http://dx.doi.org/10.18623/rvd.v23.n2.3509

THE IMPACT OF SPIRITUAL LEADERSHIP PERCEPTION ON PHYSICAL EDUCATION TEACHERS' INNOVATION IN UNIVERSITIES IN CHINA

O IMPACTO DA PERCEPÇÃO DA LIDERANÇA ESPIRITUAL NA INOVAÇÃO DOS PROFESSORES DE EDUCAÇÃO FÍSICA EM UNIVERSIDADES NA CHINA

Article received on: 8/25/2025
Article accepted on: 11/24/2025

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The authors declare that there is no conflict of interest

Abstract
Physical education teachers play a unique role in the university environment. They need to not only teach physical skills, but also cultivate students' teamwork spirit and physical fitness, thereby playing a crucial role in higher education. This study used the questionnaire survey method, taking physical education teachers in Chinese universities as samples. A total of 554 formal questionnaires were collected. This study aims to explore predictive effects of perceived spiritual leadership of physical education teachers in Chinese universities on teachers' innovation, and the mediating effect of workplace spirituality between perceived spiritual leadership and innovative behaviors. The results indicate that there are no significant differences in teachers' innovative behaviors among physical education teachers of different genders, while there are significant differences among teachers with different educational backgrounds and professional titles. Perceived spiritual leadership has a significant positive impact on teachers' innovative behaviors and workplace spirituality; workplace spirituality has a significant positive influence on teachers' innovative behaviors; and workplace spirituality has a mediating effect between the perceived spiritual leadership and teachers' innovative behaviors. This study provides practical guidance for university administrators by exploring the impact of perceived spiritual leadership on the innovative behaviors of physical education teachers in universities.

Resumo
Os professores de educação física desempenham um papel único no ambiente universitário. Eles precisam não apenas ensinar habilidades físicas, mas também cultivar o espírito de trabalho em equipe e a aptidão física dos alunos, desempenhando assim um papel crucial no ensino superior. Este estudo utilizou o método de pesquisa por questionário, tomando como amostra professores de educação física em universidades chinesas.
Um total de 554 questionários formais foram coletados. Este estudo tem como objetivo explorar os efeitos preditivos da liderança espiritual percebida dos professores de educação física em universidades chinesas sobre a inovação dos professores e o efeito mediador da espiritualidade no local de trabalho entre a liderança espiritual percebida e os comportamentos inovadores. Os resultados indicam que não há diferenças significativas nos comportamentos inovadores dos professores entre professores de educação física de diferentes gêneros, enquanto há diferenças significativas entre professores com diferentes formações acadêmicas e títulos profissionais. A liderança espiritual percebida tem um impacto positivo significativo nos comportamentos inovadores dos professores e na espiritualidade no local de trabalho; a espiritualidade no local de trabalho tem uma influência positiva significativa nos comportamentos inovadores dos professores; e a espiritualidade no local de trabalho tem um efeito mediador entre a liderança espiritual percebida e os comportamentos inovadores dos professores. Este estudo fornece orientações práticas para

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Keywords: Perceived Spiritual Leadership. Teachers' Innovative Behaviors. Workplace Spirituality. Physical Education Teachers.

administradores universitários, explorando o impacto da liderança espiritual percebida nos comportamentos inovadores dos professores de educação física em universidades.

Palavras-chave: *Liderança espiritual percebida. Comportamentos inovadores dos professores. Espiritualidade no local de trabalho. Professores de educação física.*

1 INTRODUCTION

In order to survive in the fierce competitive environment, institutions of higher learning must rely on innovation and creativity. In addition to being aware of the changes and developments in the environment, they also need to face the upcoming challenges with a new look (Hart & Rodgers, 2024). It's of great necessity to have people rich in creativity and innovative spirit in educational institutions and other scientific education organizations, because these organizations play a crucial role in cultivating professional and responsible talents for various organizations and departments. As the main part of the education system, teachers' innovation behaviors have a huge impact on the performance of education (Hidayat & Patras, 2024). Physical education teachers play a unique role in the university environment, because they need to not only teach physical skills, but also cultivate students' teamwork spirit and physical fitness, which makes the work nature of physical education teachers different from that of teachers of other disciplines (Hellison *et al*., 2025). In terms of reality, physical education teachers in universities still generally have problems of slow knowledge update and low self-efficacy, leading to the lack of competitiveness in discipline construction and talent cultivation (Zheng & Lv, 2022).

Researchers have verified that the importance of leadership in influencing teachers' innovative behaviors to achieve better school performance (Bao, 2024; Kebede *et al*., 2024; Kılınç *et al*., 2024). And leaders play an important role in achieving a high level of organizational performance, since they can develop the flexibility of the organizations and adapt to the changes in the internal and external environment (Torlak & Kuzey, 2019). One of the goals of leader style is the ability to supervise, develop, and make decisions more effectively, which is one of factors driving the development of all industries (Yang *et al*., 2023). In addition, it also enhance the original thinking level and situational adaptability of followers. Leader's behaviors that improve individual

innovative capacity include providing an attractive vision, influencing the values and culture of the organization, respecting individual contribution, showing personalized concern and openness to individuals, and engaging in healthy social communication with individuals (Carnevale *et al*., 2017; Dedahanov *et al*., 2019; Javed *et al*., 2019; Jung *et al*., 2003).

Compared with traditional leadership method, spiritual leadership is regarded as an overall and advanced characteristic that can integrate leadership characteristics and behaviors, shared organizational values, and individual welfare into a comprehensive leadership method (Fry & Kriger, 2009). Self-determination theory reflects the prototype manifestation of human learning and innovation tendencies, and spiritual leadership is developed based on this theory (Suriyankietkaew & Kantamara, 2019). Research has demonstrated that inner drives are related to better performance and innovative behaviors (Fischer *et al*., 2019). Spiritual leadership concerns individuals who actively participate in the workplace so that they can find meanings in their own life, which in turn promotes the continuous development of the followers (Sholikhah *et al*., 2019). Intrinsically motivated followers always tend to effectively execute their goals, actively participate in transferring knowledge, and adopt new ideas in the process of transforming learning organizations and growth possibilities (Andersen *et al*., 2020; Elrehail *et al*., 2021). Moreover, spiritual leadership is beneficial to establishing a pleasant and harmonious work environment, enabling followers to better understand themselves and the meaning of life through work. Modern organizations have realized that traditional leadership methods often fail to essentially motivate the innovative behaviors of modern individuals, because individuals hope to find meaning in work, establish connections with their working team, and receive recognition for their efforts (Anderson *et al*., 2017; Milliman *et al*., 2003). In other words, individuals are eager to work in an environment that can enrich human spirits and sense of happiness (Fry & Kriger, 2009). Results of study by Hunsaker (2022) show that spiritual leadership will have a positive influence on innovative behaviors. Based on self-determination theory, Zhang and Yang (2021) finds that perceived spiritual leadership has a positive effect on innovative behaviors. Therefore, this study aims to explore the influence of perceived spiritual leadership of physical education teachers in universities on their innovative behaviors.

Spirituality is a force driving the organizational reform. A credible solution to overcome the challenges in human resource management is to create workplace

spirituality (Garg, 2018b). Therefore, the spirituality of the workplace is a new way to overcome contemporary human resource problems (Garg *et al*., 2019). And the development of workplace spirituality can bring benefits to individuals in the organization (Moore & Casper, 2006). At the individual level, workplace spirituality enhances individual potential and performance and cultivates motivation, self-esteem, and self-concept. Various empirical studies have verified that workplace spirituality can influence work satisfaction, engagement, promise and happiness of individuals (Garg, 2017a, 2018a; Hassan *et al*., 2016; Ke *et al*., 2017; Rego & Cunha, 2008). Workplace spirituality aims to ensure that the whole self of individuals (physical, mental, emotional, and spiritual) are brought into the organization, ultimately improving work performance and commitment to work. And Budono and Yasin (2020) find that the workplace spirituality of schools can positively influence teachers' innovative behaviors.

Leadership style is the most critical factor in implementing workplace spirituality (Kinjerski & Skryonek, 2006). However, there is no consensus on the type of leadership that is consistent with workplace spirituality (Houghton *et al*., 2016; Pawar, 2014). Spiritual leadership integrates four fundamental essences of human existence, namely, body, heart, mind, and soul (Moxley, 2000). Spiritual leadership is beneficial to the integration and balance of leaders, individuals, and organizations (Fairholm, 2011). Spiritual leadership has good advantages in implementing workplace spirituality, which can enhance workplace spirituality (Naidoo, 2014). Helmy and Wiwoho (2006) used random sampling and found that the spiritual leadership perceived by the teachers has a significant predictive effect on their innovative behaviors. Therefore, this study explores the influence of the perceived spiritual leadership of physical education teachers in universities on workplace spirituality.

The enhancement of spirituality plays an important role in understanding what motivates people to work more effectively, and how individuals deal with rapid operational changes and build workforce resilience (Ridlo *et al*., 2021). It can inspire workers, and enable workers to become powerful, empathetic, and innovative individuals. The workplace spirituality creates awareness within organizations, which in turn promotes individual creativity and innovation power (Afsar & Badir, 2017). And there is a positive correlation between workplace spirituality and individual innovative behaviors at work (Afsar & Rehman, 2015). Therefore, this study explores the influence of

workplace spirituality of physical education teachers in universities on teachers' innovative behaviors.

Self-determination theory emphasizes the importance of intrinsic motivation. If teachers are aware of their meanings and missions at work, they are more likely to perform autonomy and innovative behaviors (Guo *et al*., 2023). Spiritual leaders can improve teachers' sense of the intrinsic meaning and mission of their work by conveying wishes and providing support and concerns (Widodo & Suryosukmono, 2021). Perceived spiritual leadership can enhance teachers' sense of belonging and teamwork spirit and create a workplace full of spirituality (Naidoo, 2014). Therefore, when teachers feel spirituality in their work, they will find their work meaningful, and this kind of intrinsic motivation can inspire their innovative behaviors (Ranasinghe & Samarasinghe, 2019). Workers who can be aware of the support from both their leaders and the workplace they are in are more likely to innovate, because they believe that they are working in an environment that supports and encourages innovation (Hunsaker, 2022). The study by Alfarajat and Emeagwali (2021) points out that workplace spirituality plays a partial mediating role between perceived spiritual leadership and individual innovative behaviors. Therefore, this study discusses the mediating effect of workplace spirituality of physical education teachers in universities between perceived spiritual leadership and teachers' innovative behaviors.

Spiritual leadership contributes to the construction of a work environment full of spirituality for teachers. Although some research has proven that in some business organizations, workplace spirituality has a mediating effect between perceived spiritual leadership and innovative behaviors, these studies mainly focus on business environment (Alfarajat & Emeagwali, 2021; Hunsaker, 2022), and research on the specific group of physical education teachers in universities still remain relatively insufficient. Therefore, in the context of colleges and universities, studies on the mediating role of workplace spirituality between perceived spiritual leadership and innovative behaviors of physical education teachers can not only fill the gap in existing research, but also provide new perspectives and practical guidance for improving the job satisfaction and teaching effectiveness of physical education teachers in universities.

2 THEORY AND RESEARCH HYPOTHESIS

2.1 Self-determination theory

In the 1980s, American psychologists, Deci and Ryan (1985), proposed the self-determination theory. They suggest that intrinsic self is crucial for the formation of motivations, behaviors are the expressions of an individual's satisfaction of intrinsic psychological needs and also the foundation for the formation of behavior. Self-determination theory proposes that humans have three basic psychological needs, including the need for autonomy, the need for competence, and the need for belonging (Ryan & Deci, 2000). Based on self-determination theory, in the studies conducted by Eyal and Roth (2011) and Hocine and Zhang (2014), leadership was regarded as an external situation, which had an impact on individuals' intrinsic motivations. Leadership can be understood as a kind of behavior style that can inspire teachers' autonomy, senses of competence and belonging (Zhu *et al*., 2022). When teachers perceive spiritual support from their leaders, they are more likely to actively seek innovative teaching methods based on self-determination principle, thereby meeting the needs of self-actualization (Kesting *et al*., 2015).

Workplace spirituality refers to a transcendent experience that individuals experience at work, including perception of the meaning of work, the sense of connection with colleagues and organizations, and willingness for self-transcendence (Kinjerski & Skrypnek, 2004). Bantha and Nayak (2021) and Hodge (2003) recognized the value of intrinsic motivations, believing that workplace spirituality is also intrinsic. According to self-determination theory, external situations can stimulate intrinsic motivation (Kanat-Maymon *et al*., 2020). Within the framework of self-determination theory, when teachers perceive spiritual leadership, they are more likely to experience workplace spirituality, which in turn promotes teachers' pursue for innovation to meet the needs of self-determination (Hunsaker, 2022). In addition, self-determination theory explains how external situations stimulate intrinsic motivations and influence individual's behaviors (Ryan & Deci, 2020). Based on this theory, workplace spirituality can be regarded as a mediating variable linking spirituality leadership and teachers' innovative behaviors.

In summary, self-determination theory can provide a theoretical framework for understanding the effect of the spiritual leadership perceived by teachers on their

innovative behaviors. Within this framework, workplace spirituality as a mediating variable connects spiritual leadership with teachers' innovative behaviors. Through the in-depth understanding and application of self-determination theory, it's possible to better guide the innovative behaviors of physical education teachers in practice and promote their professional growth and career development.

2.2 Spiritual leadership and innovative behaviors

According to the collected data from 174 participants, Zhang and Yang (2021) found that if leaders could adopt a spiritual leadership style, it will positively promote the individuals' innovative behaviors. Yang *et al*. (2021) used the questionnaire survey method and learned that the spiritual leadership perceived by individuals has a positive impact on their innovative behaviors. Adhering to the idea of social capital theory, Usmanova *et al*. collected data from foreign and local employees in multinational companies in China and confirmed the positive correlation between perceived spiritual leadership and teachers' innovative behaviors in a multi-cultural workplace. Li *et al*. (2023a) conducted a three-stage questionnaire survey on 886 Chinese employees in the workplace. And the research results showed that spiritual leadership has a positive impact on individual's innovative behaviors.

In the educational context, the spiritual leadership of school principal can enhance teachers' sense of professional career and values by formulating a vision of school development. It can also build teachers' confidence and hopes, enabling them to have more courage and perseverance to overcome difficulties and setbacks in their work. Additionally, by showing selfless love to teachers, it can make teachers experience the warmth and strength of the collective, improving their job satisfaction and motivation (Li *et al*., 2023b). As a type of leadership behavior, spiritual leadership may provide good prerequisite for teachers to better identify and control their own and others' emotions through behaviors, such as visionary motivation, trust, and selfless concerns. The spiritual leadership ability of a school's principal embodies his behaviors and attitudes. And spiritual leadership can inspire, encourage, influence, and motivate others by setting examples (Gibson, 2014). Spiritual leadership contributes to the improvement of teachers' performance and students' achievements (Fry *et al*., 2017). Studies by Prasetyo (2019) pointed out that perceived spiritual leadership of teachers has a positive effect on

their innovative behaviors. Therefore, this study proposes the following research hypothesis.

H1: The perceived spiritual leadership of physical education teachers in Chinese universities has a significant impact on their innovative behaviors.

2.3 Spiritual leadership and workplace spirituality

Afsar *et al*. integrated theories of leadership, spirituality and environmental protection behaviors and used questionnaire methods to conduct a study. And they found that spiritual leadership had a positive influence on workplace spirituality. The study by Astakoni *et al*. (2022) involved a sample of 200. The survey used a multi-choice questionnaire to collect data and found that spiritual leadership had a positive influence on the level of workplace spirituality. And the study by Widodo and Surypsukmono (2021) had a sample size of 150. They adopted convenience sampling and the SEM method for hypothesis testing, concluding that spiritual leadership had a positive effect on workplace spirituality.

Spiritual leadership can promote teachers' intrinsic well-being by creating a kind of vision. That is, people can achieve higher life goals and make contributions to society by providing service for others, and thereby enhancing the workplace spirituality. Helmy and Wiwoho (2016) conducted research on Islamic secondary schools with about 250 teachers as interviewers. And the results showed that spiritual leadership had a positive impact on workplace spirituality. According to the above description, this study proposes the following hypothesis.

H2: The perceived spiritual leadership of physical education teachers in Chinese universities has a significant impact on the workplace spirituality.

2.4 Workplace spirituality and innovative behaviors

Based on structural equation model and hierarchy regression analysis, Hunsaker and Ding (2022) conducted a cross-sectional survey of 236 millennial workers in the service and manufacturing industries in China. And the research results confirmed that workplace spirituality had a positive predictive effect on individual innovative behaviors. Ranasinghe and Samarasinghe (2019) integrated and proposed from the componential

theory of creativity that workplace spirituality had a positive influence on individuals' innovative behaviors.

The study of Saxena and Prasad (2023) involved quantitative and qualitative methods. A cross-sectional survey was conducted on a sample of bank workers from public, private, and foreign banks. The results showed that workplace spirituality had a positive impact on innovative behaviors. Sonia er al. (2024) surveyed 276 teachers in the primary education stage and found that workplace spirituality had a positive influence on teachers' innovative behaviors.

Budiono and Yasin (2020) surveyed 161 teachers in boarding schools in Indonesia and found that workplace spirituality can positively promote teachers' innovative behaviors. Therefore, this study proposes the following research hypothesis.

H3: The perceived workplace spirituality of physical education teachers in Chinese universities has a significant impact on their innovative behaviors.

2.5 Mediating effect of workplace spirituality

Spiritual leadership enhances teachers' sense of belonging and emotional connection by emphasizing altruistic love (Terzı *et al*., 2020). When teachers are aware the respect, care, and support from their leaders, they can gain more psychological senses of security and identity (Blase & Kirby, 2008). This kind of emotional connection further strengthens the workplace spirituality, enabling teachers to experience deep connections with others and organizations in their work (Paul *et al*., 2020). In such a situation, teachers will not only regard their work as a means to make a living, but also as a way to achieve self-fulfillment and serve others. This kind of intrinsic motivation drives teachers to actively seek to improve their teaching methods, design innovative courses, and solve problems encountered in the educational process (Klaeijsen *et al*., 2018). Moreover, a working environment full of spirituality is often accompanied by a higher level of psychological security, which enables teachers to dare to challenge the traditional teaching models, put forward new ideas, and try new methods, further promoting innovative behaviors (Ke *et al*., 2020).

While conducting his study in China, Hunsaker (2022) found that workplace spirituality had a mediating effect between perceived spiritual leadership and teachers' innovative behaviors. Innovative behaviors would be positively affected by spiritual

leadership. Therefore, by initiating spiritual leadership practice to create workplace spirituality, the innovative behaviors of individuals can be enhanced, which in turn can help organizations effectively cope with the intense market competition and continuously innovate. The study by Alfarajat and Emeagwali (2021) pointed out that workplace spirituality had a partial mediating effect between perceived spiritual leadership and individual innovative behaviors. Therefore, this study proposes the research hypothesis:

H4: The perceived workplace spirituality of physical education teachers in Chinese universities has a significant mediating effect between perceived spiritual leadership and teachers' innovative behaviors.

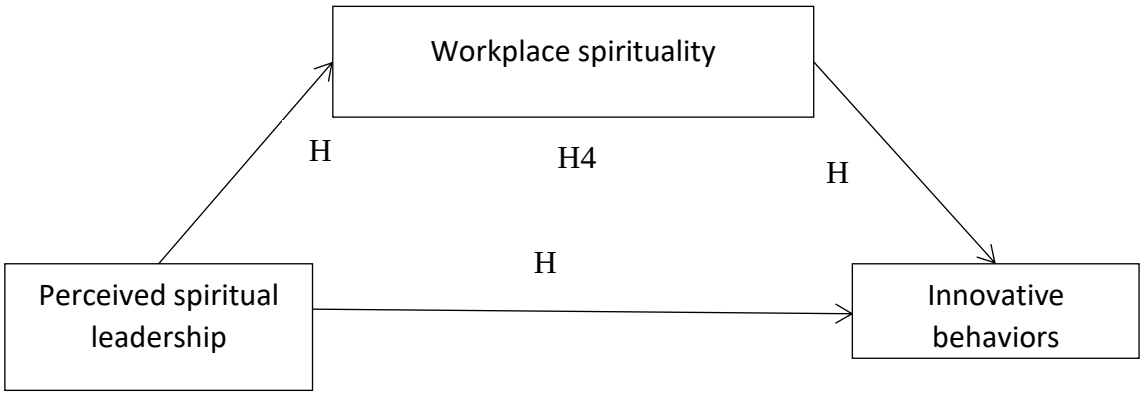
3 RESEARCH METHODS

3.1 Research framework

In summary, this study takes spiritual leadership as the independent variable, innovative behavior as the dependent variable, and workplace spirituality as the mediating variable. The research framework diagram of this study is shown in Figure 1.

Figure 1

Research framework diagram



3.2 Data sources

This research was conducted from April to May 2025, involving physical education teachers from many Chinese universities and covering universities in the southern, northern, western, and eastern regions. In order to ensure the representativeness

of the sample, a stratified random sampling method was employed. First, stratify the research subjects according to geographical regions (southern, northern, western, and eastern). Within each stratum, randomly select physical education teachers by using computer-generated random numbers, ensuring that each physical education teacher had an equal chance of being selected. Then, allocate the sample size for each stratum according to the proportion of the region, thus guaranteeing broad representativeness of the sample. The questionnaire for this study was generated on Wenjuanxing platform and pushed through WeChat, a mainstream social media platform.

This study was conducted in strictly compliance with the research ethics requirements of the National Research Council of Thailand (2015). The teachers in universities were informed of the research contents and purposes, and they signed content forms, explaining the goals, research procedures, duration, and application of research results that both the researchers and the subjects must follow. All the information obtained was anonymized, and the information about schools and teachers involved in the report was also anonymized. According to this guidance principle, procedures, and requirements, all the aspects of this study were subject to an ethical review following the procedures required by the Ethics Committee of Dhurakij Pundit University in Thailand, and the collection of all research data began after obtaining the approval of the university.

In this study, a total number of 600 questionnaires was distributed, and finally 554 valid questionnaires were recovered, with an effective rate of 92.333%. Among the surveyed teachers, there were 280 males, accounting for 50.542% of the total sample; and 274 females, accounting for 49.258%, indicating a relatively balanced gender ratio. In terms of the education background structure of the respondents, there were 312 teachers with a bachelor’s degree or below, accounting for 56.318% of the total; and 185 teachers with a master’s degree, accounting for 33.394%; and 57 teachers with a doctor’s degree, accounting for 10.289%, reflecting that the proportion of teachers with high educational backgrounds in the sample was relatively appropriate. From the perspective of the distribution of professional titles, there were 211 teaching assistants, accounting for 38.087%; 184 lecturers, accounting for 33.213%; 110 associate professors, accounting for 19.856%; and 49 professors, accounting for 8.845%.

3.3 Research tools

3.3.1 Research tool for perceived spiritual leadership

This study used the spiritual leadership scales developed by Fry (2005) and translated by Li and Sheng (2024), which consists of three dimensions, that is vision, belief, and altruistic love with a total of 17 items. And this scale uses Likert 5-point scoring method, with 1 indicating strong disagreement and 5 indicating strong agreement.

3.3.2 Research tool for innovative behaviors

This study used the five-item innovative behavior scales designed by Ding *et al*. (2020), which has only one dimension. And this scale is used to measure teachers in colleges and universities and has good reliability and validity. The scales uses Likert 5-point scoring method, with 1 indicating strong disagreement and 5 indicating strong agreement.

3.3.3 Research tool for workplace spirituality

This study used the workplace spirituality measurement tool developed by Ke *et al*. (2014), which consists of three dimensions, that is, sense of teamwork, sense of work meaning, and sense of consistency with organizational values. And each dimension includes 9 items, with a total of 27 items. The scale uses Likert 5-point scoring method, with 1 indicating strong disagreement and 5 indicating strong agreement.

4 DATA ANALYSIS RESULTS

4.1 Common method bias

In this study, Harman’s single-factor testing was used for factor analysis. First, input the variables into the exploratory factor and conduct verification for the factors that have not been rotated. The results showed that the cumulative total explained variance with an eigenvalue greater than 1 was 60.320%. The explained variance of the first factor

accounted for 26.474% of the total variance, which didn't exceed 50%. This value indicated that the problem of common method bias is not serious (Podsakoff *et al*., 2003).

4.2 Confirmatory factor analysis

4.2.1 Confirmatory factor analysis of perceived spiritual leadership

The fit indices of perceived spiritual leadership scale are as follows: χ^2/df is 1.733, less than 5, GFI is .958, greater than .900; AGFI is .945, greater than .900; NFI is .958, greater than .900; CFI is .982, greater than .900; RMR IS .035 and RMSEA is 0.036, both are less than .100. According to the criteria of model fit indices, the fit indices of perceived spiritual leadership scale model all meet the requirements (Hair *et al*., 2013).

The standard loading coefficients of the vision dimension range from .739 to .798, with AVE of .595 and CR of .880; the standard loading coefficients of the belief dimension range from .676 to .788, with AVE of .557 and CR of .862; and the standard loading coefficients of the altruistic love dimension range from .705 to .772, with AVE of .542 and CR of .892. Therefore, the convergent validity of this scale is good. See Table 1.

Table 1

Perceived spiritual leadership convergent validity scale

Dimension	Items	Standard loading coefficient	AVE	CR
	A1	.798		
	A2	.763		
Vision	A3	.782	.595	.880
	A4	.739		
	A5	.774		
	A6	.754		
	A7	.676		
Belief	A8	.788	.557	.862
	A9	.754		
	A10	.755		
	A11	.772		
	A12	.746		
	A13	.741		
Altruistic love	A14	.710	.542	.892
	A15	.705		
	A16	.747		
	A17	.731		

4.2.2 Confirmatory factor analysis of innovative behaviors

The fit indices of innovative behavior scale are as follows: χ^2/df is 2.952, less than 5, with GFI of .990, greater than .900; AGFI is .970, greater than .900; NFI is .991, greater than .900; CFI is .994, greater than .900; and RMR is .019 and RMSEA is .059, both are less than .100. According to the criteria of model fit indices, the fit indices of innovative behavior scale model all meet the requirements (Hair *et al*., 2013).

The innovative behavior loading coefficients range from .770 to .821, with AVE of .636 and CR of .897, and thus, the convergent validity of this scale is good. See Table 2.

Table 2

Innovative behavior convergent validity scale

Dimension	Items	Standard loading coefficient	AVE	CR
Innovative behaviors	B1	.789	.636	.897
	B2	.812		
	B3	.795		
	B4	.821		
	B5	.770		

4.2.3 Confirmatory factor analysis of workplace spirituality

The fit indices of workplace spirituality scale are as follows: χ^2/df is 1.867, less than 5, with GFI of .920, greater than .900; AGFI is .906, greater than .900; NFI is .932, greater than .900; CFI is .967, greater than .900; and RMR is .051 and RMSEA is .040, both are less than .100. According to the criteria of model fit indices, the fit indices of workplace spirituality scale model all meet the requirements (Hair *et al*., 2013).

According to the results in Table 3, the standard loading coefficients of working meaning range from .660 to .795, with AVE of .536 and CR of .912; the standard loading coefficients of sense of teamwork range from .680 to .805, with AVE of .576 and CR of .924; and the standard loading coefficients of sense of consistency with organizational values range from .712 to .801, with AVE of .548 and CR of .916. Therefore, the convergent validity of this scale is good.

Table 3

Workplace spirituality convergent validity scale

Dimension	Items	Standard loading coefficient	AVE	CR
Working meaning	C1	.668	.536	.912
	C2	.795		
	C3	.743		
	C4	.733		
	C5	.768		
	C6	.774		
	C7	.690		
	C8	.660		
	C9	.745		
Sense of teamwork	C10	.755	.576	.924
	C11	.779		
	C12	.782		
	C13	.730		
	C14	.789		
	C15	.723		
	C16	.781		
	C17	.805		
	C18	.680		
Consistency with organizational values	C19	.801	.548	.916
	C20	.725		
	C21	.747		
	C22	.715		
	C23	.712		
	C24	.753		
	C25	.732		
	C26	.746		
	C27	.728		

4.3 Validity analysis

The Cronbach's Alpha coefficient for perceived spiritual leadership is .912, and that for the vision dimension is .880, for the belief dimension is .861, for the altruistic love dimension is .892. The Cronbach's Alpha coefficient for innovative behaviors is .897. And the Cronbach's Alpha coefficient for workplace spirituality is .934, and that for work meaning dimension is .912, for the sense of teamwork dimension is .924, for the sense of consistency with organizational values is .916. Besides, the Cronbach's Alpha coefficient for work flourishing is .885, and that for the learning dimension is .852 and for the vitality dimension is .896. According to Table 4, all reliability coefficients are greater than .700, indicating four scales have good reliability.

Table 4

Reliability testing scale

Variable	Dimension	Number of questions	Cronbach's Alpha coefficient	Total Cronbach's Alpha coefficient
Perceived spiritual leadership	Vision	5	.880	.912
	Belief	5	.861	
	Altruistic love	7	.892	
Innovative behavior	Innovative behaviors	5	.897	.897
Workplace spirituality	Work meaning	9	.912	.934
	Sense of teamwork	9	.924	
	Sense of consistency with organizational values	9	.916	
Work flourishing	Learning	5	.852	.885
	Vitality	5	.896	

4.4 Difference analysis

4.4.1 Difference analysis of genders

This study used an independent sample t-testing to examine whether there were significant differences in teachers' innovative behaviors among physical education teachers in Chinese universities. And there was no difference in teachers' innovative behaviors among physical education teachers of different genders, therefore there was no need for comparison. See Table 5.

Table 5

Difference analysis table of innovative behaviors of teachers of different genders

类别	样本量	平均值	标准差	*t*	*p*
男	280	3.249	0.967	-.169	.866
女	274	3.262	0.903		

4.4.2 Difference analysis of education backgrounds

This study used single-factor analysis to test whether there were significant differences in teachers' innovative behaviors of physical education teachers with different

education backgrounds in Chinese universities. The results showed that there were significant differences in physical education teachers with different education backgrounds (*F*=3.789, *p*= .023). Through the Scheffe's post-hoc test, this study found that the innovative behaviors of teachers with a doctor's degree were higher than those of teachers with a bachelor's degree, and the innovative behaviors of teachers with a doctor's degree were higher than those of teachers with a master's degree. See Table 6.

Table 6

Difference analysis table of innovative behaviors of teachers with different education backgrounds

Category	Sample volumes	Standard values	Standard deviation	*F*	*p*	post-hoc test
Bachelor	312	3.219	0.871	3.789	.023	doctor>bachelor doctor>master
Master	185	3.230	1.014			
Doctor	57	3.537	0.973			

4.4.3 Difference analysis of professional titles

This study used single-factor analysis to examine whether there were significant differences in teachers' innovative behaviors of physical education teachers with different professional titles in Chinese universities. The results showed that there were significant differences in teachers' innovative behaviors of physical education teachers with different professional titles (*F*=3.629, *p*= .013). Through Scheffe's post-hoc test, this study found that the innovative behaviors of professors were higher than those of teaching assistants, lecturers, and associate professors. See Table 7

Table 7

Difference analysis table of innovative behaviors of teachers with different professional titles

Category	Sample volumes	Standard values	Standard deviation	*F*	*p*	post-hoc test
1. Teaching assistants	211	3.196	0.914	3.629	.013	4>1 4>2 4>3
2. Lecturers	184	3.202	0.969			
3. Associate professors	110	3.276	0.896			
4. Professors	49	3.661	0.903			

4.5 Correlation analysis

In this paper, Pearson correlation is first used to analyze the relationships among the variables in this study. The correlation value r between the perceived spiritual leadership and the innovative behaviors is .555 (p＜ .001), that between the perceived spiritual leadership and the workplace spirituality is .338 (p＜ .001), and that between the innovative behaviors and the workplace spirituality is .513 (p＜ .001). See Table 8.

Table 8

Correlation analysis table

	M	*SD*	Perceived spiritual leadership	Innovative behaviors	Workplace spirituality
Perceived spiritual leadership	3.262	0.682	1		
Innovative behaviors	3.255	0.935	.555***	1	
Workplace spirituality	3.285	0.648	.338***	.513***	1

Note: p<.001.

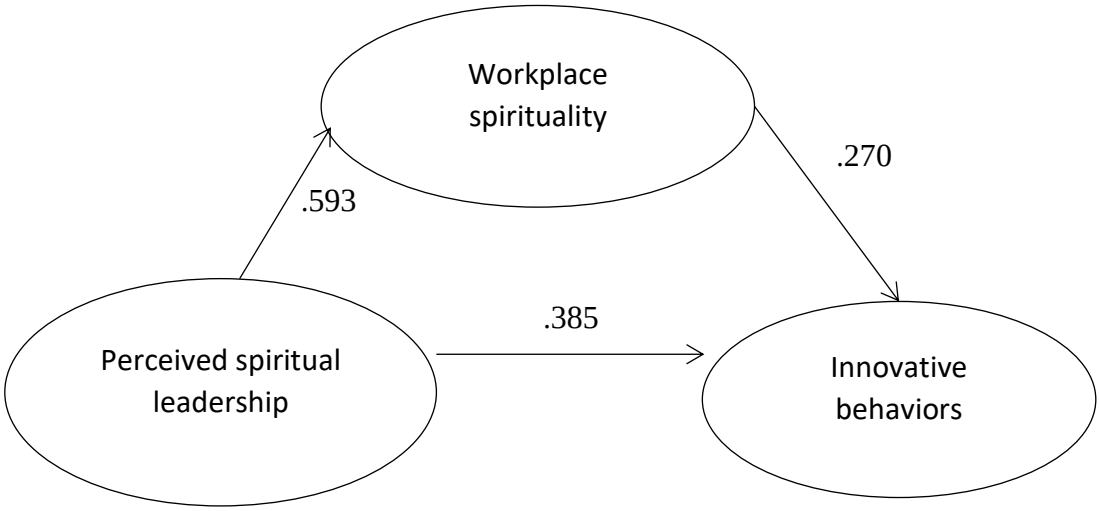
4.6 Structural equation model

According to structural equation model, the fit indices are as follows: χ^2/df is 1.344, less than 3, GFI is .880 and AGFI is .870, both approaching .900; IFI is .969, CFI is .969, and TLI is .968, all of which are greater than .900; and RMSEA is .025, less than .100. According to the criteria of model fit indices, apart from GFI and AGFI which are basic adaptations, the fit indices all meet the requirements (Hair *et al*., 2013).

The path coefficient of perceived spiritual leadership on innovative behaviors is .385, the C.R. value is 4.143, and the corresponding significance p< .001. Therefore, perceived spiritual leadership has a significant positive impact on innovative behaviors, so H1 is established. The path coefficient of perceived spiritual leadership on workplace spirituality is .593, the C.R. value is 7.417, and corresponding significance p< .001. Therefore, perceived spiritual leadership has a significant positive impact on workplace spirituality, so H2 is established. The path coefficient of workplace spirituality on innovative behaviors is .270, the C.R. value is 4.288, and the corresponding significance p< .001. Therefore, workplace spirituality has a significant positive impact on innovative behaviors, so H3 is established.

Figure 2

Structural equation model diagram



4.7 Mediating effect test

In this study, the Bootstrap method was conducted in AMOS. And the number of repetitions was set to 5000, and the confidence interval standard was 95% to calculate the standardized specific mediating effect. If the 95% confidence intervals of the total effect and the indirect effect don't contain 0, it indicates the existence of a mediating effect, so the mediating hypothesis is established; if the confidence interval of the direct effect also doesn't include 0, it's partially mediating; and if it includes 0, it's completely mediating. The effect value of direct effect (perceived spiritual leadership → innovative behaviors) is .385, and the confidence interval ranges from .175 to .581, which doesn't contain 0. The effect value of indirect effect (perceived spiritual leadership → workplace spirituality → innovative behaviors) is .160, and the confidence interval ranges from .065 to .296, which doesn't contain 0. The effect value of total effect (perceived spiritual leadership → innovative behaviors) is .739, and the confidence interval ranges from .638 to .827, which doesn't contain 0. Therefore, workplace spirituality has a partial mediating effect both on perceived spiritual leadership and on innovative behaviors.

Table 9

Mediating effect test table

	Effect value	*SE*	bias-corrected 95%		
			Lower	Upper	*p*
Direct effect	.385	.117	.175	.581	.008
Indirect effect	.160	.057	.065	.296	.006
Total effect	.739	.047	.638	.827	.000

5 RESEARCH CONCLUSION

The results of this study show that the innovative behaviors of physical education teachers in Chinese universities are significantly influenced by various factors, and there are certain differences in innovative behaviors among different demographic characteristics. First, in terms of gender differences, this study doesn't find any significant differences in innovative behaviors between male and female physical education teachers in universities, which can indicate that gender is not an important factor affecting teachers' innovative behaviors. And thus, there is no need for universities to pay excessive attention to gender differences when promoting innovative behaviors. Besides, in terms of education background, the results show that teachers' innovative behaviors are significantly enhanced with the improvement of education backgrounds. And teachers with a doctor's degree perform better than teachers with a bachelor's or master's degree, indicating that teachers with higher education backgrounds have more advantages in accumulating professional knowledge, expanding their research horizons, and developing innovative awareness and can perform stronger innovative abilities in teaching and research. Moreover, in terms of professional titles, the innovative behaviors of professions are significantly greater than those of teaching assistants, lecturers, and associate professors. It reflects that with the improvement of teachers' professional development, academic accumulation, and academic status, their innovative abilities and innovative behaviors also increase accordingly, indicating that there is a close correlation between teachers' academic experience and innovative input.

Perceived spiritual leadership has a significant impact on teachers' innovative behaviors. This means that when teachers in universities experience that leaders demonstrate spiritual leadership driven by values, beliefs, and missions, their innovative motivation and creative input will be improved significantly. Spiritual leadership can not only directly promote innovative behaviors, but also has an indirect effect by enhancing

workplace spirituality. The research results show that spiritual leadership can effectively create a working environment which is full of senses of meaning, belonging and value recognition, inspiring teachers' intrinsic motivations and creativity. At the same time, workplace spirituality has a significant positive impact on innovative behaviors, indicating that when teachers perceive a sense of mission and spiritual satisfaction in the work, their innovative motivation will be enhanced.

This study reveals the formation mechanism and key influencing factors of teachers' innovative behaviors, emphasizing that spiritual leadership has a core effect on promoting teachers' innovation. And it also verifies the important mediating effect of workplace spirituality. This finding provides theoretical reference and practical insights for university administrators. This is, by strengthening the construction of spiritual leadership, optimizing the psychological support for teachers, and establishing a campus cultural environment full of meaning and a sense of value, the innovative behaviors of physical education teachers in universities can be effectively promoted. At the same time, the research results also suggest that universities should pay attention to the promotion effect of academic qualifications and professional titles during the teachers' cultivation process, thereby providing solid personnel guarantee and intellectual support for the innovative development of university physical education.

6 RESEARCH RECOMMENDATIONS

6.1 Practical recommendations

This study finds that teachers with high academic qualifications and high professional titles perform significantly better in innovative behaviors than those with medium-low academic qualifications and low professional titles. It indicates that universities should pay more attention to the different support for different groups when formulating their own policies concerning teachers' development. Specifically, universities can help teachers with medium-low academic qualifications improve their academic ability and expand their research perspectives by setting up in-service training programs, supporting teachers to pursue doctor's degree or participate in domestic and international academic exchanges. At the same time, universities should provide teachers with low professional titles with more scientific research startup funds, project application

guidance, and teaching innovation platforms to reduce the development barrier caused by scarcity of resources. By building a fair development environment and narrowing the gap between teachers with different academic qualifications and professional titles, the overall teachers' innovative level and educational quality of the teaching staff can be improved.

The study shows that teachers' perception of spiritual leadership can significantly promote innovative behaviors, and thus, university administrators should give full play to the leading role of spiritual leadership. Leaders can combine teachers' personal values with organizational goals by clarifying the mission and vision of school, thereby enhancing teachers' senses of meaning and responsibility. The school management should establish a working environment that emphasizes spiritual care and value recognition through institutional design and cultural shaping. For example, a teacher honor system can be established to give spiritual inspiration and value affirmation to teachers who have made outstanding achievements in teaching and scientific research innovation, rather than simply material rewards. Besides, leaders should convey positive beliefs and values through daily communication and setting good examples to enhance teachers' professional identity and sense of team belonging. These measures can inspire teachers' intrinsic motivations, and thereby improving their creativity and innovative behaviors in teaching and scientific research.

6.2 Recommendation for future research

In terms of research methods, although the cross-sectional survey design can reveal the correlation among variables, it's difficult to establish a strict direction of casual relationships. In the future, longitudinal follow-up studies can be conducted to examine the time-lag effect of perceived spiritual leadership on teachers' innovative behaviors, or behavior intervention methods (such as leadership training experiments) can be adopted to test the actual changes at both organizational and individual levels.

All variables in this study are measured by self-reporting methods. Although the common method bias can be partially reduced through procedural controls (such as anonymous filling), variables related to psychological perception are still affected by social desirability effects and differences in subjective interpretations. In the future, multi-source data should be integrated: in addition to teachers' self-evaluations,

evaluations of teachers' innovative behaviors by their immediate supervisors, scores of colleagues' perceptions of workplace spirituality, and students' feedback on the effectiveness of their teaching innovation should be collected. In addition, the objective indices (such as the number of teachers' innovative achievements, expert scores on the novelty of teaching plan design) should be introduced as the supplementary measurements of the dependent variables to enhance the validity and reliability of the data.

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Authors' Contribution

All authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

How to cite this article (APA)

Xiang, C., & Wang, H.-P. THE IMPACT OF SPIRITUAL LEADERSHIP PERCEPTION ON PHYSICAL EDUCATION TEACHERS' INNOVATION IN UNIVERSITIES IN CHINA. Veredas Do Direito, e233509. https://doi.org/10.18623/rvd.v23.n2.3509