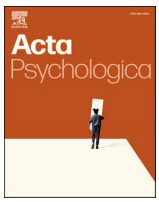
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# Sustainable education in action: Principal leadership, teacher wellbeing, and altruism in the sports context

Weiqiang Qi [a], Yunxiao Zhang [b,c,*], Muhammad Zulqarnain Arshad [d]

[a] Research Center for Humanistic Medicine, Zunyi Medical University, Guizhou, China
[b] Chongqing College of Mobile Communication, Chongqing, China
[c] University Sains Malaysia, 11800 Penang, Malaysia
[d] School of Business Management, Universiti Utara Malaysia, Malaysia

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ABSTRACT

This study investigates the effect of principal leadership on teacher commitment and subjective well-being in the sport education context of China with subjective well-being as a mediator and teacher altruism as a moderator. SMART-PLS is used for data analysis and the result shows that principal leadership plays a positive role in teacher commitment and wellbeing. In addition, the mediating roles of teacher's subjective well-being as well as the moderating role of teacher altruism are confirmed. The study stresses the role of the principal leadership which is supportive and recommends creating a school culture that considers the wellbeing of teachers and recognizes values such as altruism as a way of improving teachers' outcomes. This research adds to the knowledge base regarding educational leadership, emphasizing the complex nature of the interplay between leadership practices and teacher behaviors.

## 1. Introduction

In the modern educational landscape, effective school management is essential for creating a learner-friendly environment. Leadership is a key factor in the formation of teachers' attitudes to their schools, which determines their professional involvement in the process (Al-Mahdy et al., 2018; Babbitt, 2019). Principal leadership is the competency of the school administrator in directing teachers and students to reach organizational goals and targets (Covey, 1992). The leadership of a principal is very important in creating a favorable learning environment, enhancing school staff morale, and finally encouraging the teachers to do their work diligently. This consequently results in a well-rounded and efficient education system in which the congruence between the principal vision and teacher commitment becomes the driving force that leads to student success and the institution's growth (Al-Mahdy & Alazmi, 2023; DeMatthews et al., 2020). Thus, its significance in educational settings can hardly be denied. Principal leadership is vital in creating effective teaching environments, especially in sports education (Alazmi & Al-Mahdy, 2022; Sugiharti et al., 2021). Sports education is particularly relevant due to its unique blend of challenges and opportunities. Unlike traditional subjects, it merges physical training, team dynamics, and emotional support, making it ideal for studying leadership impacts. Leaders in this area provide academic and co-curricular activities that define the school environment and development of students. Sports education is a dynamic form of education with a leadership impact on both the teachers and students making this area of education a focused area of study for educational leadership. This field improves physical fitness together with such skills as teamwork and discipline, thus requiring proper leadership strategies (Tzeni et al., 2019). Leadership in sports education is also about providing guidance to teachers and coaches so that they can engage their students more effectively. With the focus on sports as an important factor for the overall development of an individual, the demand for effective principals rises (Rizzo, 2020). The studies suggest that the school principals' leadership influences school climate, teacher engagement, and student performance (DeMatthews et al., 2020). In sports, principals have to perform both administrative tasks as well as support the athletic programs vigorously. They have to facilitate and create conditions that enhance the performance and well-being of educators and students in academic and physical domains (Deligiannidou et al., 2020).

This paper focuses on principal leadership in sports education to determine the success factors and the approach to enhance leadership in schools with well-developed sports sections. To understand the role of principals in sports education, it is necessary to discuss leadership

* Corresponding author.
*E-mail addresses:* qiweiqiang@zmu.edu.cn (W. Qi), zhangyunxiao@cqytxy.edu.cn (Y. Zhang), m.zulqarnain.arshad@uum.edu.my (M.Z. Arshad).

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behaviors that foster educational and athletic outcomes. The implementation of efficient management in sports programs increases athletic performance, students' interest, academic performance, and overall health (Sugiharti et al., 2021). Leadership in this context is defined as planning, capacity building, and supporting teachers and students (Roman-Acosta et al., 2023).

In sports education, the principals have to form coalitions and relations, manage resources constructively, and advocate for the integration of sports in the curriculum (Santos et al., 2024). These skills help to deal with logistic and financial concerns from intramural to competitive levels. In this case, it is necessary to link the development of the physical and academic aspects of the learning process in order to combine sports with the achievement of academic goals (Öktem & Kul, 2020). A practical leadership position supports the need to know how principals can accumulate sports and infuse them into the general school development. This study therefore fills the gap by examining the relationship between the leadership behaviors of the principal and the delivery of sports education and the consequent implications for positive change in schools and communities. Though the extant literature agrees on the importance of leadership in affecting employee outcomes (Ahmad, Scholz, et al., 2021; Chen, Ghardallou, et al., 2022; Fu et al., 2022), few studies reflect on the role leadership plays in adjusting to the characteristics of particular educational systems. Principal leadership in the Chinese educational context presents as unique due to the underlying traditional hierarchical structure and collectivist values in this context (Zhang et al., 2022). Specifically, these cultural attributes affect perceptions and enactment of leadership and consequently teacher commitment and well-being differently than in other more individualistic educational systems. For example, in China, the focus on collective responsibility may enhance the altruistic behavior of teachers magnifying the effects of supportive leadership. Getting this cultural sophistication to work for leadership strategies requires incorporating them into leadership strategies. Specifically, this study intends to explore the relationship between principal leadership and teachers' commitment in the context of sports education filed in China. The study seeks to contribute to policy and practice to enhance sports in learning and to prepare students for future endeavors.

Expanding on the leadership effects on sports education, the study will also explore the psychological and personal pathways of teachers that contribute to enhancing their commitment, in the principal leadership framework. To do this, the study researches the influence of teacher subjective well-being and altruism on their commitment within a principal leadership context. Teacher commitment, one of the major determinants of educational success, depends on what makes or breaks the commitment (Mart, 2013). The subjective well-being that includes job satisfaction and emotional experiences shapes teachers' attitudes and behaviors meaning that they become more dedicated and involved in their work. Teacher altruism, selfless concern for students and the community, can either increase or reduce how the principal leadership affects teacher wellbeing and commitment (Olitalia et al., 2013). Structured initiatives like peer mentoring programs, collaborative teaching models, and recognition systems that are designed to reward acts of altruism are ways to foster altruism in an educational setting (Smith et al., 2024). For example, schools can implement teacher-buddy systems where experienced educators support less-experienced colleagues, thereby promoting a culture of mutual assistance. Organizing workshops or team-building activities focusing on shared goals and collective achievements can foster altruistic behaviors as well. Principals can also set the tone or lead by example showing empathy and putting the success of collective above their own, resulting in staff acting in this way, too. These practical approaches create an environment where altruistic values are not only encouraged but actively embedded into the school culture. This study is geared towards the elucidation of the role principal leadership plays in fostering a supportive environment that elicits teacher commitment through the reinforcement of the significance of well-being and altruism in sports educational settings. In the context of the unique challenges and opportunities that sports education faces in China, the present study is devoted to sports education. Sports teachers play a significant role in building the physical and mental wellness of students (Jones et al., 2019). Knowing how principal leadership in sports education can impact teacher commitment is important for achieving better educational results.

This study offers a more sophisticated understanding of principal leadership in sports education management by incorporating both psychological and behavioral aspects into a single framework. It examines how these components affect school effectiveness, crucial for leadership to formulate solutions to contemporary education issues and foster sustainability (Martinsone et al., 2023). The study contributes to the scholarly literature and provides solutions for educational managers to include sports for the development of the students.

The study focuses on sports education in China, where there is a strong emphasis on educational excellence and global competitiveness. China's educational system increasingly views sports as vital for holistic development, requiring a leadership style that is both adaptable and forward-thinking (Lee, 2019). Principals must create supportive environments that optimize teacher and student outcomes (Park & Kim, 2022). Studying leadership in this context fills a research gap and deepens understanding of leadership within a significant educational system.

Nevertheless, some important research gaps still remain in this field. Firstly, there exists a gap in the comprehension of how principals' leadership influences teachers' commitment within the particular context of sports education in Chinese schools that is characterized by traditional values and a hierarchical structure. This study aims to close this gap by investigating the specific role of principal leadership in Chinese schools in terms of teacher commitment, so as to generate culturally-based information. Also, the role of subjective well-being as a mediator in the relationship between principal leadership and the commitment of teachers in sports education is not yet well-known. Such a mediating mechanism is important since teacher's well-being profoundly influences their professional morale and competency. This research closes the gap by exploring how the principal leadership influences the commitment of teachers via subjective well-being, thus emphasizing the necessity of creating a positive work environment for teachers. Besides the fact that altruism is considered a key element of educational institutions, its moderating effect on the relationship between principal leadership and teacher well-being in sports education has not been thoroughly investigated. This research has the objective of filling the gap by investigating whether teacher altruism moderates the relationship between principal leadership and subjective well-being, thus providing information on the situations in which leadership is most efficient. Finally, there is a gap in the research that attempts to integrate these variables into a unified framework, as the relationship between principal leadership, subjective well-being, teacher altruism, and commitment has not been completely examined in sports education. This paper aims to cover this knowledge gap by creating and implementing an integrated model, which takes into account the complexity of educational management, thus contributing to the overall knowledge in this field.

## 2. Literature review

Organizational commitment in education requires effective leadership (Cansoy et al., 2022). Leader's actions that encourage identification with the organization, perceived support, and meaningfulness contribute to increased levels of commitment, satisfaction, and performance of teachers. The literature establishes that leaders' effective management of subordinates has a direct impact on their work-related attitudes and behaviors (Klein & Bronnert-Härle, 2020).The role of leadership in teacher commitment is well-known. Without supportive and effective leadership, school teachers' attachment to their workplace is difficult to achieve (Liu et al., 2021). Research has shown that

leadership styles that provide a sense of belonging and purpose, have a significant impact on teacher commitment, job satisfaction, and performance (Saleem et al., 2020; Yao et al., 2020). In education, leadership plays a significant role in shaping the teachers' attitudes and behavior. Principal leadership in this case is of paramount importance as they set the school culture and climate by infusing the vision, giving instructional advice, and creating a supportive environment. Successful principal leadership enhances teacher engagement, motivation, and alignment with school goals and hence improves the learning outcomes and commitment. Effective principals foster conditions where teachers learn and become content through proactivity, feedback, and appreciation (Sun, 2004).

The culture and climate of the school is set and determined by the principals. Besides the administrative responsibilities, they establish a vision, direct learning and foster appropriate learning climates. They perform operational tasks such as planning, understanding the needs of the faculty, and coming up with ways to improve on those needs (Marshall, 2015). This assists in placing value and direction in the teachers and thus increases their morale in the school. Motivated and committed teachers are important for the realization of educational objectives as pointed out by Harris et al. (2019) and (Jenkins, 2021), and this comes from the encouragement of the principals. Teacher commitment consists of an affective, calculative, and normative commitment to a school (Fresko et al., 1997). The principals who establish positive and goal-relevant climates enhance the motivation and commitment of teachers. When teachers perceive the environment as favorable and compatible with their organizational values, their commitment to the school and quality is likely to increase.

In support of this, self-determination theory (SDT) by Deci and Ryan (1985) offers a conceptualization that underlines the necessity to satisfy inherent psychological needs of autonomy, competence, and relatedness, to enhance motivation and well-being. In educational leadership, SDT implies that the commitment of teachers can be improved a lot by satisfying the above needs of principals. Autonomy implies freedom to practice and develop practice professional standards; competence makes teachers believe they are effective; relatedness makes them feel that they are valued members of the school community. Hence:

**H1**. Principal leadership is positively associated with teacher commitment.

Teachers' subjective well-being is an important measure of job satisfaction, work environment, and psychological health, which is affected by the principal leadership (Van der Vyver et al., 2020). Subjective well-being encompasses teachers' evaluation of their quality of life at the workplace, emotional well-being, and job satisfaction (Song et al., 2020). Encouraging and developmental actions from the leaders are most related to enhanced teacher satisfaction. When principals are warm and supportive, and provide staff with resources and decision-making autonomy, teachers feel appreciated, enhancing intrinsic needs for autonomy, competence, and relatedness, which promotes a positive school climate (Eyal & Roth, 2011). Research shows that higher well-being leads to low stress and thus low rates of burnout which is crucial in ensuring a healthy teaching workforce (Cenkseven-Onder & Sari, 2009).

Teacher commitment is affected by school leadership and internal factors such as subjective well-being. Teachers with high subjective well-being (indicated by the presence of positive emotions and life satisfaction) are very committed to their work. This commitment enhances their engagement, motivation, and dedication to their school (Eyal & Roth, 2011). An Effective teacher is better positioned to fulfill their professional duties and to follow the school's mission. The present study proposes that subjective well-being mediates the relationship between principal leadership and teacher commitment. Supportive headship, which focuses on staff well-being, also influences the teachers' commitment to the school. This mediation highlights subjective well-being as one of the key factors that principal leadership uses to develop teacher's commitment.

Teacher commitment is strongly correlated with their happiness, satisfaction, engagement, and emotional bond with the school. Improved well-being also improves the relationship between the teachers and their jobs as well as their positions (Chen, Luo, et al., 2022). Pleasant feelings enhance job satisfaction and increase the commitment to the goals of the school. Research evidence indicates that enhancing teacher well-being leads to enhanced participation, decreased attrition, and enhanced organizational commitment and that these positive outcomes are aligned with enhanced teacher and student achievement (Song et al., 2020). Supportive administration also improves professional efficacy which strengthens commitment.

The principal leadership's influence on teachers' commitment is complex and has various factors including the role of subjective well-being as a mediator. Principal leadership critically matters in the teachers' mental health; it not only involves emotional reactions but also includes cognitive judgments (Heidmets & Liik, 2014). Leadership behaviors that are supportive like providing emotional support, facilitating professional development, and creating a positive school climate are relevant to the subjective well-being of teachers. Research has revealed that a supportive leadership style improves job satisfaction and reduces job-related stress leading to better mental health (Maurya & Agarwal, 2015). Using SDT, the relationships between the levels of principal leadership, teachers' well-being, and commitment can be explained. SDT centers on satisfying the basic psychological needs of autonomy, competence, and relatedness in order to be motivated and healthy. In education, SDT demonstrates how the leadership of principals influences the satisfaction and commitment of teachers (Gan & Cheng, 2021). Autonomy in SDT means the teachers are in charge of their work. When principals engage the teachers in decision-making processes, support them to be innovative, and allow for autonomy, their job satisfaction and well-being improve thus increasing commitment. Competence is about feeling capable, adequate, and competent in the different tasks that are assigned to an individual. Principals complement this by rewarding, affirming, and promoting professional development. When teachers feel competent their confidence as well as commitment to their work is boosted, illustrating how leadership fosters growth. Relatedness is about being connected and appreciated. This is encouraged by principals through facilitating a culture of collaboration. Therefore:

**H2**. Principal leadership is positively associated with the subjective well-being of the teacher.

**H3**. The subjective well-being of the teacher is positively associated with teacher commitment.

**H4**. Subjective well-being mediates the relationship between principal leadership and teacher commitment.

The moderated mediation role of altruism serves as the key factor that helps in examining the relationship between principal leadership, subjective well-being, and teacher commitment. Altruism, or the unselfish caring for others' welfare, is significant in education (Chen et al., 2014), more so in sports where teachers are not only developing skills but also teamwork and personal growth. Altruistic teachers not only help in the acquisition of relevant skills but also create a positive learning atmosphere, which contributes to overall positive change (Song et al., 2020). Altruistic educators are known to have higher levels of professional happiness and quality of life (García-Vázquez et al., 2022). They also boost their own competence and belongingness within the school context, when they assist others (Derakhshan & Zare, 2023). This increase in motivation, affects the positive state of the individual's health and their level of commitment resulting in increased satisfaction and dedication.

When altruism acts as a moderator between principal leadership and teacher well-being, the results can be revolutionary. If teachers are altruistic, they are likely to perceive positive leadership support more

positively and this is likely to boost well-being and extension commitment as pointed out by Gregersen and Reinders (2023). Altruistic sports teachers build stable relationships and, as a result, contribute to the creation of a friendly atmosphere and promote their own and their students' health. Altruism ensures that leaders' behaviors are consistent with teachers' self-determination, thus improving leadership outcomes. The interaction of altruism implies that the effect of the principal leadership on teacher commitment through well-being depends on the level of teachers' altruism (Song et al., 2020). This variability underlines the significance of the teacher characteristics when assessing the leadership effects. Schools that promote altruistic behaviors may be better off the leadership that is aimed at supporting teachers' well-being hence promoting the commitment of teachers. All in all, the moderated mediation model incorporates altruism into the connection between principal leadership and teacher outcomes as described by SDT. In this respect, altruism provides a sense of autonomy, competence, and relatedness, which are the keys to intrinsic motivation. Teaching selflessly, in turn, helps the teacher feel better and be more connected, and therefore achieve the feeling of being happy. This innate motivation, the heart of SDT, accounts for general welfare and dedication (Ismail & Miller, 2021). Altruism likely moderates how principal leadership influences teacher well-being, affecting commitment. Altruistic teachers may respond more positively to supportive leadership, improving their well-being and commitment. This model helps in understanding how teacher attributes such as altruism, in a leadership context, impact well-being and commitment as pointed out, implying that leadership interventions that target both universal concerns and character strengths such as altruism should have the greatest effect. Therefore:

**H5**. The mediating effect of subjective well-being in the relationship between principal leadership and teacher commitment is moderated by teacher altruism, such that the effect is stronger when altruism is high.

## 3. Methodology

### 3.1. Participants and procedure

Participants in this study were sports education teachers from various schools across China. Focusing on these educators provided unique insights into physical education practices and the challenges within this field, particularly amidst China's educational reforms emphasizing sports and physical education. The study aimed to explore their experiences, motivations, and professional challenges. The data collection was carefully planned to ensure a robust and representative sample. Formal permissions were first obtained from school principals, administrators, and local education boards to ensure ethical research access. They were then contacted through in-person school visits. Face-to-face visits enabled us to give direct explanations and foster participation (Ahmad, Ullah, et al., 2021; Deng et al., 2022). The questionnaires were administered through structured questions that were developed from a previous literature review and pilot-tested for clarity, reliability, and validity (Fu et al., 2023; Jiang et al., 2025; Li et al., 2024). The sample size was determined using Cochran's formula in relation to the desired level of precision, size of the population, and variability in response. Based on this, about 370 participants were considered adequate for a statistically meaningful sample. To cater for non-response (a common issue in survey research), 550 questionnaires were administered. Of these, 433 were returned, a response rate of 78. Out of 433 questionnaires, 412 were valid after excluding the initial screening of invalid responses, ensuring adequate statistical power for the study (Ahmad, Samad, & Han, 2023; Zhou et al., 2023). Ethical considerations are a critical aspect of this study, particularly given the hierarchical nature of educational institutions in China. In such settings, participants may feel compelled to provide socially desirable responses due to perceived power dynamics or concerns about confidentiality. To address these challenges, several measures were implemented to ensure ethical compliance and minimize response bias. Participation in the study was entirely voluntary, and participants were informed that their responses would remain anonymous and confidential, with no identifying information linked to their data. Additionally, school principals and administrators were explicitly instructed not to influence or monitor the teachers' participation in any way, ensuring that responses were independent and free from external pressures (Ahmad, Ahmad, & Siddique, 2023; Han et al., 2022). These precautions were reinforced through the use of standardized instructions and carefully worded consent forms (Ahmad et al., 2022; Xu et al., 2022). Future studies could further mitigate such ethical concerns by incorporating alternative data collection methods, such as anonymous online surveys or third-party-administered interviews, to reduce any potential for perceived coercion or influence. Such approaches would enhance the reliability of responses and strengthen the ethical framework of studies conducted in hierarchical contexts. The study was conducted on a voluntary basis and each participant gave informed consent having been informed of the aim and objectives of the study, the procedures to be employed, and the risks and benefits of the study (Wang et al., 2024). Participants' identity was also protected and all the procedures followed the standard code of ethics and data protection acts (Ahmad, Han, & Kim, 2024; Yuxiang et al., 2024).

To increase respondent engagement and minimize errors and fatigue, data collection was carried out in three phases (Liu et al., 2023; Yuxiang et al., 2024). The first wave included data on principal leadership practices. The second wave gathered information regarding teacher's subjective well-being, and their altruistic behaviors. The last wave looked at the level of commitment that teachers have to the institution. Table 1 below shows the socio-demographic profile of the participants; their age, gender, years of teaching experience, and education level.

### 3.2. Measures

The study employed validated scales for each of the research variables, with all items measured on a seven-point Likert scale. These scales were employed for their known validity and reliability (Ahmad, Samad, & Han, 2024; Liu et al., 2023). The principal leadership questionnaire was taken from which measured the work of principals in Hong Kong secondary schools (33 items), covering seven dimensions of leadership practice. These dimensions include strategic management (e.g., “Our principal helps clarify the reasons for our school's improvement

**Table 1**
Sample profile.

| Characteristic | Frequency | Percentage (%) |
|---|---|---|
| **Gender** | | |
| Male | 210 | 51.0 |
| Female | 202 | 49.0 |
| **Age** | | |
| Under 30 | 120 | 29.1 |
| 31–40 | 150 | 36.4 |
| 41–50 | 80 | 19.4 |
| Over 50 | 62 | 15.0 |
| **Education level** | | |
| Bachelor's Degree | 180 | 43.7 |
| Master's Degree | 160 | 38.8 |
| Doctorate Degree | 72 | 17.5 |
| **Years of experience** | | |
| <5 | 90 | 21.8 |
| 5–10 | 140 | 34.0 |
| 11–15 | 110 | 26.7 |
| Over 15 | 72 | 17.5 |

**Note:** This table summarizes the demographic profile of the study participants, including their gender, age distribution, education level, and years of teaching experience. The sample reflects a balanced representation across these categories, with slightly more male participants (51.0 %) and a majority falling within the 31–40 age group (36.4 %). Most participants hold a Bachelor's or Master's degree and have between 5 and 10 years of teaching experience.

initiatives"), teacher professional development (e.g., "Our principal helps train the school management team"), staff management (e.g., "Our principal assigns work to staff in accordance with their capabilities"), resource management (e.g., "Our principal develops strategies to promote the school to the community"), external communication (e.g., "Our principal demonstrates an ability to secure additional resources for the school"), quality management (e.g., "Our principal establishes a structured quality assurance mechanism in school"), and instructional leadership (e.g., "Our principal encourages staff to consider new ideas for their teaching"). Each dimension was measured by a set of four to six items. Teacher commitment to the school was measured using 18 items from Pranitasari (2020), such as "I feel very happy spending the rest of my career in this school." Subjective well-being of the teacher was measured using five items (Diener et al., 1985), such as "In most ways, my life is close to my ideal." Teacher altruism was measured using five items adapted from Podsakoff et al. (1990), including a sample item such as "I help my colleagues who have heavy workloads."

## 4. Results and analysis

The confirmatory factor analysis (CFA) of this study supported the factor structure of different constructs such as principal leadership (PL),

**Table 2**
Factor structure.

| | EC | IL | PL | QM | RM | SM | STM | TAL | TC | TD | TSWB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EC1 | 0.94 | | | | | | | | | | |
| EC2 | 0.959 | | | | | | | | | | |
| EC3 | 0.949 | | | | | | | | | | |
| EC4 | 0.948 | | | | | | | | | | |
| IL1 | | 0.852 | | | | | | | | | |
| IL2 | | 0.951 | | | | | | | | | |
| IL3 | | 0.961 | | | | | | | | | |
| IL4 | | 0.95 | | | | | | | | | |
| QM1 | | | | 0.932 | | | | | | | |
| QM2 | | | | 0.942 | | | | | | | |
| QM3 | | | | 0.831 | | | | | | | |
| QM4 | | | | 0.862 | | | | | | | |
| QM5 | | | | 0.918 | | | | | | | |
| QM6 | | | | 0.934 | | | | | | | |
| RM1 | | | | | 0.967 | | | | | | |
| RM2 | | | | | 0.977 | | | | | | |
| RM3 | | | | | 0.961 | | | | | | |
| SM1 | | | | | | 0.939 | | | | | |
| SM2 | | | | | | 0.83 | | | | | |
| SM3 | | | | | | 0.938 | | | | | |
| SM4 | | | | | | 0.949 | | | | | |
| STM1 | | | | | | | 0.96 | | | | |
| STM3 | | | | | | | 0.961 | | | | |
| STM4 | | | | | | | 0.939 | | | | |
| STM5 | | | | | | | 0.967 | | | | |
| STM6 | | | | | | | 0.902 | | | | |
| TAL1 | | | | | | | | 0.843 | | | |
| TAL2 | | | | | | | | 0.875 | | | |
| TAL3 | | | | | | | | 0.817 | | | |
| TAL4 | | | | | | | | 0.822 | | | |
| TAL5 | | | | | | | | 0.823 | | | |
| TC1 | | | | | | | | | 0.92 | | |
| TC10 | | | | | | | | | 0.927 | | |
| TC11 | | | | | | | | | 0.912 | | |
| TC13 | | | | | | | | | 0.928 | | |
| TC14 | | | | | | | | | 0.837 | | |
| TC15 | | | | | | | | | 0.907 | | |
| TC16 | | | | | | | | | 0.904 | | |
| TC17 | | | | | | | | | 0.921 | | |
| TC18 | | | | | | | | | 0.919 | | |
| TC2 | | | | | | | | | 0.922 | | |
| TC4 | | | | | | | | | 0.904 | | |
| TC6 | | | | | | | | | 0.908 | | |
| TC7 | | | | | | | | | 0.819 | | |
| TC8 | | | | | | | | | 0.898 | | |
| TC9 | | | | | | | | | 0.862 | | |
| TD1 | | | | | | | | | | 0.924 | |
| TD2 | | | | | | | | | | 0.941 | |
| TD3 | | | | | | | | | | 0.931 | |
| TD4 | | | | | | | | | | 0.926 | |
| TD5 | | | | | | | | | | 0.945 | |
| TD6 | | | | | | | | | | 0.955 | |
| TSWB2 | | | | | | | | | | | 0.872 |
| TSWB3 | | | | | | | | | | | 0.882 |
| TSWB4 | | | | | | | | | | | 0.86 |
| TSWB5 | | | | | | | | | | | 0.82 |

**Note:** This table presents the loadings of observed variables (items) on their respective latent constructs, including Principal Leadership (PL), Teacher Subjective Well-Being (TSWB), Teacher Commitment (TC), Teacher Altruism (TAL), and other dimensions such as External Communication (EC), Instructional Leadership (IL), Quality Management (QM), Resource Management (RM), Strategic Management (SM), and Staff Management (STM). High loadings ($\geq$0.70) confirm the reliability and validity of the measurement items within their constructs.

teacher subjective wellbeing (TSWB), teacher commitment (TC), and teacher altruism (TAL). The results indicated the multidimensional nature of the leadership with strong loadings across dimensions e.g., instructional leadership (IL), resource management (RM), staff management (STM), quality management (QM), external communication (EC), strategic management (SM). A few items were deleted because of the low factor loadings. This factor structure provided a stable base for exploring the relationships implied in the study's hypothesis.

Table 2 demonstrates the measurement model's effectiveness in capturing the constructs. The EC dimension showed high factor loadings (EC1 to EC4) from 0.940 to 0.959, indicating strong reliability (Guan et al., 2023; Xu et al., 2022). IL items (IL1 to IL4) had loadings from 0.852 to 0.961, confirming robustness. QM had strong loadings, mostly above 0.90, with QM3 and QM4 slightly lower at 0.831 and 0.862 but still cohesive. RM had very high loadings (0.961 to 0.977), affirming its validity. SM showed reliable loadings from 0.830 to 0.949. STM had high loadings, mostly above 0.90, confirming consistency. TAL exhibited strong internal consistency with all items loading above 0.80 (0.817 to 0.875). TC had high loadings, mostly above 0.90, like 0.920 (TC1) and 0.928 (TC13). TD items, centered on professional growth, had high loadings (0.924 to 0.955), indicating strong coherence. TSWB had reliable loadings from 0.820 to 0.882. Overall, the CFA results confirm strong convergent validity for all constructs. The reliable items support further analysis, providing insights into the relationships between leadership and teacher outcomes. The measurement model of our research is given in Fig. 1.

Table 3 confirms the reliability and validity of the study's psychological constructs, demonstrating a strong measurement model. All constructs show high reliability, with Cronbach's Alpha, ρA, and composite reliability values above 0.70, indicating strong internal consistency (Ahmad, Ahmad, Lewandowska, & Han, 2024; Ahmad, Ahmad, & Siddique, 2024). For example, EC, IL, and PL have Cronbach's Alpha and composite reliability values over 0.90, showing robust consistency.

Convergent validity is indicated by average variance extracted (AVE) values above 0.50, meaning a substantial portion of variance is explained by their indicators (Guo et al., 2021; Peng et al., 2022). High AVE values, such as 0.9 for EC, 0.864 for IL, and 0.938 for RM, confirm strong convergent validity. Discriminant validity is assessed by comparing the square root of each construct's AVE to its correlations with other constructs. The square root of AVE must be higher than the correlations with other constructs (Ahmad, Samad, & Han, 2023). For instance, the square root of AVE for EC is 0.949, higher than its correlations with IL (0.438), PL (0.509), and QM (0.515), confirming strong discriminant validity. Correlations between constructs are moderate to high, showing meaningful relationships without losing distinctiveness. For instance, the correlation between IL and PL is 0.622, and with QM, it is 0.639, both below their AVE square roots. Similarly, TAL's correlations with TC (0.45) and TSWB (0.566) are below its AVE square root (0.836).

Constructs like TC and TD also have high Cronbach's Alpha values (0.983 and 0.972) and composite reliability scores (0.985 and 0.977), indicating high reliability (Ahmad, Ahmad, & Siddique, 2024; Ahmad, Ullah, et al., 2021). R-squared values for PL, TC, and TSWB are 1, 0.261, and 0.451, respectively, showing significant explained variance.

The hypothesis testing (Table 4) conducted using SMART-PLS yielded statistically significant results for all proposed relationships. The analysis confirmed the positive influence of PL on TC with a beta value of 0.25 and a T statistic of 5.627, supporting H1. Similarly, H2 which proposed that PL positively affects TSWB, was validated by a beta value of 0.184 and a T statistic of 5.111. The H3 suggesting that TSWB significantly impacts TC was robustly supported by the highest T statistic of 6.4 and a beta value of 0.373, indicating a substantial effect. Furthermore, the mediating effect of TSWB in the relationship between PL and TC (H4) was also supported, with a beta value of 0.069 and a T statistic of 2.379, confirming the significance of this mediation. Lastly, the moderating effect of TAL in the relationship between TSWB and TC (H5) was evidenced by a beta value of 0.057 and a T statistic of 2.192, indicating a statistically significant moderation at the 0.029 p-value level. Fig. 1 depicts the Structural model (Fig. 2).

Fig. 3, displays a simple slopes analysis that investigates how principal leadership (PL) influences teacher subjective wellbeing (TSWB) at different levels of a moderator (e.g., teacher altruism). It illustrates three conditions: PL one standard deviation below the mean (red line), at the mean (blue line), and one standard deviation above the mean (green line). The analysis shows that as PL increases, TSWB also rises across all levels, with the strongest effect evident when the moderator is at +1 SD, indicating a more significant impact of PL on TSWB at higher levels of the moderator.

## 5. Discussion

This research verifies a principal leadership role in the increase of teacher commitment and subjective well-being. It is a consistent result with Liu et al. (2021) research. The primary link of leadership with teacher retention and subjective well-being is consistent with models suggesting leadership as fundamental to educational outcomes (Eyal & Roth, 2011; Heidmets & Liik, 2014). Principal leadership raises teacher commitment by communicating and managing principals and other staff members in an efficient manner or by providing support to teachers as indicated by Liu et al. (2021). Principal leaders build a motivated workforce which is crucial for high standards of education as posited by Yao et al. (2020). In the same manner, Principal leadership has a significant and positive relationship with teacher well-being since it improves the perception of the teachers and makes them feel appreciated, in line with Van der Vyver et al. (2020) and Song et al. (2020) who mentioned the health and well-being of the employees as key factors that determine their level of commitment, performance, and loyalty at the workplace.

The study contributes to educational leadership research by showing that teacher well-being is a mediator between principal leadership and teacher commitment highlighting both direct and indirect effects. This mediated relationship also points to the need for a favorable context that improves well-being, if commitment is to be boosted, strengthening the argument of Song et al. (2020). The role of well-being as a mediator demonstrates that leadership can enhance the results by meeting teachers' psychological needs. They create a good organizational climate that enhances health, productivity, and contentment among the workers.

The study also presents the concept of teacher altruism, which it identifies as having a moderating influence on the relationship between well-being and commitment, arguing that altruistic behaviors have a strong influence on the aforementioned relationship. In line with Chen et al. (2014) who opine that altruistic teachers are more committed when their well-being is high. Although investigated in the context of nursing and social work in the past, analyzing altruism in education is a novel attempt. The results indicate that the traits such as altruism can enhance the relationship between well-being and commitment, thus, leaders should consider these traits when designing development programs. In summary, this study reveals the bidirectional relationship between Principal Leadership and teachers' characteristics and quality, which occur through various channels (well-being and altruism, for example). It is important for educational leaders to know these pathways in order to establish environments that are successful. In this way, the work connects leadership practices, teacher well-being, and commitment and offers a broad picture of leadership's impacts in educational contexts. It emphasizes the need to consider both direct and indirect effects and the role of personal values to fully understand leadership's influence on educational outcomes.

### 5.1. Theoretical implications

Theoretically, this study significantly enriches our understanding of

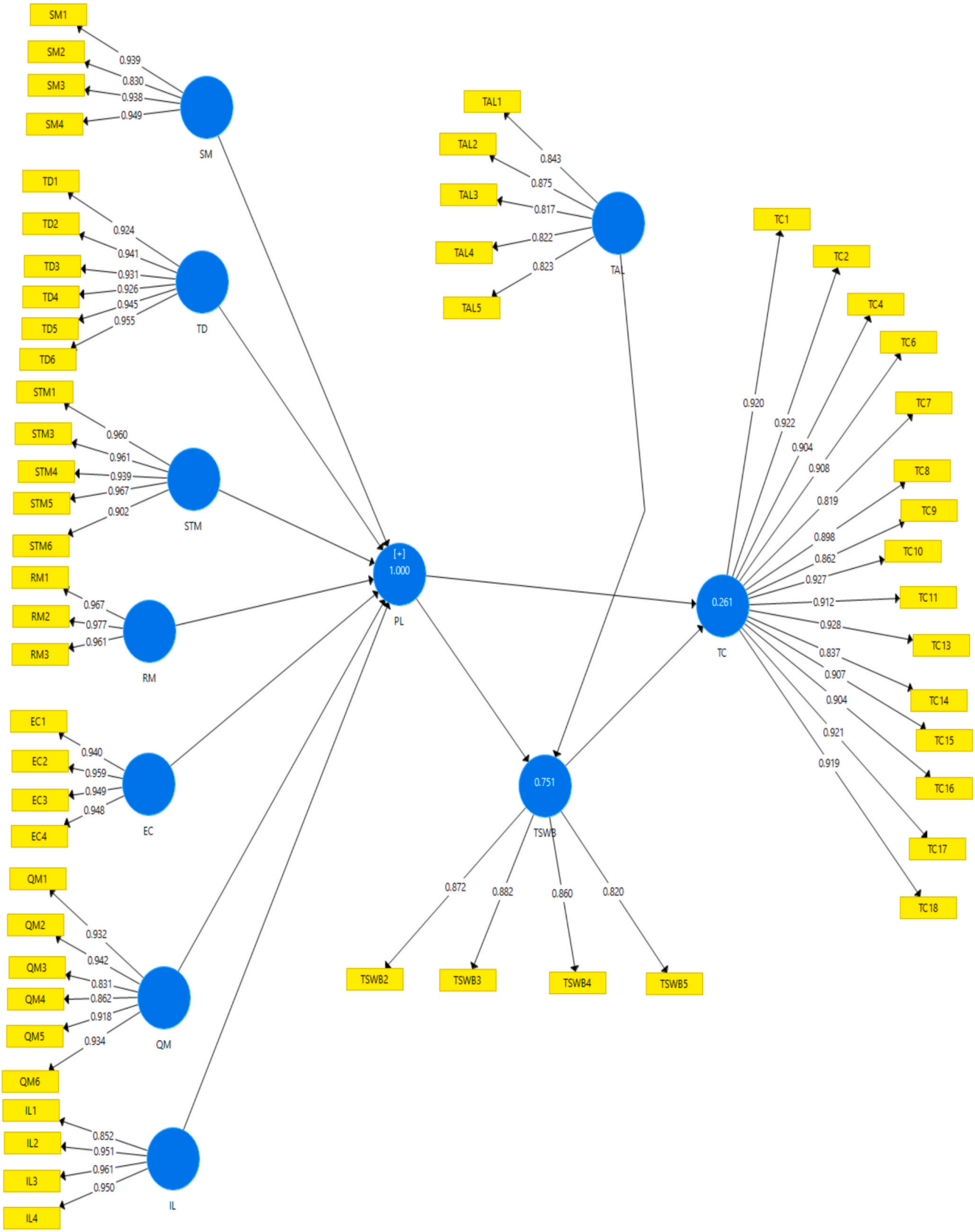



**Fig. 1.** Measurement Model illustrating the relationships between constructs, observed variables, and latent variables. The model displays factor loadings for each observed variable, highlighting the reliability and validity of the measurement items across constructs such as Principal Leadership (PL), Teacher Subjective Well-Being (TSWB), Teacher Commitment (TC), and Teacher Altruism (TAL). The R-squared values for endogenous constructs demonstrate the variance explained by the model.

**Table 3**
Reliability and validity.

| Square root of AVE | Correlations (EC, IL, PL, QM, RM, SM, STM, TAL, TC, TD, TSWB) | α | ρA | CR | AVE |
|---|---|---|---|---|---|
| EC (0.949) | IL (0.438), PL (0.509), QM (0.515), RM (0.692), SM (0.347), STM (0.291), TAL (0.257), TC (0.367), TD (0.3), TSWB (0.274) | 0.963 | 0.963 | 0.973 | 0.90 |
| IL (0.93) | EC (0.438), PL (0.622), QM (0.639), RM (0.539), SM (0.407), STM (0.421), TAL (0.33), TC (0.387), TD (0.414), TSWB (0.31) | 0.947 | 0.948 | 0.962 | 0.864 |
| PL (0.741) | EC (0.509), IL (0.622), QM (0.654), RM (0.501), SM (0.471), STM (0.653), TAL (0.343), TC (0.367), TD (0.554), TSWB (0.314) | 0.974 | 0.974 | 0.975 | 0.55 |
| QM (0.904) | EC (0.515), IL (0.639), PL (0.654), RM (0.605), SM (0.387), STM (0.343), TAL (0.299), TC (0.389), TD (0.341), TSWB (0.294) | 0.955 | 0.956 | 0.964 | 0.817 |
| RM (0.968) | EC (0.692), IL (0.539), PL (0.501), QM (0.605), SM (0.357), STM (0.28), TAL (0.27), TC (0.355), TD (0.289), TSWB (0.275) | 0.967 | 0.967 | 0.978 | 0.938 |
| SM (0.915) | EC (0.347), IL (0.407), PL (0.471), QM (0.387), RM (0.357), STM (0.616), TAL (0.223), TC (0.176), TD (0.608), TSWB (0.196) | 0.934 | 0.936 | 0.954 | 0.838 |
| STM (0.946) | EC (0.291), IL (0.421), PL (0.653), QM (0.343), RM (0.28), SM (0.616), TAL (0.253), TC (0.184), TD (0.537), TSWB (0.193) | 0.971 | 0.971 | 0.977 | 0.895 |
| TAL (0.836) | EC (0.257), IL (0.33), PL (0.343), QM (0.299), RM (0.27), SM (0.223), STM (0.253), TC (0.45), TD (0.263), TSWB (0.566) | 0.892 | 0.893 | 0.921 | 0.699 |
| TC (0.9) | EC (0.367), IL (0.387), PL (0.367), QM (0.389), RM (0.355), SM (0.176), STM (0.184), TAL (0.45), TD (0.177), TSWB (0.452) | 0.983 | 0.983 | 0.985 | 0.81 |
| TD (0.937) | EC (0.3), IL (0.414), PL (0.554), QM (0.341), RM (0.289), SM (0.608), STM (0.537), TAL (0.263), TC (0.177), TSWB (0.202) | 0.972 | 0.972 | 0.977 | 0.878 |
| TSWB (0.859) | EC (0.274), IL (0.31), PL (0.314), QM (0.294), RM (0.275), SM (0.196), STM (0.193), TAL (0.566), TC (0.452), TD (0.202) | 0.881 | 0.883 | 0.918 | 0.738 |

**Note:** This table presents the square root of AVE, construct correlations, Cronbach's alpha (α), rho_A (ρA), composite reliability (CR), AVE, and R-squared values. The results confirm strong reliability, convergent validity, and discriminant validity for all constructs, with R-squared values indicating explained variance for key outcomes such as Teacher Commitment (TC) and Teacher Subjective Well-Being (TSWB).

educational leadership by identifying teacher subjective well-being as a mediating factor in the relationship between principal leadership and teacher commitment. It highlights how leadership's effectiveness transcends direct interactions, influencing teachers' psychological states, which in turn affect organizational outcomes. This advocates for a deeper consideration of emotional and well-being factors in leadership models. The study also indicates the importance of taking into consideration the leadership behaviors and psychological states of teachers when developing theories on educational leadership. The findings that teacher well-being mediates the relationship between principal leadership and teacher commitment, imply that leadership effectiveness is partially dependent on the effects it has on teachers' well-being. This is consistent with the best practices of emotionally intelligent leadership, which include fostering psychological safety and trust. The research proposes that leadership theories should be broadened to capture psychological factors, which provide a broader perspective on how leadership impacts Teacher Commitment and learning performance.

Furthermore, the role of teacher altruism as a moderating factor suggests that individual traits can significantly influence the impact of subjective well-being on commitment, emphasizing the need for personalized approaches in educational research. This finding implies that the relationship between well-being and commitment depends on such characteristics as altruism. By including altruism as a moderator, the study encourages leadership theories that consider variations in the reaction of the subjects to leadership, rather than the all-encompassing, 'one size fits all' approach, and supports the theories that acknowledge the variation in the reaction of teachers. The research also supports the integration of positive psychology into educational leadership theories by showcasing how well-being is crucial for effective leadership. This underlines the importance of prioritizing teachers' emotional welfare, aiming for not only better performance but also improved quality of life. Including teacher altruism in the theoretical framework enhances the understanding of leadership effectiveness. It implies that leadership is most effective when it is congruent with the teachers' self-organized values, especially the values that are related to prosocial behavior. This broadens leadership theories from the leader and the follower relationship to the relationship between the self and the organizational environment and enables the integration of social psychological theories into educational leadership.

The study calls for the incorporation of positive psychology into theories of educational leadership. In this way, by situating teacher well-being as a variable influenced by and in turn influencing leadership, it underscores the importance of leadership models that are not only focused on productivity but also on the well-being of the teachers. This is in line with trends that highlight the importance of well-being, positive organizational behavior, and human potential development as parameters of leadership and strength-based approach to organizational health and positive psychological states. The theoretical implications also present leadership in the context of a process that is constantly changing and depends on the interactions between individuals. The mediating role of teacher well-being on the relationship between principal leadership and teacher commitment indicates leadership outcomes are constructed through reciprocal processes in leaders and followers and their psychological states. This leads to the shift from the fixed and categorical perceptions of leaders, which are based on personality characteristics to the more fluid and contextual approaches that use the dynamic processes of the organizational relationships.

### 5.2. Practical implications

The present work provides effective recommendations for improving teacher engagement and professional fulfillment based on the principal's leadership and the support framework. It brings out the need to enhance the development of interpersonal and emotional intelligence skills in the training of principals. These skills include empathy, active listening, conflict resolution, and emotional regulation that help principals to effectively engage with their staff, and promote a positive school climate that values teacher wellbeing and professional development. Training in these areas assists leaders in meeting the needs of diverse learners while fostering a climate that increases teacher's morale and job satisfaction.

The findings also underscore the importance of having well-being programs, professional counseling, and peer support groups as essential factors in enhancing teacher health. Some of the wellness activities that may be offered could include stress management, mindfulness, and

**Table 4**
Structural analysis.

| Hypothesis | Path | Beta value | Standard deviation | T statistics | p values | Confidence interval | Accepted/rejected |
|---|---|---|---|---|---|---|---|
| H1 | PL → TC | 0.25 | 0.044 | 5.627 | 0.000 | [0.168, 0.344] | Accepted |
| H2 | PL → TSWB | 0.184 | 0.036 | 5.111 | 0.000 | [0.131, 0.214] | Accepted |
| H3 | TSWB → TC | 0.373 | 0.058 | 6.400 | 0.000 | [0.246, 0.478] | Accepted |
| H4 | PL → TSWB → TC | 0.069 | 0.029 | 2.379 | 0.009 | [0.011, 0.080] | Accepted |
| H5 | Moderating Effect 1 → TSWB → TC | 0.057 | 0.026 | 2.192 | 0.029 | [0.026, 0.069] | Accepted |

**Note:** This table presents the path relationships among the constructs, including Principal Leadership (PL), Teacher Subjective Well-Being (TSWB), and Teacher Commitment (TC). It highlights the beta values, standard deviations, T-statistics, p-values, confidence intervals, and the acceptance or rejection of each hypothesis. The results confirm the significance of direct effects (H1, H2, H3), a mediating effect (H4), and a moderated mediation effect (H5), demonstrating the robustness of the structural model.

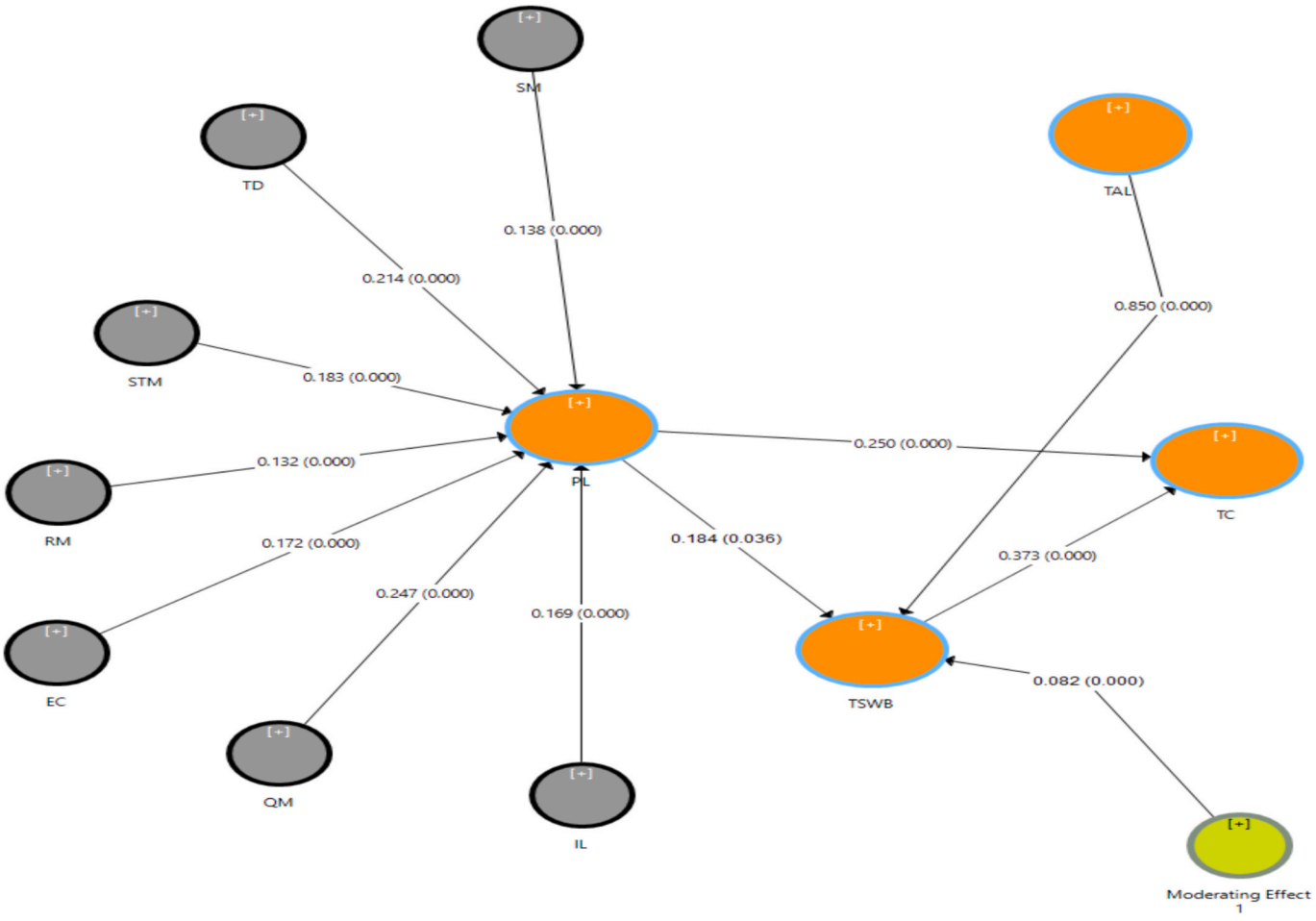



**Fig. 2.** Full Structural Model illustrating the relationships among the constructs, including Principal Leadership (PL), Teacher Subjective Well-Being (TSWB), Teacher Commitment (TC), and Teacher Altruism (TAL). Path coefficients and their significance levels are displayed alongside each relationship, highlighting direct, mediating, and moderating effects. The model integrates multiple dimensions, such as Strategic Management (SM), Resource Management (RM), External Communication (EC), Quality Management (QM), Instructional Leadership (IL), and Staff Management (STM), to provide a comprehensive representation of the hypothesized framework.

physical activities that may enable teachers to deal with some of the challenges they encounter in their workplace. Professional counseling allows a person to avoid emotional burnout and turn to peers for help, while peer support groups create a sense of community and involve people in solving problems, eliminating loneliness. The study also recommends that to enhance the teacher well-being-commitment relationship, there is a need to encourage altruism. Promoting altruism can be done by acknowledging and providing incentives to the acts of other people that may include mentoring and taking up more responsibilities. Sharing ideas through mentorship and projects will go a long way in fostering altruism and making the teachers feel appreciated.

It is recommended to have surveys and check-ups of teachers' satisfaction levels at least once a semester, in order to track any signs of stress or dissatisfaction. Emotional, social, and physical well-being can be assessed through surveys, and check-ins can allow school leaders to speak with teachers, address their concerns, and include them in decision-making, which will result in increased job satisfaction and decreased turnover.

In this context, the study calls for differentiated professional development and support plans that will fit each teacher's needs. It also provides specific training and development and materials that can be linked to the goals, thus increasing the level of support and engagement

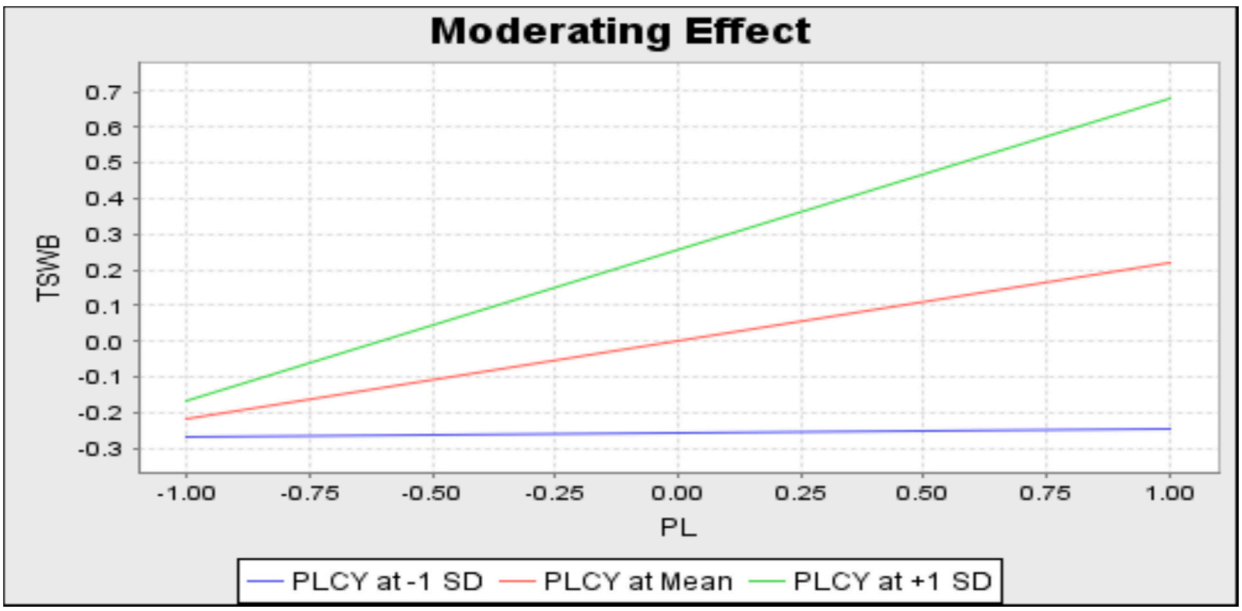



**Fig. 3.** The moderating effect of a variable on the relationship between principal leadership (PL) and teacher subjective wellbeing (TSWB), demonstrated at three levels of the moderator: −1 SD (red line), mean (blue line), and +1 SD (green line). The graph shows that the influence of PL on TSWB strengthens as the moderator increases. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

among the teachers. In terms of policy, the present study suggests that there is a need for constant emotional and psychological training for school leaders to enhance teacher welfare. This could include the integration of emotional intelligence, stress, and mental health modules as parts of the certification and professional development for principals. In addition, it is crucial to allocate funds for the well-being of students, the funding of which includes programs and counseling services that are necessary to create a healthy learning environment.

To achieve sustainable change, educational policymakers and stakeholders are encouraged to focus on comprehensive well-being frameworks supported by adequate resources. This involves ongoing feedback and evaluation of well-being initiatives and collaboration with mental health professionals, wellness experts, and educational consultants to develop effective strategies. By adopting a holistic approach to teacher support, schools can create a flourishing environment for teachers, students, and the broader community. This study provides recommendations that are both actionable and adaptable to different educational contexts. Specific leadership practices in the domain of principals can be implemented to raise teacher commitment and teacher well-being, like, holding regular check-ins with teachers to talk about their stress and needs, organizing professional development workshops related to stress management and emotional intelligence, as well as, create peer support networks to work collaboratively and support each other. Principals can also lead by example, showing empathy, and putting teachers on the front pages with public acknowledgments of their efforts. They can be tailored to a number of educational settings beyond sports education. For example, in schools stressing on academic performance, principals might add mindfulness programs as a way to deal with the stress, whereas in schools with less resources, they could concentrate on building a supportive culture by combining community alliances and resource sharing. Moreover, leaders can promote teacher well-being and commitment by customizing these practices to fit the specific challenges and opportunities facing different educational environments.

### *5.3. Limitations and suggestions for future*

Although the current study offers valuable findings on the ways in which principal leadership affects teacher commitment and subjective well-being, there are some limitations that indicate directions for future research. While this study focuses on sports education in China, future research could explore variables like school culture and organizational size or replicate the study in diverse cultural settings. These efforts would validate the findings and expand understanding of leadership's impact across varied contexts. Even though this study makes use of a robust methodology, including the use of SMART-PLS to test the hypothesis and validate constructs, there are some limitations to the study design. In particular, a cross-sectional design is used that precludes the drawing of causal inferences among the variables. This also assumes the use of self-reported data, which could be causing bias in the results; social desirability and common method variance, for example, are likely to play a role.

Future research, then, should try to address these limitations by using longitudinal designs with time to see who is changing over time and examining with more certainty the causal relationships that exist. Furthermore, utilizing mixed methods such as combining quantitative data with qualitative understanding from interviews or focus groups can provide a more detailed understanding of the underlying mechanisms and contextual forces at work. For example, future researchers can use strategies that include getting a triangulated view of data that could be used to address potential bias in self-reported data, as well as ensuring anonymity of response, and statistical techniques like Harman's single-factor test. Future studies can continue to apply these approaches to build on the findings presented here and to make further contributions to the understanding of the relationships between principal leadership and teacher well-being, and commitment. Future work should also examine other possible moderator variables like the culture of the organization or the size of the school, to help unravel the relationships within the educational leadership models.

## 6. Conclusions

This study provides clear evidence of how principal leadership significantly influences teacher commitment and subjective well-being, with teacher well-being acting as a mediating factor and altruism serving as a moderating variable. The findings demonstrate that principal leadership affects teacher commitment both directly and indirectly by fostering an environment that enhances teacher wellness. Moreover,

the study highlights altruism as an important personal trait, showcasing the diverse roles such characteristics can play in the educational context. This perspective encourages a more individualized understanding of how personal attributes influence professional outcomes, which is essential for developing more inclusive leadership models. The study's findings offer valuable insights for educational leaders aiming to create more supportive and effective environments that promote teacher engagement, satisfaction, and overall well-being, ultimately leading to a more robust educational system. Based on these outcomes, the study strongly recommends extended leadership training programs that emphasize emotional intelligence, empathy, and individualized approaches, ensuring a teacher-friendly learning environment that enhances the success and sustainability of educational institutions. Furthermore, integrating these elements into leadership practices can help in achieving long-term educational goals, creating a culture where both teachers and students thrive.

## CRediT authorship contribution statement

**Weiqiang Qi:** Writing – review & editing, Writing – original draft, Conceptualization. **Yunxiao Zhang:** Validation, Supervision, Resources, Investigation. **Muhammad Zulqarnain Arshad:** Methodology, Formal analysis, Data curation.

## Informed consent statement

Informed consent was obtained from all subjects involved in the study.

## Ethical approval statement

This study received ethical approval from the Ethics Review Committee for Educational Research at Chongqing College of Mobile Communication, Chongqing, China (Approval Number: ECER-2023-078). All procedures involving human participants were conducted in accordance with the ethical standards of the institution and informed consent was obtained from all participants prior to their involvement in the study.

## Declaration of competing interest

The authors declare no conflict of interest.

## Data availability

Data will be made available on request.

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