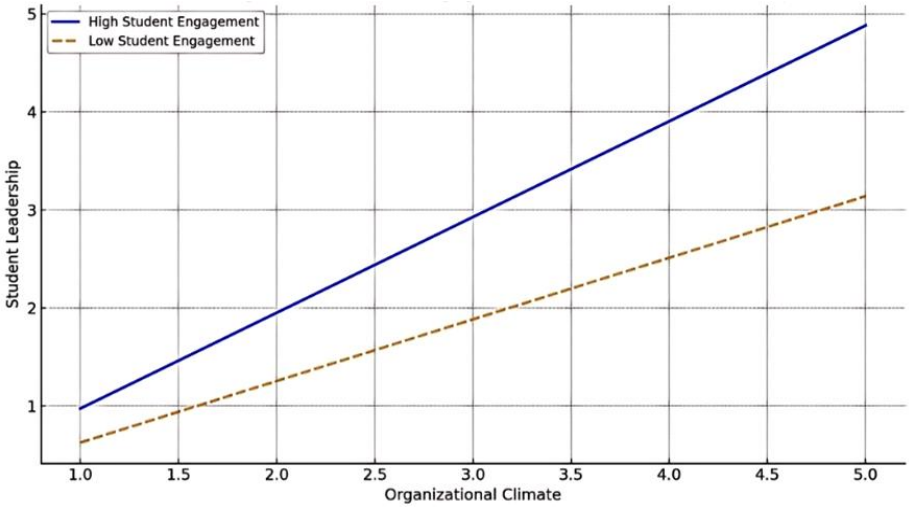

Figure 2. The interaction effect of SE

3.4. Limitation and recommendation

While this research provides valuable theoretical and empirical insights into OC, SE, and SL, there are a few limitations that should be acknowledged. First, the survey data is self-reported, which introduces the potential for response bias and the misrepresentation of findings due to CMV. In addition, convenience sampling within a single province may pose a limitation on the generalizability of the findings in other locations. Furthermore, this research employed a cross-sectional design, which limits the possibility of establishing a causal link between OC and SL.

To further address limitations, future studies may incorporate additional data collection methods, such as structured interviews and multi-source analysis, to eliminate bias. Additionally, draw samples from multiple provinces and use a probability-based sampling design to improve the external validity of findings.

In addition, future studies should consider using a longitudinal design or experimental design to establish stronger causal relationships. Finally, this research looked at the relationships among OC, SE, and SL. Future studies are encouraged to employ additional potential variables, such as students' psychological capital, teacher support, campus culture, and other variables, to form a more robust model. Future studies might also consider employing moderating variables, such as gender, grade, and family background, to examine differences among groups.

4. CONCLUSION

In conclusion, unlike prior studies, this research focuses on formal student union contexts in China and empirically tests a moderating mechanism (engagement). To be specific, this research explored the impact of OC and SE on SL within college student unions in the Chinese context. It also examined whether SE moderates the effects of OC on SL. The results indicate that supportive organizational conditions, together with active student participation, foster SL development among student unions in colleges in Shanxi Province, China. This research offers significant theoretical and practical implications.

Theoretically, this research gives a deep understanding of how SL developed, enriching the empirical evidence about relationships among OC, SE, and SL in the context of Chinese colleges. In addition, it extends the theoretical perspective of SL development by highlighting that leadership practice occurs through the interaction of context and individual agency. This interaction perspective adds to the understanding of the mechanism of SL development by illuminating the process of internalization by which individuals develop leadership within a given context. Also, it embodies the central idea of the triadic reciprocal determinism "environment–cognition–behavior" in social cognitive theory. Overall, this research extends social cognitive theory by demonstrating the interactive effect of OC and SE on SL in Chinese students.

Furthermore, these findings have practical implications and offer concrete suggestions to support student development and the management of student organizations. A supportive OC contributes to the students' leadership awareness and their capacity through practice. Therefore, colleges should be active managers of student unions and encourage students to speak up and provide appropriate humanistic support. Examples may include transparent decision-making processes, accessibility to various forms of communication, and mentorship opportunities through faculty or more seasoned student leaders. Moreover, the essential moderation of SE implies that colleges should draw upon students' intrinsic motivation by encouraging different forms of participation that engender the transition from passive involvement to active engagement. Therefore, colleges may include structured feedback processes, recognition and incentive opportunities, and a variety of formats for activities to appeal to diverse interests and forms of SE. Overall, Chinese colleges should foster transparent student union climates and create structured engagement pathways to strengthen leadership development.

ACKNOWLEDGMENTS

Special thanks are extended to my supervisors for their cooperation in making this study possible and thank Universiti Kebangsaan Malaysia with the great opportunity to conduct this research.

FUNDING INFORMATION

Authors state no funding involved.

AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
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R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

INFORMED CONSENT

Informed consent was obtained from all participants prior to their participation in this study. Participants were informed that their responses would be used for research purposes only, participation was voluntary, and all data were collected anonymously.

DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author, [AHAH], upon reasonable request.

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APPENDIX

Table 1. The instruments with items

Variable	Dimension	No.	Items
Organizational climate	Affiliation	1	Members in my organization maintain close ties with one another.
		2	Members in my organization consider other members' standpoints highly.
		3	Members in my organization have a strong feeling of 'one team'.
		4	Members in my organization cooperate reasonably with each other.
		5	The relationship between members in my organization is harmonious.
	Innovativeness	6	My organization encourages suggesting ideas for new opportunities.
		7	My organization places a high value on taking risks, even if that means facing potential failure.
		8	My organization encourages finding new methods to perform a task.
		9	My leader respects different opinions and suggestions.
		10	My leader is an excellent example of innovation.
	Fairness	11	My organization's allocation system reflects the will of the majority.
		12	I can trust my leaders' evaluation to be good.
		13	Objectives that are given to me are reasonable.
		14	My Leaders don't show favoritism to anyone.
		15	The efforts and rewards of members in my organization are relatively matched.
Student engagement	Vigor	1	When I get up in the morning, I feel like going to work.
		2	At my work, I feel bursting with energy.
		3	At my work, I always persevere, even when things do not go well.
		4	I can continue working for very long periods at a time.
		5	At my job, I am very resilient, mentally.
		6	At my job, I feel strong and vigorous.
	Dedication	7	To me, my job is challenging.
		8	My job inspires me.
		9	I am enthusiastic about my job.
		10	I am proud of the work that I do.
		11	I find the work that I do full of meaning and purpose.

Table 1. The instruments with items (*continued*)

Variable	Dimension	No.	Items
Student engagement	Absorption	12	When I am working, I forget everything else around me.
		13	Time flies when I am working.
		14	I get carried away when I am working.
		15	It is difficult to detach myself from my job.
		16	I am immersed in my work.
		17	I feel happy when I am working intensely.
Student leadership	Model the way	1	I set a personal example of what is expected.
		2	I make certain that people adhere to agreed-on standards.
		3	I follow through on promises and commitments
		4	I ask for feedback on how my actions affect people's performance
	Inspire a shared vision	5	I talk about future trends influencing my work.
		6	I describe a compelling image of the future.
		7	I appeal to others to share the dream of the future.
		8	I show others how their interests can be realized.
	Challenge the process	9	I seek challenging opportunities to test my skills.
		10	I challenge people to try new approaches.
		11	I search outside the organization for innovative ways to improve
		12	I ask, "What can we learn?"
	Enable others to act	13	I develop cooperative relationships.
		14	I actively listen to diverse points of view.
		15	I treat others with dignity and respect.
		16	I support decisions other people make.
	Encourage the heart	17	I praise people for a job well done.
		18	I express confidence in people's abilities.
		19	I creatively reward people for their contributions.
		20	I recognize people for commitment to shared values.

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