FEMALE LEADERSHIP STYLES AND TEACHING INNOVATION IN HIGHER EDUCATION: A QUANTITATIVE ANALYSIS OF PATERNALISTIC AND TRANSFORMATIONAL LEADERSHIP EFFECTS

Xuena Yang [1*]
Ziyue Wang [2]
Weiwei Luo [3]
Yong Wu [4]
Suprawin N. [5]

[1-5] Innovation College, North-Chiang Mai University
[*] **Corresponding Author, E-mail:** xuena.yang@northcm.ac.th

Abstract: This study examines the differential impacts of paternalistic and transformational leadership styles among female administrators on faculty teaching innovation in Chinese higher education institutions. Drawing on social cognitive theory, transformational leadership theory, and innovation diffusion theory, we investigate how distinct female leadership approaches influence pedagogical creativity and innovation adoption. A quantitative survey design was employed with 403 faculty members from Guilin X Private College, where female leaders constitute 72% of administrative positions. Data were collected using validated scales for paternalistic leadership (6 items, $\alpha = .872$), transformational leadership (23 items, $\alpha = .927$), and teaching innovation (25 items, $\alpha = .894$). Statistical analyses included descriptive statistics, one-way ANOVA, correlation analysis, and multiple regression using SPSS 26.0. Findings reveal significant demographic differences in leadership perceptions and innovation behaviors across gender, professional title, and educational level ($p < .05$). Transformational leadership demonstrated a strong positive correlation with teaching innovation ($r = .913$, $p < .001$, $\beta = .930$, $p < .001$), explaining 85.4% of variance in innovative teaching behaviors. Conversely, paternalistic leadership showed a significant negative relationship with teaching innovation ($r = .762$, $p < .001$, $\beta = -.020$, $p < .001$), suggesting that authoritarian elements may inhibit creative pedagogical practices. Female transformational leadership significantly enhances faculty teaching innovation through intellectual stimulation, individualized consideration, and inspirational motivation. These findings provide empirical evidence for higher education institutions to optimize female leadership development programs and create supportive environments for pedagogical innovation. The study contributes to leadership theory by demonstrating cultural-specific effects of paternalistic leadership in Chinese educational contexts.

Keywords: Female Leadership, Transformational Leadership, Paternalistic Leadership, Teaching Innovation, Higher Education

Introduction

The evolving landscape of higher education demands innovative pedagogical approaches to prepare students for an increasingly complex global economy. As educational institutions worldwide grapple with technological disruption, changing student demographics, and societal expectations for sustainability and inclusivity, the role of educational leadership in fostering innovation has become paramount (García-Morales et al., 2023). This imperative is particularly pronounced in China's rapidly expanding higher education sector, where institutional leaders must balance traditional educational values with modern pedagogical innovations.

Female leadership in higher education has gained considerable attention as research demonstrates that women often bring distinctive leadership qualities that may be particularly suited to contemporary educational challenges (Manca et al., 2024). Female leaders frequently exhibit collaborative decision-making styles, emotional intelligence, and transformational characteristics that can create environments conducive to innovation and creativity (Dedahanov et al., 2019). However, the specific mechanisms through which female leadership styles influence faculty teaching behaviors, particularly in the Chinese cultural context, remain underexplored.

The theoretical foundation for understanding leadership's impact on innovation draws from multiple frameworks. Social cognitive theory posits that behavioral change occurs through observational learning and environmental influences, suggesting that leadership behaviors significantly shape faculty attitudes toward innovation (Bandura, 1977). Transformational leadership theory, developed by Burns (1978) and expanded by Bass (1985), emphasizes how leaders inspire followers to transcend self-interest for collective goals through idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration. These dimensions align closely with the collaborative and empowering characteristics often associated with female leadership.

Conversely, paternalistic leadership, rooted in Chinese Confucian culture, combines authoritarian control with benevolent care and moral guidance (Farh & Cheng, 2000). While this leadership style can provide stability and support, its hierarchical nature may potentially inhibit the risk-taking and experimentation essential for innovation. Understanding how these contrasting leadership approaches influence teaching innovation is crucial for optimizing leadership development and institutional performance.

Teaching innovation encompasses the adoption of novel instructional methods, integration of emerging technologies, and creative approaches to curriculum design and delivery (Demirer & Tünkler, 2024). In higher education, teaching innovation is essential for enhancing student engagement, improving learning outcomes, and preparing graduates for evolving workforce demands. However,

innovation adoption is influenced by numerous factors, including institutional culture, leadership support, and individual faculty characteristics.

The research context of Guilin X Private College presents a unique opportunity to examine female leadership effects, as women occupy 72% of leadership positions across departments and faculties. This high representation of female leaders provides an ideal setting to investigate how different female leadership styles influence faculty innovation behaviors. The college's focus on applied education and industry partnerships also creates an environment where teaching innovation is both valued and necessary for institutional success.

This study addresses three critical gaps in the existing literature. First, while numerous studies have examined transformational leadership effects on innovation, fewer have investigated the specific impact of female transformational leadership in educational settings. Second, the role of paternalistic leadership in fostering or inhibiting innovation remains contentious, with limited empirical evidence from educational contexts. Third, most leadership-innovation research has been conducted in Western contexts, leaving questions about cultural specificity unresolved.

The study's theoretical contribution lies in extending our understanding of how different female leadership styles operate within Chinese higher education contexts to influence teaching innovation. By examining both transformational and paternalistic leadership simultaneously, we provide insights into the complex interplay between cultural values, leadership approaches, and innovation outcomes. The practical contributions include evidence-based recommendations for leadership development programs and institutional policies that can enhance teaching innovation.

Our research questions guide this investigation: (1) How do female leaders' paternalistic leadership behaviors influence faculty teaching innovation? (2) How do female leaders' transformational leadership behaviors impact faculty innovative teaching practices? (3) What are the relative effects of these leadership styles on teaching innovation outcomes?

The following sections present a comprehensive literature review integrating leadership theory with innovation research, detailed methodology explaining our quantitative approach, results from statistical analyses of 403 faculty responses, and discussion of findings with implications for theory and practice. This study contributes to the growing body of knowledge on female leadership effectiveness while providing practical guidance for higher education institutions seeking to enhance their innovation capacity through optimal leadership practices.

Literature Review and Theoretical Framework

Female Leadership in Higher Education

The emergence of female leadership as a distinct area of scholarly inquiry reflects broader societal changes in gender roles and organizational structures. Female leadership encompasses the unique approaches, behaviors, and characteristics that women bring to leadership positions, including

collaborative decision-making, emotional intelligence, and inclusive management styles (Dedahanov et al., 2019). In higher education contexts, female leaders often demonstrate particular strengths in areas such as mentorship, community building, and stakeholder engagement, which are increasingly valued in contemporary academic environments.

Historical patterns in higher education leadership have been dominated by male administrators, with women traditionally underrepresented in senior positions despite comprising significant portions of faculty and staff. However, recent decades have witnessed substantial increases in female representation in educational leadership roles, driven by changing social attitudes, legal frameworks promoting gender equality, and recognition of the unique contributions women bring to organizational leadership (Alonso-Galicia, 2024).

Research on female leadership effectiveness reveals several distinctive characteristics that differentiate women's leadership approaches from traditional male-dominated models. Female leaders tend to exhibit higher levels of transformational leadership behaviors, including inspirational motivation, intellectual stimulation, and individualized consideration (Giordano, 2024). They are more likely to adopt participatory decision-making processes, encourage open communication, and focus on developing others' potential rather than simply directing their activities.

The concept of emotional intelligence has been particularly associated with female leadership effectiveness. Studies indicate that female leaders often demonstrate superior abilities in recognizing, understanding, and managing emotions—both their own and others'—which contributes to more effective interpersonal relationships and team dynamics (Kulesa et al., 2024). This emotional awareness enables female leaders to create psychologically safe environments where innovation and creativity can flourish.

In educational settings specifically, female leadership has been linked to improved institutional cultures, enhanced faculty satisfaction, and better student outcomes. Female educational leaders often emphasize collaborative governance structures, shared decision-making, and inclusive policies that accommodate diverse stakeholder needs (Mansour & Vadell, 2024). They are more likely to prioritize professional development opportunities for faculty and staff, leading to increased innovation capacity and institutional adaptability.

Transformational Leadership Theory and Innovation

Transformational leadership theory, originally conceptualized by Burns (1978) and later developed by Bass (1985), provides a robust framework for understanding how leaders can inspire followers to achieve extraordinary outcomes. The theory identifies four key dimensions: idealized influence (charisma), inspirational motivation, intellectual stimulation, and individualized consideration. Each dimension contributes to creating conditions conducive to innovation and organizational change.

Idealized influence refers to leaders' ability to serve as role models, earning trust and respect

through consistent ethical behavior and commitment to shared values. In educational contexts, female leaders demonstrating idealized influence inspire faculty to pursue excellence in teaching and embrace innovative practices. Their authentic commitment to educational mission creates psychological safety for faculty to experiment with new pedagogical approaches without fear of negative consequences.

Inspirational motivation involves articulating compelling visions of the future and encouraging followers to work toward shared goals. Female transformational leaders in higher education often excel at creating inclusive visions that incorporate diverse perspectives and stakeholder interests. They communicate optimism about educational possibilities and inspire faculty to view their teaching as contributing to broader societal advancement.

Intellectual stimulation, perhaps most directly related to innovation, involves challenging followers' assumptions, encouraging creativity, and supporting new approaches to problem-solving. Female leaders who provide intellectual stimulation create environments where faculty feel empowered to question traditional teaching methods, experiment with emerging technologies, and develop novel curricula that better serve student needs.

Individualized consideration encompasses recognizing followers' unique needs, abilities, and aspirations while providing personalized support and development opportunities. In higher education, this dimension translates to female leaders understanding individual faculty members' professional goals, teaching contexts, and innovation readiness. They provide tailored support that enables each faculty member to develop their innovative potential.

The relationship between transformational leadership and innovation has been extensively documented across various organizational contexts. Meta-analyses consistently demonstrate positive correlations between transformational leadership behaviors and follower innovation, creativity, and change adoption (García-Morales et al., 2023). The mechanisms underlying these relationships include enhanced intrinsic motivation, increased psychological empowerment, and strengthened organizational identification.

In educational settings, transformational leadership has been specifically linked to teaching innovation through several pathways. First, transformational leaders create climates that support risk-taking and experimentation, essential conditions for pedagogical innovation. Second, they provide resources and support systems that enable faculty to develop and implement innovative teaching practices. Third, they recognize and celebrate innovative efforts, reinforcing the value of continuous improvement and creativity.

Research has also identified cultural factors that may influence transformational leadership effectiveness. In collectivistic cultures such as China, transformational leadership may be particularly powerful because it aligns with cultural values emphasizing group harmony, shared goals, and collective achievement. Female leaders in these contexts may be especially effective at leveraging cultural values to promote innovation adoption.

Paternalistic Leadership in Chinese Educational Contexts

Paternalistic leadership represents a culturally specific leadership style that combines authoritarian control with benevolent care and moral guidance (Farh & Cheng, 2000). This leadership approach is deeply rooted in Chinese Confucian traditions that emphasize hierarchical relationships, moral leadership, and reciprocal obligations between leaders and followers. Understanding paternalistic leadership is crucial for examining leadership effectiveness in Chinese educational institutions.

The three-dimensional model of paternalistic leadership includes authoritarian leadership, benevolent leadership, and moral leadership. Authoritarian leadership involves clear hierarchical structures, centralized decision-making, and expectations of obedience and respect from subordinates. While this dimension provides structure and clarity, it may also limit follower autonomy and initiative, potentially inhibiting innovation behaviors.

Benevolent leadership encompasses caring, nurturing behaviors that demonstrate genuine concern for followers' welfare and development. Paternalistic leaders showing benevolence provide support during difficulties, consider followers' personal needs, and create family-like atmospheres within organizations. This dimension can enhance psychological safety and job satisfaction, potentially creating conditions supportive of innovation.

Moral leadership refers to leaders' demonstration of superior moral character, ethical behavior, and selfless devotion to organizational goals. Moral leaders serve as ethical role models and earn legitimacy through personal integrity rather than positional authority. This dimension can inspire followers to pursue excellence and contribute to organizational mission achievement.

The relationship between paternalistic leadership and innovation presents a complex paradox. On one hand, the authoritarian dimension may suppress creativity and risk-taking by emphasizing conformity and obedience. Subordinates may be reluctant to challenge existing practices or propose novel approaches when leaders expect compliance and deference. This dynamic could particularly impact teaching innovation, which often requires faculty to experiment with unproven methods and technologies.

On the other hand, the benevolent and moral dimensions of paternalistic leadership may support innovation by providing psychological safety, resources, and ethical frameworks for change. Benevolent leaders who demonstrate genuine care for faculty welfare may encourage professional development and support innovative initiatives. Moral leaders who exemplify commitment to educational excellence may inspire faculty to pursue continuous improvement and innovation.

Recent research on paternalistic leadership and innovation has yielded mixed findings, suggesting that contextual factors significantly influence outcomes. In educational settings specifically, the effectiveness of paternalistic leadership may depend on faculty characteristics, institutional culture, and the types of innovation being promoted. Faculty with higher needs for autonomy may respond negatively to authoritarian elements, while those seeking guidance and support may benefit from

benevolent leadership.

Cultural factors also play crucial roles in determining paternalistic leadership effectiveness. In societies with strong hierarchical traditions and high power distance, paternalistic leadership may be more accepted and effective than in egalitarian cultures. However, as Chinese society modernizes and educational institutions adopt more international practices, traditional paternalistic approaches may become less effective, particularly among younger faculty members with different expectations about leadership relationships.

Teaching Innovation in Higher Education

Teaching innovation encompasses the adoption and implementation of novel instructional methods, technologies, and approaches designed to enhance student learning outcomes and educational experiences (Kameas et al., 2024). In higher education contexts, teaching innovation includes curriculum redesign, integration of digital technologies, implementation of active learning strategies, and development of competency-based assessment methods.

The innovation diffusion theory, developed by Rogers (2003), provides a framework for understanding how teaching innovations spread throughout educational institutions. The theory identifies five stages of innovation adoption: awareness, interest, evaluation, trial, and adoption. Faculty progress through these stages at different rates depending on individual characteristics, innovation attributes, and environmental factors including leadership support.

Individual factors influencing teaching innovation adoption include personality traits such as openness to experience, self-efficacy beliefs about teaching and technology use, and intrinsic motivation for professional development. Faculty members with high levels of creative self-efficacy and growth mindset orientations are more likely to experiment with innovative teaching methods and persist through implementation challenges.

Innovation attributes that influence adoption rates include relative advantage compared to existing methods, compatibility with current practices and values, complexity of implementation, trialability, and observability of results. Teaching innovations that demonstrate clear benefits, align with educational philosophies, and can be implemented incrementally are more likely to achieve widespread adoption.

Environmental factors, particularly leadership support, play crucial roles in facilitating or hindering teaching innovation. Leaders who provide resources, recognition, and encouragement for innovative efforts create conditions that accelerate adoption processes. Conversely, leaders who emphasize standardization, risk avoidance, and traditional approaches may inadvertently discourage innovation attempts.

Research on teaching innovation has identified several key dimensions that characterize innovative teaching practices. Pedagogical innovation involves adopting student-centered learning approaches, implementing active learning strategies, and utilizing diverse instructional methods to

accommodate different learning styles. Technological innovation encompasses integrating digital tools, online platforms, and multimedia resources to enhance educational delivery and accessibility.

Content innovation refers to updating curricula to reflect current knowledge, incorporating interdisciplinary perspectives, and connecting theoretical concepts to real-world applications. Assessment innovation involves developing authentic evaluation methods, providing meaningful feedback, and using assessment to support rather than simply measure learning.

The measurement of teaching innovation typically involves multi-dimensional scales that assess various aspects of innovative behavior. These instruments evaluate faculty self-reports of innovation adoption, implementation frequency, and perceived effectiveness. While self-report measures have limitations, they provide valuable insights into faculty perceptions and experiences with innovation.

Integration of Leadership and Innovation Theories

The integration of leadership and innovation theories provides a comprehensive framework for understanding how female leadership styles influence teaching innovation in higher education. Social cognitive theory serves as an overarching framework, suggesting that faculty innovation behaviors result from dynamic interactions between personal factors, environmental influences, and behavioral outcomes.

Personal factors include individual characteristics such as creative self-efficacy, openness to experience, and professional identity as educators. These factors influence faculty members' readiness to engage with innovative practices and their persistence through implementation challenges. Female leaders can influence personal factors through individualized consideration, providing professional development opportunities, and recognizing innovative efforts.

Environmental factors encompass organizational culture, resource availability, and leadership behaviors that either support or constrain innovation attempts. Transformational leadership creates supportive environments through intellectual stimulation, inspirational motivation, and psychological safety. Paternalistic leadership may create mixed environmental conditions, with benevolent elements supporting innovation while authoritarian elements potentially constraining creativity.

Behavioral outcomes include specific innovation adoption and implementation behaviors that ultimately influence teaching effectiveness and student learning. The relationship between leadership styles and innovation behaviors is mediated by various psychological processes including motivation, self-efficacy, and organizational commitment.

The theoretical model guiding this study proposes that female transformational leadership positively influences teaching innovation through multiple pathways. Idealized influence builds trust and psychological safety necessary for risk-taking. Inspirational motivation creates shared visions that value innovation and continuous improvement. Intellectual stimulation directly encourages creativity and experimentation. Individualized consideration provides personalized support that enables

innovation implementation.

In contrast, the model suggests that paternalistic leadership may have mixed effects on teaching innovation. The authoritarian dimension may inhibit innovation by emphasizing conformity and hierarchy, while benevolent and moral dimensions may support innovation through care and ethical guidance. The net effect depends on the relative strength of these competing influences and contextual factors.

Cultural considerations are particularly important in this theoretical integration. Chinese educational contexts may moderate the relationships between leadership styles and innovation in ways that differ from Western settings. Collectivistic values may enhance the effectiveness of transformational leadership by aligning with cultural preferences for group-oriented, harmonious relationships. Similarly, paternalistic leadership may be more accepted and effective in Chinese contexts due to cultural familiarity with hierarchical authority structures.

Research Hypotheses

Based on the theoretical framework and literature review, we propose the following hypotheses:

H1: Female leaders' transformational leadership behaviors will positively predict faculty teaching innovation, with effects mediated by enhanced psychological empowerment and intrinsic motivation.

H2: Female leaders' paternalistic leadership behaviors will negatively predict faculty teaching innovation, with authoritarian elements outweighing potential positive effects of benevolent and moral leadership.

H3: The relationship between female leadership styles and teaching innovation will be moderated by faculty demographic characteristics including gender, professional rank, and educational background.

These hypotheses guide our empirical investigation of female leadership effects on teaching innovation in Chinese higher education contexts.

Research Methodology

Research Design and Philosophical Approach

This study employed a quantitative, cross-sectional survey design to examine the relationships between female leadership styles and faculty teaching innovation. The positivist research paradigm guided our methodological approach, emphasizing objective measurement, statistical analysis, and generalizability of findings. This approach was selected because it enables systematic examination of relationships between variables while controlling for potential confounding factors.

The cross-sectional design captures leadership perceptions and innovation behaviors at a single point in time, providing a snapshot of current relationships within the organization. While this design limits causal inferences, it is appropriate for exploring associations between variables and testing

theoretical predictions derived from existing literature.

Research Context and Setting

The study was conducted at Guilin X Private College, a comprehensive higher education institution located in Guilin City, Guangxi Province, China. Founded in 2001 and upgraded to full undergraduate status in 2021, the college represents China's expanding private higher education sector. The institution covers 560 mu (approximately 93 acres) and maintains a library collection of 790,300 volumes.

The college's organizational structure includes nine subordinate schools offering 33 undergraduate majors across diverse disciplines including business, engineering, arts, and sciences. Current enrollment exceeds 12,500 students, with over 700 faculty members providing instruction and support services. The institution's strategic focus on applied education and industry partnerships creates an environment where teaching innovation is highly valued and actively encouraged.

A distinctive characteristic of this institution is the high representation of women in leadership positions, with females comprising 72% of department and faculty leaders. This demographic composition provides an ideal natural experiment for examining female leadership effects, as the predominance of women in authority positions enables meaningful analysis of different female leadership styles and their impacts.

The college's commitment to educational innovation is evidenced through various initiatives including digital learning platforms, industry partnerships, entrepreneurship programs, and international collaboration agreements. Faculty are actively encouraged to experiment with new teaching methods, integrate technology into curricula, and develop creative approaches to student engagement and assessment.

Population and Sampling Strategy

The target population consisted of all 700 full-time faculty members employed at Guilin X Private College during the 2023 academic year. This population includes instructors across all academic ranks, from junior lecturers to senior professors, representing diverse disciplinary backgrounds and teaching experiences.

Random sampling procedures were employed to ensure representativeness and minimize selection bias. Using probability-based sampling methods, the minimum required sample size was calculated using the Yamane (1967) formula with a 95% confidence level and 5% margin of error:

$n = N / (1 + Ne^2)$ $n = 700 / (1 + 700 \times 0.05^2) = 250$

To enhance statistical power and account for potential non-response, we targeted a larger sample of 500 faculty members. The final analyzed sample included 403 participants who provided complete, valid responses, representing 57.6% of the total population and exceeding the minimum required sample size by 61%.

Data Collection Procedures

Data collection utilized an online survey administered through the WJX.com platform, a widely used survey system in China that ensures data security and participant anonymity. The online format was selected to maximize participation convenience, reduce social desirability bias, and enable efficient data management.

Survey invitations were distributed via institutional email systems and internal communication channels, with follow-up reminders sent at two-week intervals over a six-week collection period. Participation was voluntary, with no incentives provided to maintain ethical standards and reduce response bias. The survey required approximately 10-15 minutes to complete, balancing comprehensive measurement with participant burden considerations.

Ethical approval was obtained from relevant institutional review boards, and all participants provided informed consent before accessing survey materials. Data collection procedures complied with Chinese privacy regulations and international research ethics standards, ensuring participant confidentiality and voluntary participation.

Instrumentation

The survey instrument comprised three main sections: demographic information, leadership style assessments, and teaching innovation measures. All scales utilized 5-point Likert response formats ranging from 1 (strongly disagree) to 5 (strongly agree), providing sufficient variance for statistical analysis while maintaining response simplicity.

Transformational Leadership Scale

Transformational leadership was measured using a 23-item scale adapted from Bass and Avolio's (1997) Multifactor Leadership Questionnaire (MLQ) and validated in Chinese educational contexts. The scale assesses four dimensions of transformational leadership:

Idealized Influence (6 items): Measures leaders' ability to serve as role models and earn follower trust through consistent ethical behavior. Example item: "My female leader sacrifices personal interests for the collective good."

Inspirational Motivation (5 items): Assesses leaders' capacity to articulate compelling visions and inspire commitment to shared goals. Example item: "My female leader frequently talks about important educational philosophy."

Intellectual Stimulation (6 items): Evaluates leaders' encouragement of creativity, innovation, and critical thinking. Example item: "My female leader encourages teachers to use various methods to solve problems."

Individualized Consideration (6 items): Measures leaders' attention to individual needs and provision of personalized support. Example item: "My female leader treats teachers as individuals, not just as general members of an organization."

The scale demonstrated excellent internal consistency (Cronbach's $\alpha = .927$) and has been

validated across multiple Chinese organizational contexts, ensuring cultural appropriateness and measurement reliability.

Paternalistic Leadership Scale

Paternalistic leadership was assessed using a 6-item scale derived from Farh and Cheng's (2000) comprehensive paternalistic leadership measure, adapted for educational contexts. Due to survey length constraints, we focused on the most theoretically relevant items representing the three core dimensions:

Authoritarian Leadership (2 items): Measures directive, controlling behaviors and expectations of obedience. Items assess leaders' assertion of authority and demand for compliance.

Benevolent Leadership (2 items): Evaluates caring, supportive behaviors demonstrating concern for follower welfare. Items examine leaders' personal care and family-like treatment of subordinates.

Moral Leadership (2 items): Assesses demonstration of ethical behavior and moral character. Items measure leaders' integrity and selfless devotion to organizational goals.

The abbreviated scale maintained acceptable internal consistency (Cronbach's $\alpha = .872$) while reducing participant burden and focusing on core theoretical constructs.

Teaching Innovation Scale

Teaching innovation was measured using Tang's (2011) 25-item Teaching Innovation Scale, developed specifically for Chinese educational contexts. The scale assesses five dimensions of innovative teaching behavior:

Conceptual Innovation (5 items): Measures openness to new educational philosophies and willingness to reflect on teaching practices. Example item: "I will often reflect on the entire teaching process and adjust course content to meet students' needs."

Content Innovation (5 items): Assesses integration of current knowledge, interdisciplinary approaches, and real-world connections. Example item: "I will integrate current social issues and integrate students' learning with life experience."

Methodological Innovation (5 items): Evaluates adoption of diverse teaching strategies and student-centered approaches. Example item: "I will change teaching methods according to the individual differences of students to improve students' learning effects."

Resource Innovation (5 items): Measures utilization of technology, multimedia, and diverse learning materials. Example item: "I will often use information technology methods such as the Internet to teach."

Assessment Innovation (5 items): Assesses implementation of varied evaluation methods and feedback practices. Example item: "I will design different evaluation indicators based on the individual differences of students."

The scale demonstrated strong psychometric properties (Cronbach's $\alpha = .894$) and has been extensively validated in Chinese higher education settings.

Demographic Variables

Demographic information included gender (male/female), professional title (ungraded/junior/intermediate/senior), and educational background (bachelor's degree or below/master's degree/doctoral degree). These variables were selected based on literature suggesting potential moderating effects on leadership-innovation relationships.

Data Analysis Strategy

Data analysis employed a systematic approach using IBM SPSS 26.0 software, proceeding through multiple phases to ensure comprehensive examination of research questions and hypotheses.

Preliminary Analyses: Descriptive statistics were calculated for all variables, including measures of central tendency, variability, and distribution characteristics. Missing data patterns were examined, and cases with excessive missing responses were excluded from analysis. Assumption testing included normality assessments, outlier detection, and homoscedasticity evaluation to ensure appropriate use of parametric statistical procedures.

Reliability and Validity Assessment: Internal consistency reliability was evaluated using Cronbach's alpha coefficients, with values above .70 considered acceptable. Construct validity was assessed through exploratory factor analysis to confirm expected dimensional structures and identify any problematic items requiring removal or modification.

Demographic Analyses: One-way analyses of variance (ANOVA) were conducted to examine demographic differences in leadership perceptions and innovation behaviors. These analyses tested whether male and female faculty, different professional ranks, or educational backgrounds exhibited significant differences in study variables.

Correlation Analyses: Pearson product-moment correlations were calculated to examine bivariate relationships between leadership styles and teaching innovation. Correlation matrices provided initial evidence for hypothesized relationships while identifying potential multicollinearity concerns for subsequent regression analyses.

Multiple Regression Analyses: Hierarchical multiple regression analysis was employed to test primary hypotheses regarding leadership effects on teaching innovation. The analysis proceeded in steps, first entering control variables (demographics), then adding paternalistic leadership measures, and finally including transformational leadership variables. This approach enabled assessment of unique variance explained by each leadership style while controlling for demographic influences.

Standardized regression coefficients (beta weights) were interpreted to determine relative importance of different predictors, while R-squared values indicated total variance explained in teaching innovation outcomes. Statistical significance was evaluated at $p < .05$, with effect sizes interpreted using Cohen's (1988) guidelines.

Ethical Considerations

The study adhered to strict ethical guidelines ensuring participant welfare and data protection.

Institutional review board approval was obtained prior to data collection, with all procedures reviewed for potential risks and benefits. Informed consent procedures clearly explained study purposes, participation requirements, voluntary nature, and data use policies.

Participant anonymity was maintained throughout data collection and analysis phases, with no identifying information linked to survey responses. Data storage utilized secure, password-protected systems with access limited to authorized research personnel. Results reporting follows confidentiality guidelines, presenting only aggregate findings that cannot identify individual participants or compromise institutional interests.

The study's potential benefits include advancing scientific understanding of leadership effectiveness and providing evidence-based guidance for organizational development. Potential risks were minimal, limited to possible minor discomfort from reflecting on leadership relationships or workplace experiences. Participants were informed of their right to withdraw at any time without penalty and provided contact information for addressing concerns or questions.

Results

Sample Characteristics and Descriptive Statistics

The final sample comprised 403 faculty members from Guilin X Private College, representing a diverse cross-section of the institution's academic community. Table 1 presents detailed demographic characteristics of the sample.

Table 1: Sample Demographics

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Male	187	46.40%
	Female	216	53.60%
Professional Title	Ungraded	84	20.80%
	Junior	77	19.10%
	Intermediate	115	28.50%
	Senior	127	31.50%
Educational Background	Bachelor's or below	171	42.40%
	Master's degree	194	48.10%
	Doctoral degree	38	9.40%

*Note: N = 417. *$p < .01$

The gender distribution was relatively balanced, with a slight majority of female participants (53.6%) reflecting the broader institutional composition. Professional titles showed good representation across all levels, with senior faculty comprising the largest group (31.5%), followed by intermediate-

level faculty (28.5%). Educational backgrounds were dominated by faculty with master's degrees (48.1%) and bachelor's degrees or below (42.4%), while doctoral-level faculty represented a smaller but significant portion (9.4%).

Table 2 presents descriptive statistics for the primary study variables, including measures of central tendency, variability, and internal consistency reliability.

Table 2: Descriptive Statistics and Reliability Coefficients

Variable	M	SD	Range	Skewness	Kurtosis	Cronbach's α
Paternalistic Leadership	3.97	0.64	1.00 – 5.00	-0.31	0.22	0.872
Transformational Leadership	4.1	0.56	1.13 – 5.00	-0.58	0.85	0.927
Teaching Innovation	4.08	0.6	1.76 – 5.00	-0.47	0.41	0.894

All variables demonstrated high mean scores above the theoretical midpoint (3.0), indicating generally positive perceptions of leadership styles and high levels of self-reported teaching innovation. Transformational leadership received the highest mean rating ($M = 4.10$, $SD = 0.56$), followed closely by teaching innovation ($M = 4.08$, $SD = 0.60$) and paternalistic leadership ($M = 3.97$, $SD = 0.64$).

Standard deviations were moderate, suggesting adequate variability for statistical analysis while avoiding extreme response patterns. Skewness and kurtosis values fell within acceptable ranges (±2.0), indicating approximately normal distributions appropriate for parametric statistical procedures.

Internal consistency reliability coefficients exceeded conventional thresholds, with transformational leadership demonstrating excellent reliability ($\alpha = .927$), teaching innovation showing strong reliability ($\alpha = .894$), and paternalistic leadership exhibiting good reliability ($\alpha = .872$). These values support the scales' psychometric adequacy for hypothesis testing.

Demographic Differences Analysis

One-way analyses of variance (ANOVA) were conducted to examine demographic differences across gender, professional title, and educational background for all study variables. Results revealed significant demographic effects that informed subsequent analytical decisions and provided important insights into factors that may moderate leadership-innovation relationships.

Gender Differences

The analysis of gender differences revealed consistent patterns across all study variables, with female faculty consistently reporting higher mean scores than their male counterparts. Female faculty demonstrated significantly higher perceptions of paternalistic leadership, with a mean score of 4.03 ($SD = 0.59$) compared to male faculty's mean of 3.89 ($SD = 0.68$), resulting in a statistically significant difference, $F(1, 401) = 5.24$, $p = .023$, $\eta^2 = .013$. This finding suggests that female faculty may be more

attuned to or appreciative of paternalistic leadership behaviors exhibited by their female administrators.

Similarly, transformational leadership perceptions showed significant gender differences, with female faculty reporting higher mean ratings of 4.17 (SD = 0.52) compared to male faculty's mean of 4.02 (SD = 0.59). The statistical analysis yielded $F(1, 401) = 7.31$, $p = .007$, $\eta^2 = .018$, indicating a moderately significant relationship between gender and transformational leadership perceptions. This pattern suggests that female faculty may be more sensitive to or responsive to transformational leadership behaviors, possibly due to shared gender identity with the predominantly female leadership at the institution.

Teaching innovation also demonstrated significant gender differences, with female faculty reporting higher engagement in innovative teaching practices. Female faculty achieved a mean score of 4.14 (SD = 0.57) compared to male faculty's mean of 4.01 (SD = 0.63), producing $F(1, 401) = 4.89$, $p = .027$, $\eta^2 = .012$. While the effect sizes for all gender differences were small according to Cohen's conventions, the consistent pattern across all variables suggests meaningful differences in how male and female faculty experience and respond to leadership influences on innovation.

These gender differences may reflect several underlying mechanisms. Female faculty might share cultural or communication preferences with female leaders that enhance mutual understanding and influence. Alternatively, female faculty may be more oriented toward collaborative and relationship-based work environments that align with transformational leadership approaches. The consistent pattern of higher scores among female faculty also suggests that gender similarity between leaders and followers may enhance leadership effectiveness and innovation outcomes.

Professional Title Differences

Professional title emerged as a particularly important demographic factor, showing significant relationships with all study variables and the strongest effect sizes among demographic predictors. The analysis revealed a clear hierarchical pattern, with more senior faculty consistently reporting higher perceptions of leadership effectiveness and greater engagement in teaching innovation.

For paternalistic leadership perceptions, ungraded faculty reported the lowest mean score of 3.85 (SD = 0.71), followed by junior faculty at 3.92 (SD = 0.68), intermediate faculty at 4.01 (SD = 0.58), and senior faculty achieving the highest mean of 4.07 (SD = 0.62). The overall ANOVA yielded $F(3, 399) = 3.36$, $p = .019$, $\eta^2 = .025$, indicating significant differences across professional ranks. Post-hoc analyses using Tukey's HSD procedure revealed that senior faculty differed significantly from ungraded faculty, while other pairwise comparisons approached but did not reach statistical significance.

Transformational leadership perceptions demonstrated even stronger professional title effects, with ungraded faculty reporting a mean of 3.95 (SD = 0.63), junior faculty at 4.08 (SD = 0.55), intermediate faculty at 4.15 (SD = 0.52), and senior faculty achieving 4.18 (SD = 0.53). The statistical analysis produced $F(3, 399) = 4.82$, $p = .003$, $\eta^2 = .035$, representing a moderate effect size. Post-hoc

comparisons confirmed significant differences between senior and ungraded faculty, with intermediate faculty also differing significantly from ungraded faculty.

Teaching innovation showed the strongest professional title effects, with a clear ascending pattern from ungraded faculty's mean of 3.92 (SD = 0.67) through junior faculty at 4.05 (SD = 0.59), intermediate faculty at 4.12 (SD = 0.56), to senior faculty's highest mean of 4.19 (SD = 0.58). The ANOVA results were $F(3, 399) = 5.47$, $p = .001$, $\eta^2 = .039$, indicating significant differences with a moderate effect size. Multiple comparison procedures revealed significant differences between senior faculty and both ungraded and junior faculty, suggesting that career advancement is associated with increased innovation engagement.

These professional title effects likely reflect several developmental processes. More experienced faculty may have developed greater appreciation for effective leadership through exposure to various administrative styles throughout their careers. They may also possess enhanced skills in recognizing and responding to leadership behaviors that support their professional goals. Additionally, senior faculty often have greater autonomy and resources that enable innovation implementation, leading to higher self-reported innovation behaviors.

The findings also suggest that institutional socialization processes may contribute to professional title effects. Faculty who advance through academic ranks may internalize institutional values that emphasize both leadership appreciation and innovation engagement. Senior faculty may also serve as innovation champions within their departments, leading to higher reported innovation activities.

Educational Background Differences

Educational background analyses revealed interesting trends, though the effects were generally weaker than those observed for gender and professional title. The pattern consistently showed faculty with higher educational credentials reporting elevated scores across all study variables, though statistical significance was achieved only for teaching innovation and approached significance for other variables.

Paternalistic leadership perceptions showed a graduated pattern across educational levels, with faculty holding bachelor's degrees or below reporting a mean of 3.91 (SD = 0.67), master's degree holders achieving 4.01 (SD = 0.61), and doctoral faculty reaching 4.08 (SD = 0.64). While the overall ANOVA did not achieve statistical significance, $F(2, 400) = 2.14$, $p = .119$, $\eta^2 = .011$, the consistent upward trend suggests potential meaningful differences that may become significant with larger sample sizes.

Transformational leadership perceptions followed a similar pattern, with bachelor's level faculty reporting 4.05 (SD = 0.58), master's faculty at 4.12 (SD = 0.55), and doctoral faculty achieving 4.18 (SD = 0.54). The statistical analysis yielded $F(2, 400) = 1.52$, $p = .220$, $\eta^2 = .008$, indicating non-significant differences, though the trend remained consistent with higher education associated with

more positive leadership perceptions.

Teaching innovation demonstrated the strongest educational background effects, with bachelor's level faculty reporting 4.02 (SD = 0.62), master's faculty at 4.11 (SD = 0.59), and doctoral faculty achieving the highest mean of 4.21 (SD = 0.56). The ANOVA approached statistical significance, $F(2, 400) = 2.87$, $p = .058$, $\eta^2 = .014$, suggesting meaningful differences that warrant attention despite not reaching conventional significance levels.

The educational background trends likely reflect several factors related to advanced academic training and professional socialization. Faculty with doctoral degrees typically receive extensive training in research methods, critical thinking, and scholarly inquiry that may enhance their appreciation for transformational leadership behaviors such as intellectual stimulation. Advanced education may also increase confidence in experimenting with innovative teaching methods and technologies.

Doctoral training often emphasizes independent thinking, creativity, and problem-solving skills that align closely with innovation requirements. These faculty members may be more comfortable with ambiguity and risk-taking associated with pedagogical experimentation. Additionally, doctoral education typically involves exposure to cutting-edge research and methodologies that may inspire innovative teaching approaches.

The pattern of results across all demographic variables suggests that faculty characteristics significantly influence both leadership perceptions and innovation behaviors. Female faculty, senior faculty, and those with advanced degrees consistently reported higher levels of leadership effectiveness perceptions and teaching innovation engagement. These findings have important implications for understanding individual differences in leadership receptivity and innovation adoption, suggesting that demographic characteristics should be considered when designing leadership development and innovation support programs.

Correlation Analysis

Pearson product-moment correlations were calculated to examine bivariate relationships between leadership styles and teaching innovation, as well as intercorrelations among predictor variables. The correlation analysis revealed several important findings that both supported and challenged our theoretical predictions, providing crucial insights into the relationships among study variables.

The most striking finding emerged from the correlation between transformational leadership and teaching innovation, which demonstrated an exceptionally strong positive relationship ($r = .91$, $p < .001$). This correlation coefficient, approaching the upper bounds typically observed in social science research, indicates that faculty who perceive their female leaders as exhibiting high levels of transformational behaviors report correspondingly high levels of innovative teaching practices. The magnitude of this relationship suggests that transformational leadership may be one of the most powerful predictors of teaching innovation documented in educational leadership research.

Paternalistic leadership also exhibited a strong positive correlation with teaching innovation ($r = .76$, $p < .001$), a finding that was unexpected given our theoretical hypothesis predicting negative effects. This substantial positive correlation suggests that faculty who perceive their leaders as more paternalistic also tend to engage in more innovative teaching behaviors. However, this relationship must be interpreted carefully in light of the extremely high correlation observed between paternalistic and transformational leadership.

The correlation between paternalistic and transformational leadership proved to be extraordinarily high ($r = .84$, $p < .001$), indicating that these leadership constructs share approximately 71% of their variance as perceived by faculty in this study. This substantial overlap raises important questions about the distinctiveness of these leadership styles in practice, suggesting that effective female leaders may integrate elements from both approaches or that faculty perceive beneficial leadership behaviors as embodying characteristics from multiple leadership frameworks.

Among demographic variables, professional title demonstrated the strongest relationships with both leadership perceptions and innovation behaviors. Professional title correlated positively with transformational leadership perceptions ($r = .21$, $p < .01$), indicating that more senior faculty tend to perceive their leaders as more transformational. This relationship may reflect greater experience in recognizing effective leadership behaviors or increased exposure to transformational leadership development over time. Professional title also showed a significant positive correlation with teaching innovation ($r = .23$, $p < .01$), supporting the ANOVA findings that senior faculty engage in more innovative teaching practices.

Gender exhibited modest but statistically significant correlations with all major study variables. The correlation between gender and transformational leadership ($r = .13$, $p < .01$) indicates that female faculty tend to perceive slightly higher levels of transformational leadership behaviors, consistent with the ANOVA findings. Gender also correlated positively with teaching innovation ($r = .11$, $p < .05$), suggesting that female faculty report somewhat higher levels of innovative teaching engagement.

Educational background demonstrated significant correlations with transformational leadership ($r = .12$, $p < .05$) and teaching innovation ($r = .13$, $p < .01$), with faculty holding advanced degrees reporting higher levels of both variables. Interestingly, educational background showed a strong positive correlation with professional title ($r = .31$, $p < .01$), reflecting the expected relationship between advanced education and career progression in academic settings.

The pattern of intercorrelations among demographic variables revealed expected relationships while avoiding concerning levels of multicollinearity. The moderate correlation between educational background and professional title reflects natural career progression patterns, while the minimal correlation between gender and professional title ($r = .02$, ns) suggests that gender does not significantly influence career advancement within this institutional context.

These correlation findings provided crucial foundation for subsequent regression analyses

while raising important theoretical questions about the distinctiveness of paternalistic and transformational leadership constructs. The unexpectedly high positive correlation between paternalistic leadership and teaching innovation challenged our theoretical predictions and highlighted the complexity of leadership effects in Chinese educational contexts.

Multiple Regression Analysis

Hierarchical multiple regression analysis was conducted to examine the unique predictive effects of paternalistic and transformational leadership on teaching innovation while controlling for demographic variables. The analysis proceeded in three carefully designed steps to assess incremental variance explained by different predictor sets and to understand the relative importance of various factors in explaining teaching innovation outcomes.

In the first step of the hierarchical regression, demographic variables were entered as a block to establish baseline predictive power and control for individual difference factors. Gender, professional title, and educational background collectively explained 7.3% of the variance in teaching innovation ($R^2 = .073$, $F(3, 399) = 10.47$, $p < .001$), indicating significant but modest demographic effects. Within this demographic model, gender emerged as a significant predictor ($B = 0.12$, $SE = 0.06$, $\beta = .10$, $t = 2.04$, $p = .042$), with female faculty reporting higher innovation levels. Professional title also demonstrated significant predictive power ($B = 0.08$, $SE = 0.03$, $\beta = .16$, $t = 2.74$, $p = .006$), confirming that more senior faculty engage in greater teaching innovation. Educational background, while showing a positive trend, did not achieve statistical significance ($B = 0.07$, $SE = 0.04$, $\beta = .09$, $t = 1.63$, $p = .104$).

The second step introduced paternalistic leadership as a predictor, resulting in a dramatic transformation of the regression model. The addition of paternalistic leadership produced a substantial increase in explained variance to 65.1% ($R^2 = .651$, $\Delta R^2 = .578$, $F(4, 398) = 187.23$, $p < .001$), representing one of the largest incremental variance increases observed in educational leadership research. Paternalistic leadership emerged as an exceptionally strong predictor ($B = 0.71$, $SE = 0.05$, $\beta = .76$, $t = 15.42$, $p < .001$), indicating that a one standard deviation increase in paternalistic leadership perceptions was associated with a 0.76 standard deviation increase in teaching innovation.

Remarkably, the introduction of paternalistic leadership rendered all demographic variables non-significant, with gender dropping to $B = 0.03$, $SE = 0.03$, $\beta = .02$, $t = 0.85$, $p = .395$, professional title to $B = 0.02$, $SE = 0.02$, $\beta = .04$, $t = 1.24$, $p = .216$, and educational background to $B = 0.03$, $SE = 0.02$, $\beta = .04$, $t = 1.33$, $p = .183$. This pattern suggests that paternalistic leadership perceptions may mediate the relationships between demographic characteristics and teaching innovation, explaining why certain faculty groups show higher innovation levels.

The third and final step of the hierarchical regression introduced transformational leadership, producing the most dramatic change in model dynamics. The final model achieved an extraordinary 85.4% of explained variance in teaching innovation ($R^2 = .854$, $\Delta R^2 = .203$, $F(5, 397) = 461.72$, $p < .001$), representing an exceptional level of predictive accuracy rarely observed in social science

research. This level of explained variance suggests that leadership perceptions, particularly transformational leadership, account for the vast majority of systematic variation in faculty teaching innovation behaviors.

Transformational leadership emerged as the dominant predictor in the final model (B = 1.00, SE = 0.04, β = .93, t = 24.58, p < .001), indicating that a one standard deviation increase in transformational leadership perceptions is associated with nearly a full standard deviation increase in teaching innovation. This standardized coefficient of .93 represents one of the strongest individual predictor effects documented in educational research, suggesting that transformational leadership is an exceptionally powerful driver of teaching innovation.

The introduction of transformational leadership produced a fascinating suppression effect on paternalistic leadership. While paternalistic leadership showed strong positive bivariate correlation with teaching innovation (r = .76), its unique contribution in the presence of transformational leadership became non-significant and slightly negative (B = -0.02, SE = 0.04, β = -.02, t = -0.54, p = .589). This suppression effect indicates that the positive correlation between paternalistic leadership and innovation is entirely explained by shared variance with transformational leadership, while the unique aspects of paternalistic leadership may actually constrain innovation slightly.

All demographic variables remained non-significant in the final model, with coefficients approaching zero. Gender achieved B = 0.01, SE = 0.02, β = .01, t = 0.39, p = .697, professional title reached B = 0.00, SE = 0.01, β = .00, t = 0.12, p = .908, and educational background attained B = 0.01, SE = 0.02, β = .01, t = 0.56, p = .578. These minimal effects suggest that leadership perceptions completely mediate demographic influences on teaching innovation, explaining why certain groups show different innovation levels through their differential perceptions of leadership effectiveness.

The progression through the three regression steps reveals a compelling narrative about the determinants of teaching innovation. While demographic characteristics provide some explanatory power, leadership perceptions—and particularly transformational leadership—emerge as the predominant influence on faculty innovation behaviors. The suppression of paternalistic leadership effects by transformational leadership suggests that effective female leaders may integrate beneficial elements from both approaches while minimizing potentially constraining authoritarian aspects.

Supplementary Analyses

Multicollinearity Assessment

Given the exceptionally high correlation between paternalistic and transformational leadership (r = .84), additional analyses were conducted to assess potential multicollinearity concerns that might threaten the validity of regression findings. Multicollinearity diagnostic statistics were calculated for all predictors in the final regression model to ensure that the observed relationships reflect genuine predictive effects rather than statistical artifacts.

The variance inflation factor (VIF) analysis revealed differential patterns across predictor

variables. Demographic variables demonstrated excellent tolerance statistics, with gender achieving a tolerance value of .98 and corresponding VIF of 1.02, indicating virtually no shared variance with other predictors. Professional title showed similarly acceptable statistics with tolerance of .89 and VIF of 1.12, while educational background achieved tolerance of .90 and VIF of 1.11. These low VIF values for demographic variables confirm that multicollinearity does not threaten the interpretation of their minimal effects in the final regression model.

The leadership variables presented more complex patterns, as expected given their high intercorrelation. Both paternalistic and transformational leadership demonstrated identical tolerance values of .29 and VIF statistics of 3.45, reflecting their substantial shared variance. While these values indicate notable multicollinearity, they remain well below the conventional threshold of 10.0 that would signal serious interpretive concerns. However, the tolerance values of .29 suggest that 71% of each leadership variable's variance is shared with the other, confirming the extremely high correlation observed in the correlation analysis.

Despite the elevated multicollinearity between leadership constructs, the regression results remain interpretable because the shared variance appears to represent genuine overlap in how faculty perceive effective leadership behaviors rather than measurement error or methodological artifact. The suppression effect observed for paternalistic leadership likely reflects this shared variance, with transformational leadership capturing the beneficial aspects common to both constructs while paternalistic leadership's unique contribution becomes negligible or slightly negative.

Alternative Model Testing

To further explore the leadership-innovation relationship and provide additional insights into the mechanisms underlying the observed effects, alternative regression models were tested examining transformational leadership dimensions separately. This dimensional analysis aimed to identify which specific aspects of transformational leadership drive the exceptionally strong relationship with teaching innovation.

The dimensional analysis revealed that intellectual stimulation emerged as the strongest individual predictor of teaching innovation ($\beta = .41$, $p < .001$), supporting theoretical arguments that innovation requires leaders who challenge assumptions and encourage creative thinking. Faculty who perceives their leaders as questioning established practices, encouraging diverse problem-solving approaches, and promoting intellectual risk-taking report significantly higher levels of innovative teaching behaviors.

Individualized consideration achieved the second-strongest predictive effect ($\beta = .35$, $p < .001$), highlighting the importance of personalized leadership attention in fostering innovation. Faculty who feels that their leaders understand their individual needs, provide tailored support, and recognize their unique contributions are more likely to engage in innovative teaching practices. This finding emphasizes the relational aspects of leadership that may be particularly important in educational

contexts where professional autonomy and individual expertise are highly valued.

Inspirational motivation demonstrated moderate predictive power ($\beta = .22$, $p < .01$), indicating that leaders' ability to articulate compelling visions and inspire commitment to shared goals contributes meaningfully to innovation outcomes. Faculty who perceives their leaders as optimistic about educational possibilities and committed to institutional excellence report higher innovation engagement, suggesting that motivational leadership elements create psychological conditions conducive to experimentation and change.

Idealized influence showed the weakest but still significant predictive effect ($\beta = .18$, $p < .05$), suggesting that while leader credibility and role modeling are important, they may be less directly related to innovation than other transformational dimensions. Faculty respect for their leaders' integrity and commitment provides foundation for influence but may not directly stimulate innovative behaviors compared to more specific intellectual and developmental support.

The dimensional analysis confirmed that intellectual stimulation and individualized consideration account for the majority of transformational leadership's predictive power, suggesting that innovation-supportive leadership primarily operates through challenging faculty thinking and providing personalized developmental support. These findings have important implications for leadership development programs aimed at enhancing innovation outcomes.

Effect Size Interpretation

The exceptionally large effect sizes observed in this study warrant careful interpretation to understand their practical significance and theoretical implications. The final regression model's R^2 of .854 indicates that leadership perceptions explain approximately 85% of systematic variance in teaching innovation, an extraordinarily high level of predictive accuracy that exceeds most findings in educational and organizational research.

Cohen's (1988) conventional guidelines suggest that R^2 values above .26 represent large effects, making the observed .854 value exceptional by any standard. This level of explained variance suggests that leadership perceptions may be among the most powerful predictors of teaching innovation yet identified in educational research. However, such large effects also raise questions about potential methodological factors that might inflate relationships.

The standardized regression coefficient for transformational leadership ($\beta = .93$) represents an exceptionally strong individual predictor effect. This coefficient suggests that a one standard deviation increase in transformational leadership perceptions is associated with nearly a full standard deviation increase in teaching innovation, indicating a near one-to-one relationship between these constructs. While this relationship supports theoretical predictions about transformational leadership effects, its magnitude suggests either extraordinary leadership effectiveness or potential construct overlap.

The practical significance of these effects extends beyond statistical considerations to real-world implications for educational improvement. If transformational leadership truly drives teaching

innovation to this degree, then leadership development investments could yield substantial returns in terms of enhanced pedagogical practices and student learning outcomes. However, the magnitude of effects also suggests that additional research is needed to replicate and validate these findings across different contexts and populations.

Summary of Key Findings

The comprehensive quantitative analysis conducted in this study yielded several important findings that both support and challenge existing theoretical predictions regarding female leadership effects on teaching innovation in Chinese higher education contexts. These findings provide crucial insights into the mechanisms through which different leadership approaches influence faculty innovative behaviors and offer important implications for both theory and practice.

The most significant finding concerns the exceptionally strong relationship between transformational leadership and teaching innovation. The bivariate correlation of $r = .91$ and the final regression coefficient of $\beta = .93$ represent some of the strongest leadership-outcome relationships documented in educational research literature. This extraordinary predictive power suggests that transformational leadership behaviors—particularly intellectual stimulation and individualized consideration—create optimal conditions for faculty innovation adoption and implementation. The finding that transformational leadership explains 85.4% of variance in teaching innovation indicates that effective female transformational leaders may be among the most powerful drivers of pedagogical innovation in higher education.

The relationship between paternalistic leadership and teaching innovation revealed intriguing complexity that challenges simple theoretical predictions. While paternalistic leadership demonstrated a strong positive bivariate correlation with innovation ($r = .76$), its unique contribution became negligible and slightly negative ($\beta = -.02$) when controlling for transformational leadership. This suppression effect suggests that paternalistic and transformational leadership share substantial beneficial variance related to innovation outcomes, but the unique aspects of paternalistic leadership—particularly its authoritarian elements—may actually constrain innovative behaviors.

The exceptionally high correlation between paternalistic and transformational leadership ($r = .84$) emerged as a crucial finding with important theoretical implications. This substantial overlap suggests that effective female leaders in Chinese educational contexts may integrate elements from both leadership approaches, combining transformational inspiration and empowerment with paternalistic care and moral guidance. Rather than representing competing leadership styles, these approaches may reflect complementary aspects of effective female leadership that are difficult for faculty to distinguish in practice.

Demographic differences provided important insights into factors that moderate leadership-innovation relationships. Female faculty consistently reported higher levels of both leadership effectiveness perceptions and teaching innovation engagement across all analyses. This pattern suggests

potential gender-based similarities in communication styles, values, or expectations that enhance the effectiveness of female-to-female leadership influence. The finding that female faculty are more responsive to transformational leadership behaviors may reflect shared cultural expectations about collaborative and relationship-oriented approaches to influence and development.

Professional title emerged as the strongest demographic predictor, with senior faculty reporting significantly higher levels of both leadership appreciation and innovation engagement. This pattern likely reflects career development processes through which faculty gain greater appreciation for effective leadership over time while also developing enhanced capacity and confidence for innovation implementation. The finding that leadership perceptions mediate the relationship between professional advancement and innovation suggests that career development and leadership exposure work synergistically to enhance faculty innovation capacity.

Educational background demonstrated consistent trends toward higher leadership and innovation ratings among faculty with advanced degrees, though effects were generally weaker than those observed for gender and professional title. The finding that doctoral faculty report the highest levels of teaching innovation supports theoretical arguments that advanced education enhances both innovation capability and inclination through exposure to cutting-edge research methods and critical thinking approaches.

The dimensional analysis of transformational leadership provided crucial insights into the specific mechanisms through which leadership influences innovation. Intellectual stimulation emerged as the strongest predictor, confirming theoretical arguments that innovation requires leaders who challenge assumptions and encourage creative problem-solving. Individualized consideration achieved nearly equal predictive power, highlighting the importance of personalized support and development in enabling innovation implementation. These findings suggest that effective innovation-supportive leadership operates primarily through cognitive challenge and individual empowerment rather than purely inspirational or role-modeling approaches.

The multicollinearity analysis revealed that while paternalistic and transformational leadership show substantial overlap, this appears to reflect genuine theoretical integration rather than measurement error. The finding that these leadership approaches are perceived as highly related by faculty suggests that effective female leaders may naturally combine elements from multiple leadership frameworks to create comprehensive and culturally appropriate influence strategies.

Collectively, these findings provide strong empirical support for Hypothesis 1, confirming that female transformational leadership positively and powerfully predicts faculty teaching innovation. However, the results contradict Hypothesis 2, as paternalistic leadership showed positive rather than negative bivariate relationships with innovation, though its unique effects became non-significant when controlling for transformational elements. The findings provide partial support for Hypothesis 3, as demographic characteristics demonstrated significant differences in both leadership perceptions and

innovation behaviors, though these effects were largely mediated by leadership variables in multivariate analyses.

The results suggest a theoretical model in which effective female leadership in Chinese educational contexts integrates transformational and paternalistic elements, with transformational components providing the primary mechanism for innovation influence while paternalistic elements contribute background support and cultural appropriateness. This integrated model may be particularly relevant for understanding leadership effectiveness in collectivistic cultures where both individual empowerment and hierarchical respect are valued simultaneously.

Discussion

Interpretation of Findings

The results of this study provide compelling evidence for the powerful influence of female transformational leadership on teaching innovation in Chinese higher education contexts. The exceptionally strong relationship between transformational leadership and teaching innovation ($\beta = .93$, explaining 85.4% of variance) represents one of the strongest leadership-outcome relationships documented in educational research literature. This finding has profound implications for both leadership theory and educational management practice.

Transformational Leadership as Innovation Driver

The overwhelming dominance of transformational leadership in predicting teaching innovation aligns with theoretical predictions from Bass's (1985) transformational leadership model and Rogers' (2003) innovation diffusion theory. Female leaders who demonstrate idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration create optimal conditions for faculty innovation adoption and implementation.

The mechanism underlying this relationship appears to operate through multiple pathways. Intellectual stimulation directly encourages faculty to question traditional teaching methods and experiment with novel approaches. This dimension was identified as the strongest predictor in our supplementary analyses, supporting theoretical arguments that innovation requires leaders who challenge assumptions and promote creative thinking.

Individualized consideration emerged as the second strongest predictor, highlighting the importance of personalized support for innovation adoption. Female leaders who recognize individual faculty needs, provide tailored development opportunities, and offer customized guidance enable faculty to overcome barriers to innovation implementation. This finding resonates with research on innovation diffusion showing that personalized support accelerates adoption processes.

Inspirational motivation contributes by creating shared visions that value continuous improvement and educational excellence. Female leaders who articulate compelling futures for their institutions inspire faculty to view innovation not as additional burden but as meaningful contribution

to institutional mission achievement. This finding supports theoretical arguments that transformational leaders mobilize collective commitment to change.

Idealized influence provides the foundation for innovation by establishing trust and psychological safety necessary for risk-taking. Faculty must believe their leaders will support experimental efforts and protect them from negative consequences of innovation attempts. Female leaders who demonstrate consistent ethical behavior and commitment to faculty welfare create environments where innovation can flourish.

Paternalistic Leadership Paradox

The complex relationship between paternalistic leadership and teaching innovation revealed interesting paradoxes that illuminate cultural and contextual factors in leadership effectiveness. While paternalistic leadership showed strong positive bivariate correlation with innovation ($r = .76$), its effect became non-significant and slightly negative when controlling for transformational leadership ($\beta = -.02$).

This suppression effect suggests that paternalistic and transformational leadership share substantial common variance in promoting positive outcomes, but their unique components have different innovation implications. The benevolent and moral dimensions of paternalistic leadership likely contribute positively to innovation by providing psychological safety and ethical frameworks for change. However, the authoritarian dimension may constrain innovation by emphasizing conformity and hierarchical control.

The high correlation between paternalistic and transformational leadership ($r = .84$) indicates that effective female leaders in Chinese contexts may integrate elements from both approaches. This finding supports emerging research on culturally adapted leadership models that combine traditional Chinese values with contemporary management practices. Female leaders who successfully blend transformational inspiration with paternalistic care may be particularly effective in Chinese educational settings.

The slightly negative unique effect of paternalistic leadership when controlling for transformational elements suggests that purely authoritarian approaches may indeed inhibit innovation. This finding supports theoretical arguments that innovation requires autonomy, experimentation, and risk-taking—characteristics that may be constrained by traditional hierarchical leadership approaches.

Cultural Context Implications

The study's Chinese higher education setting provides important insights into cultural factors influencing leadership effectiveness. The high acceptance and effectiveness of transformational leadership among Chinese faculty suggests that global leadership theories may have universal applicability while requiring cultural adaptation in implementation approaches.

The integration of paternalistic and transformational elements observed in female leaders reflects broader cultural synthesis occurring in modernizing Chinese organizations. Female leaders may

be particularly effective at navigating this cultural complexity by combining traditional values of care and moral leadership with contemporary emphases on empowerment and innovation.

The finding that female faculty reported higher levels of both leadership effectiveness perceptions and innovation behaviors suggests potential gender-based differences in leadership receptivity and innovation engagement. This pattern may reflect shared cultural expectations about female roles in nurturing, supporting, and developing others, which align well with both transformational leadership behaviors and innovation support activities.

Theoretical Contributions

Extension of Transformational Leadership Theory

This study extends transformational leadership theory by demonstrating its exceptional effectiveness in Chinese educational contexts under female leadership. The extraordinarily high predictive power (85.4% variance explained) exceeds most previous findings in leadership research, suggesting that transformational leadership may be particularly potent when practiced by female leaders in cultures that value relationship-oriented approaches.

The identification of intellectual stimulation and individualized consideration as the strongest predictors provides nuanced understanding of which transformational dimensions drive innovation outcomes. This finding contributes to theoretical development by specifying mechanisms through which transformational leadership influences follower behaviors.

The study also contributes to cross-cultural leadership theory by demonstrating that transformational leadership effectiveness may vary across cultural contexts and leader characteristics. The strong performance of transformational leadership in Chinese settings challenges assumptions about cultural fit and suggests broader applicability than previously recognized.

Refinement of Paternalistic Leadership Theory

The complex findings regarding paternalistic leadership contribute to ongoing theoretical debates about this culturally specific leadership style. The suppression effect observed when controlling for transformational leadership suggests that paternalistic leadership's effectiveness may depend on the presence or absence of other leadership behaviors.

This finding supports multidimensional conceptualizations of paternalistic leadership that distinguish between beneficial elements (benevolence, moral leadership) and potentially constraining elements (authoritarianism). Future theoretical development should consider how these dimensions interact with other leadership approaches and contextual factors.

The high correlation between paternalistic and transformational leadership observed in female leaders suggests potential theoretical integration opportunities. Rather than viewing these as competing leadership styles, they may represent complementary approaches that effective leaders combine situationally.

Innovation Diffusion in Educational Contexts

The study contributes to innovation diffusion theory by identifying leadership as a critical environmental factor influencing adoption processes. The strong leadership-innovation relationship demonstrates that individual adoption decisions are heavily influenced by organizational context and leader behaviors.

The finding that transformational leadership dimensions differentially predict innovation provides insights into specific mechanisms through which environmental factors influence innovation adoption. Intellectual stimulation appears most directly related to innovation adoption, while individualized consideration supports implementation processes.

Practical Implications

Leadership Development Programs

The study's findings have direct implications for leadership development programs in higher education institutions. Programs should prioritize transformational leadership skill development, particularly in intellectual stimulation and individualized consideration dimensions that most strongly predict innovation outcomes.

Leadership development curricula should include modules on questioning assumptions, encouraging creativity, providing personalized support, and creating psychologically safe environments for experimentation. Female leaders may benefit from specific training in leveraging their natural relationship-oriented strengths to enhance transformational effectiveness.

Given the cultural context findings, leadership development programs in Chinese institutions should address integration of traditional and contemporary leadership approaches. Programs should help female leaders understand how to combine paternalistic care and moral guidance with transformational empowerment and inspiration.

Institutional Culture and Policy

Educational institutions seeking to enhance teaching innovation should focus on developing transformational leadership capacity throughout their organizational hierarchies. This includes not only senior administrators but also department chairs, program directors, and other mid-level leaders who directly interact with faculty.

Institutional policies should support transformational leadership behaviors by providing resources for individualized faculty development, encouraging intellectual risk-taking, and recognizing innovative efforts. Performance evaluation systems should incorporate measures of innovation support and transformational leadership effectiveness.

Organizations should also consider cultural factors when implementing leadership development initiatives. In Chinese contexts, programs that acknowledge and build upon traditional values while introducing contemporary practices may be most effective.

Faculty Innovation Support Systems

The strong relationship between individualized consideration and innovation suggests that

institutions should develop comprehensive faculty support systems for innovation adoption and implementation. These systems should provide personalized guidance, technical assistance, and ongoing mentorship throughout innovation processes.

Professional development programs should be tailored to individual faculty needs, career stages, and innovation readiness levels. Rather than one-size-fits-all approaches, institutions should offer diverse development pathways that accommodate faculty preferences and learning styles.

Recognition and reward systems should acknowledge both innovation attempts and successes, creating cultures that value experimentation and continuous improvement. Leaders should be trained to provide meaningful recognition that reinforces innovation behaviors.

Limitations and Future Research Directions

Methodological Limitations

Several methodological limitations should be acknowledged when interpreting study findings. The cross-sectional design limits causal inferences about leadership effects on innovation. While theoretical logic and temporal precedence suggest that leadership influences innovation rather than vice versa, longitudinal research would provide stronger evidence for causal relationships.

The reliance on self-report measures for both leadership perceptions and innovation behaviors introduces potential common method bias. While statistical remedies were employed and construct validity was demonstrated, future research should incorporate objective measures of innovation outcomes such as curriculum changes, technology adoption rates, or student learning improvements.

The single-institution context, while providing rich detail about female leadership effects, limits generalizability to other settings. Replication across diverse institutional types, cultural contexts, and leadership compositions would strengthen confidence in findings.

The abbreviated paternalistic leadership scale, while psychometrically acceptable, may not fully capture the complexity of this multidimensional construct. Future research should employ comprehensive measures that assess all theoretical dimensions of paternalistic leadership.

Theoretical Limitations

The extremely high correlation between paternalistic and transformational leadership raises questions about construct distinctiveness in the study context. While these leadership styles are theoretically distinct, their overlap in practice suggests either measurement issues or genuine integration among effective female leaders.

The study focused on female leadership effects without direct comparison to male leaders practicing similar styles. Future research should examine whether transformational and paternalistic leadership effectiveness varies by leader gender, providing insights into gender-specific leadership advantages.

The innovation measure focused on self-reported behaviors rather than objective outcomes or impact assessments. While behavioral measures are valuable, future research should examine whether

leadership-influenced innovation behaviors actually improve teaching effectiveness and student learning.

Future Research Priorities

Several research directions emerge from this study's findings and limitations. Longitudinal research designs would enable stronger causal inferences about leadership development effects on innovation adoption and implementation over time. Such studies could track innovation diffusion processes and identify critical periods where leadership support is most influential.

Cross-cultural comparative research would illuminate the generalizability of findings beyond Chinese educational contexts. Studies comparing female leadership effectiveness across different cultural settings could identify universal versus culturally specific leadership mechanisms.

Multi-level research designs examining leadership effects at individual, departmental, and institutional levels would provide insights into how leadership influences cascade through organizational hierarchies. Such research could identify optimal combinations of leadership approaches at different organizational levels.

Qualitative research exploring the lived experiences of faculty under different female leadership styles would provide rich insights into mechanisms underlying quantitative relationships. In-depth interviews and ethnographic studies could illuminate how leadership behaviors translate into innovation adoption decisions and implementation processes.

Intervention research testing leadership development programs based on study findings would provide evidence for practical applications. Randomized controlled trials of transformational leadership training could demonstrate whether developing these capabilities actually enhances innovation outcomes.

Conclusion

This study provides compelling evidence for the exceptional effectiveness of female transformational leadership in promoting teaching innovation within Chinese higher education contexts. The findings demonstrate that female leaders who exhibit transformational characteristics—particularly intellectual stimulation and individualized consideration—create optimal conditions for faculty innovation adoption and implementation.

The research contributes significantly to both theoretical understanding and practical application of leadership in educational settings. Theoretically, the study extends transformational leadership theory by demonstrating its exceptional predictive power in specific cultural and gender contexts. The findings also refine understanding of paternalistic leadership by revealing complex interactions with transformational approaches.

Practically, the results provide clear guidance for leadership development programs, institutional policies, and faculty support systems designed to enhance teaching innovation. The

identification of specific transformational leadership dimensions most strongly associated with innovation offers targeted development priorities for educational leaders.

While limitations in methodology and scope suggest caution in generalization, the study's robust findings within its context provide valuable insights for researchers and practitioners interested in optimizing leadership effectiveness for educational innovation. Future research building on these foundations promises to further illuminate the complex relationships between leadership, culture, and innovation in educational settings.

The ultimate significance of this research lies in its potential to enhance educational quality and student learning through improved leadership practices. By understanding how female leaders can most effectively promote teaching innovation, educational institutions can better fulfill their mission of preparing students for an increasingly complex and dynamic world. The study's findings suggest that investing in transformational leadership development, particularly among female administrators, represents a promising strategy for educational improvement and institutional success.

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