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Original Article

Transformative Leadership and Innovative Behavior in Medical Education: Mediating Effects of Psychological Empowerment and Creative Self-Efficacy

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Abstract

Developing innovative behavior among employees is one of the approaches supported to enhance quality human resources to function well in the organization and gain an advantage over competitors. The aims of the study were to investigate the relationship between transformational leadership and innovative behavior, with psychological empowerment and creative self-efficacy as mediating variables. Data were collected from 153 staff members of a medical school in Thailand via self-reported questionnaires. The results of structural equation modeling (SEM) indicated that transformative leadership was significantly and positively associated with all variables studied: innovative behavior (β = .49; t = 11.92; p < .001), psychological empowerment (β = .84; t = 15.72; p < .001), and creative self-efficacy (β = .83; t = 12.47; p < .001). It was also found that, psychological empowerment (β = .21; t = 2.40; p = .05) and creative self-efficacy (β = .54; t = 10.00; p < .001) were positively and significantly associated with innovative behavior. In addition, only creative self-efficacy partially mediates the relationship between transformative leadership and innovative behavior (β = .49; p < .001), while psychological empowerment does not (β = -.13; p > .05). The study recommends that medical school managers enhance transformative leadership through creative self-efficacy to foster higher innovative behavior among staff.

Innovation has become a critical driver of the growth and well-being of nations, affecting and providing benefits to people, businesses, education, and the economy (Chaparro-Banegas et al., 2023; Raghupathi & Raghupathi, 2017). Specifically, workplace innovation is a fundamental element through which organizations can improve employee performance, leading to the generation of new products, services, and processes and also maintaining a sustainable competitive advantage (Bak et al., 2021; Cerone & Persico, 2014; Ghardashi et al., 2022; Mendoza-Silva, 2020). Successful organizations create a competitive advantage by utilizing the innovative behavior of their employees, which is one of the most effective ways to ensure long-term and sustainable effectiveness (Afsar & Masood, 2017; De Jong & Den Hartog, 2010; Ghardashi et al., 2022; Helmy, 2022). Innovation does not happen by accident; rather, it requires systematic management of the key factors to promote innovation behavior (Ghardashi et al., 2019; Mykhailyshyn et al., 2018). Innovation behavior in organizations refers to a set of employees' skills to continuously transform knowledge, experiences, and ideas into new products, processes, and services for the benefit of the workplace (Ghardashi et al., 2019; Mendoza-Silva, 2020). Thus, it is crucial for

organizations' managers is required to strengthen and focus on the vital predictor that energizes employees' innovative behavior to maintain ongoing business growth (Hammond et al., 2011).

Nowadays, the society we live in is constantly changing because of the advancement of information and technology. It has undergone significant changes during and post the COVID pandemic era. More specifically, in education, digital technology has emerged to support learning activities and enable continuous education. Thus, academic managers must always be prepared to be innovative to cope with all these changes. Educational innovation refers to introducing new ideas, approaches, and strategies to improve the teaching-learning process and the learning experience of students. These educational innovations can take various forms, including pedagogical innovation, scientific and methodological innovation, and educational and technological innovation, which can contribute to improving access, quality, and effectiveness of the educational system by harnessing technological advancements, creative approaches, and collaborative initiatives. By embracing innovation in education, educators can better equip learners with the skills and knowledge needed to thrive in a rapidly changing world (OECD, 2016; Serdyukov, 2017; Stevens, 2004; Zhu et al., 2013).

In medical education, educational technology and innovation have gradually evolved since the 1990s. Educators have implemented and generated a wealth of innovative approaches to pre-clinical and clinical medical training (Edenius et al., 2010; Schwartz et al., 2018) through the adoption of information and communication technology for asynchronous learning, such as simulation technology, game-based instruction, and peer-to-peer learning (Tudor Car et al., 2019). The benefits of technology-enhanced learning have been widely appreciated over the last year due to the many pandemic outbreaks of COVID-19, in which sudden communication and collaboration platforms and educational innovations became the major components of education (Rajab et al., 2020), making educational innovation play an even more important role than ever. Therefore, educators or academic staff with innovative behavior are particularly important in creating products, processes, and services to enhance the effectiveness of teaching and learning in medical education sustainably.

All the preceding are important reasons why educational institutions and medical schools must support educators or academic staff to develop innovative behavior. In recent years, the study of innovative behavior variable has become an important topic of interest for researchers (Ghardashi et al., 2019; Mendoza-Silva, 2020). Particularly, transformative leadership (TFL), psychological empowerment (PE), and creative self-efficacy (CSE) are seen as major factors at the individual level that can significantly enhance an employee's innovative behavior (IB) (Hughes et al., 2018; Saeed et al., 2019). There are consistent findings from several previous studies that reported the relationship between transformative leadership and innovative behavior, with psychological empowerment playing a mediating role (Afsar et al., 2014; Afsar et al., 2018; Masood & Afsar, 2017; Stanescu et al., 2020), and some studies have also indicated creative self-efficacy as a mediating role (Afsar & Masood, 2017; Lei et al., 2020). These variables have been empirically validated in general contexts such as business, technology, industry, SMEs, and education.

However, there have been no studies examining these factors in medical education, making it difficult to predict how the results will align with earlier research in other contexts. The relationship between transformational leadership, psychological empowerment, creative self-efficacy, and innovative work behavior is complex and multifaceted. Nonetheless, these concepts are important for organizations to consider as they strive to create a work environment that fosters creativity, innovation, and effective leadership. Therefore, there is a significant gap in the literature regarding the contribution of innovative behavior to the relationship between transformative leadership and innovative behavior, with psychological empowerment and creative self-efficacy as mediating variables in medical education. To fill this gap and further understand the related variables in behavioral science literature. This study proposes to investigate

the relationship between transformative leadership and innovative behavior, with psychological empowerment and creative self-efficacy as mediating variables for academic staff in medical education.

Literature Review

This section explains the relevant literature, theories, concepts, and earlier studies to support the relationship between transformative leadership, psychological empowerment, creative self-efficacy, and innovative behavior.

Theoretical Framework

Social exchange theory and social cognitive theory are the underlying theories used in this study to explain the relationship between transformative leadership and innovative behavior, as well as the mediating mechanisms.

Social exchange theory, initially developed by Homans (1961) and further expanded by Blau (1964) and Emerson (1976) is a sociological theory that examines social interactions as a series of exchanges between individuals or groups. It emphasizes the notion of rational decision-making in social interactions. The social exchange relationship is primarily shaped by three factors: the cost and reciprocity of the relationship, the expectation of the relationship, and the evaluation of alternative relationships (Cook et al., 2013; Yang et al., 2021). Some existing studies have applied social exchange theory to investigate simultaneous relationships between contextual factors and innovative behavior at the individual level (Helmy, 2022; Yang et al., 2021), in line with Alessa and Durugbo (2021), who found that social exchange theory is commonly used in the study of innovative work behavior concepts.

In addition to social exchange theory, this study also employs social cognitive theory to explain the research model. Social cognitive theory, developed by Bandura (1986) is a learning theory that focuses on how individuals exhibit individual behaviors and learn new skills by observing, modeling, and processing information from their social environment. According to this theory, behavior is influenced by "triadic reciprocality" which includes personal factors (cognition, beliefs, and attitudes), environmental factors (social norms, situational cues), and behavioral factors (skills, self-efficacy). It also highlights the importance of self-efficacy, which refers to an individual's belief in their ability to perform specific tasks or behaviors. Social cognitive theory has been applied to various domains, such as education, health promotion, and media effects, to understand how individuals acquire new behaviors and develop cognitive skills, emphasizing the role of observational learning and modeling in behavior change (Bandura, 1999, 2001; Bandura, 2004; Kleebbua & Lindratanasirikul, 2021; McCormick, 2001; Newman et al., 2018). Previous behavioral science and management studies have applied social cognitive theory to examine the effects of transformative leadership, creative self-efficacy, and innovative behavior (Bagheri et al., 2020; Karimi et al., 2023; Newman et al., 2018; Yang et al., 2021). Some previous studies have found a link between contextual factors, psychological empowerment, creative self-efficacy, and innovative behavior (Teng et al., 2020).

In conclusion, social exchange theory and social cognitive theory are distinct psychological theories that focus on different aspects of social behavior and cognition. Social exchange theory emphasizes rational decision-making and the exchange of rewards and costs in social interactions, while social cognitive theory focuses on the cognitive processes involved in learning from observing others and the role of self-regulation in behavior. Thus, this study draws on social exchange theory and social cognitive theory to explain how transformative leadership influences employees' innovative behavior in a medical school setting, specifically investigating the mediating role of psychological empowerment and creative self-efficacy as key pathways linking leadership to innovative behavior. Therefore, this study proposes to test the hypotheses regarding these relationships in the medical school environment.

Transformative Leadership and Innovative Behavior

Transformative leadership is one of the most popular leadership styles (Alessa & Durugbo, 2021; Avolio et al., 1999; Stanescu et al., 2020). Burns (1978), who first introduced the concept of transformative leadership, defined it as a leadership approach that motivates their followers to achieve organizational goals rather than focusing on self-interest (Grant, 2012; Kuhnert & Lewis, 1987; Meng et al., 2022; Paarlberg & Lavigna, 2010). Transformative leadership emphasizes motivating and changing followers' attitudes and promoting innovative behavior, which in turn helps members of the organization develop innovative behavior (Amankwaa et al., 2019; Avolio et al., 1999; Li et al., 2019). In contrast to transactional leadership, which focuses on the exchange of processes and rewards for effort between leaders and followers (Bak et al., 2021; Khan et al., 2021), transformative leadership plays a key role in influencing employees' innovative behavior through several mechanisms.

Transformative leadership involves acting as a role model for the followers, fostering trust and respect. Transformative leaders provide visions that align with organizational needs to increase clarity and understanding in team collaboration toward achieving the set goals, as well as inspire their followers. Additionally, leaders also create models of innovative thinking and behavior that help their followers enhance their skills and abilities to solve work-based problems (Amabile, 1996; Bak et al., 2021; Günzel-Jensen et al., 2017; Li et al., 2019). Transformative leadership enhances followers' intrinsic motivation through four factors known as the "4I" (Knezović & Drkić, 2020): idealized influence, inspirational motivation, intellectual stimulus, and individual consideration. It all has to do with the leader's ability to make their followers believe in the leader's ability to promote innovative behavior. Idealized influence refers to a leader's behavior and cognitive states during interactions with others. This means leaders who provide a vision, a sense of mission, and guidance for work tasks increase the intrinsic motivation of their followers to be more devoted to accomplishing goals. Inspirational motivation involves encouraging followers to believe in their ability to achieve goals while maintaining the high expectations set by the leadership. Transformative leadership stimulates followers' innovative behavior by providing intellectual stimulation that encourages them to take on new challenges, think critically, and implement novel ideas to proactively solve problems. As a result, followers are encouraged to "think outside the box" (Bak et al., 2021), examine innovative solutions, and implement new ideas to achieve their goal. Lastly, individual consideration is another key dimension of transformative leadership that promotes innovative behavior. Leaders create an environment for innovative work and idea sharing, generating new ideas (Bak et al., 2021; Li et al., 2019; Stanescu et al., 2020). Moreover, previous empirical evidence has shown that transformative leadership is highly and positively correlated with employees' innovative behavior, making it one of the most important factors (Afsar & Umrani, 2019; Gemeda & Lee, 2020; Kim et al., 2018; Nusair et al., 2012; Stanescu et al., 2020). Therefore, the first hypothesis proposed is:

H1: Transformative leadership has a direct effect on innovative behavior.

Transformational Leadership and Psychological Empowerment

Several earlier studies (Afsar et al., 2014; Dust et al., 2014; Stanescu et al., 2020) that found a direct and positive link between transformative leadership and psychological empowerment predicted the relationship between transformative leadership and psychological empowerment. Consistent with these findings, the results of the research also indicate that transformative leadership fosters greater feelings of psychological empowerment, which, in turn, helps employees increase their commitment to the organization. This can be attributed to the fact that transformational leaders often delegate authority and encourage participatory decision-making, cooperation, and the sharing of experiences. These result in individuals feeling more empowered and having a high degree of freedom when performing tasks (Afsar et al., 2014; Stanescu et al., 2020). Transformative leadership can contribute to the psychological empowerment of employees by fostering a work environment that enhances their confidence and self-efficacy (Avolio et al., 2004). Such an environment promotes employee motivation, provides a sense of

meaningful and competent work, and influences both individual experiences and organizational outcomes (Spreitzer, 1995). Therefore, the proposed second hypothesis is:

H2: Transformative leadership is significantly and positively related to psychological empowerment.

Psychological Empowerment and Innovative Behavior

Psychological empowerment is one type of empowerment theory (Grošelj et al., 2020; Knezović & Drkić, 2020). It primarily focuses on motivational constructs that originate from an individual's feeling of having a choice in initiating and regulating actions and the importance of confidence in one's abilities for performing well at work. Psychological empowerment encompasses four cognitive factors related to an employee's work role: meaning, competence, self-determination, and impact (Afsar & Masood, 2017; Liu et al., 2019; Rehman et al., 2019; Seibert et al., 2011; Spreitzer, 1995). Meaning involves the alignment between work roles and individual beliefs and values, which shape the expectations for individual work behavior. Competence reflects an individual's feelings of self-efficacy, or the belief in their ability to successfully complete tasks with skill and confidence. Self-determination refers to the feeling of autonomy in making decisions about the work process. Finally, impact refers to the extent to which an individual can influence organizational outcomes.

When individuals feel empowered in organizations, they tend to exhibit more innovative and creative behaviors. This is because they experience a sense of well-being and confidence in the work tasks they perform, perceive those tasks as meaningful, and view them as mentally challenging, aligning their individual goals with organizational goals (Jha, 2014; Jung et al., 2003). Additionally, when individuals feel that they have greater freedom in decision-making, flexibility in engaging in innovative behavior, and recognize intrinsic motivation, they are more likely to generate innovative and improved solutions, thereby also fostering innovative behavior and task accomplishment (Afsar et al., 2014; Jung & Sosik, 2002; Stanescu et al., 2020). Thus, psychological empowerment can stimulate change through the aforementioned four factors and contribute to innovative behavior. Therefore, the proposed third hypothesis is:

H3: Psychological empowerment has a direct effect on innovative behavior.

Transformational Leadership and Creative Self - Efficacy

Transformational leadership is considered a crucial factor for fostering creativity in the workplace. It is linked to transformative leadership through its foundation of optimism and enthusiasm, which provides followers with inspirational motivation, supports them in working differently, and assigns suitable work to each follower. This broadens the opportunities for individuals who believe in their capability to generate creative ideas and contribute to innovation in organizational outcomes (Mittal & Dhar, 2015). These findings are consistent with previous studies that have suggested transformative leadership as one of the contextual factors strongly and positively influencing creative self-efficacy (Gong et al., 2009; Mittal & Dhar, 2015; Walumbwa & Hartnell, 2011; Wang et al., 2014). Based on the review, the proposed fourth hypothesis is:

H4: Transformational leadership has a direct effect on creative self-efficacy.

Creative Self-efficacy and Innovative Behavior

Creative self-efficacy is a type of self-efficacy based on social cognitive theory (Bandura, 1999; McAuley, 1985; Tierney & Farmer, 2002). According to Bandura (1986, 1999), creative self-efficacy refers to individuals' belief and confidence in their ability to identify and implement new ideas to achieve creative outcomes (Javed et al., 2020; Newman et al., 2018; Tierney & Farmer, 2002, 2011; Yang et al., 2021). It is crucial for individuals to be able to identify problems for generate and champion new ideas to effectively promote innovative work (Javed et al., 2020; Yang et al., 2021).

Creative self-efficacy plays a key role at the individual level and leads to higher levels of innovative behavior (Nisula& Kianto, 2016). Observed individuals who have successfully completed creative tasks tend to have higher self-efficacy, while those who have experienced failures often exhibit lower self-efficacy (Javed et al., 2020), which is consistent with the findings of Newman et al. (2018) and Javed et al. (2020). This support can be attributed to two main reasons. First, individuals with high creative self-efficacy are more likely to engage in innovative behavior activities because they are more confident and have greater job satisfaction in their work (Santoso et al., 2019). They also believe in their knowledge and skills to generate and implement ideas, as well as their ability to manage task difficulties Second, individuals with significant levels of creative self-efficacy are better prepared to navigate the challenges and uncertainty involved in creating and implementing innovative ideas in the workplace. When faced with difficulties or failures, they are more likely to perceive them as opportunities and persevere. Based on the review, the proposed fifth hypothesis is:

H5: Creative self-efficacy has a direct effect on innovative behavior.

Psychological Empowerment as a Mediator

Clarify the mediating role of psychological empowerment based on a self-determination perspective when an individual perceives a higher level of transformative leadership. According to Afsar et al (2014) psychological empowerment is a potential mediator between transformative leadership acts that influence an individual's work outcome (Afsar et al., 2014). When employees feel psychologically empowered, they perceive their work as meaningful and personally significant, and they believe in their ability to successfully perform tasks. As a result, they are more likely to implement new ideas, engage in activities, and suggest change (Conger & Kanungo, 1988; Seibert et al., 2011), which can lead to innovative work (Liu et al., 2019). Therefore, it can be stated that psychological empowerment can be considered a fundamental characteristic of participating in innovation activities (Chen & Chen, 2012; Dong et al., 2016; Nisula & Kianto, 2016; Seibert et al., 2011; Yasir et al., 2021), consistent with previous empirical evidence by Afsar et al. (2014), Afsar et al. (2018), and Afsar and Masood (2017), who found that psychological empowerment fully mediating the relationship between transformative leadership and innovative behavior. Similar findings were also reported by Stanescu et al. (2020) in their investigation of the relationship between transformative leadership and employees' innovative behavior, where psychological empowerment was identified as a mediating factor.

As employees or individuals are inspired and motivated by transformational leaders, it is crucial for them to have a clear understanding of the organization's or team's expectations and leadership to foster their motivation to exhibit positive work behaviors. At the same time, psychological empowerment represents a motivational construct that provides individuals with confidence and autonomy in their roles, enabling their success. Based on the preceding discussion, the following sixth hypothesis is proposed:

H6: Psychological empowerment positively mediates the relationship between transformative leadership and innovative behavior.

Creative Self - Efficacy as a Mediator

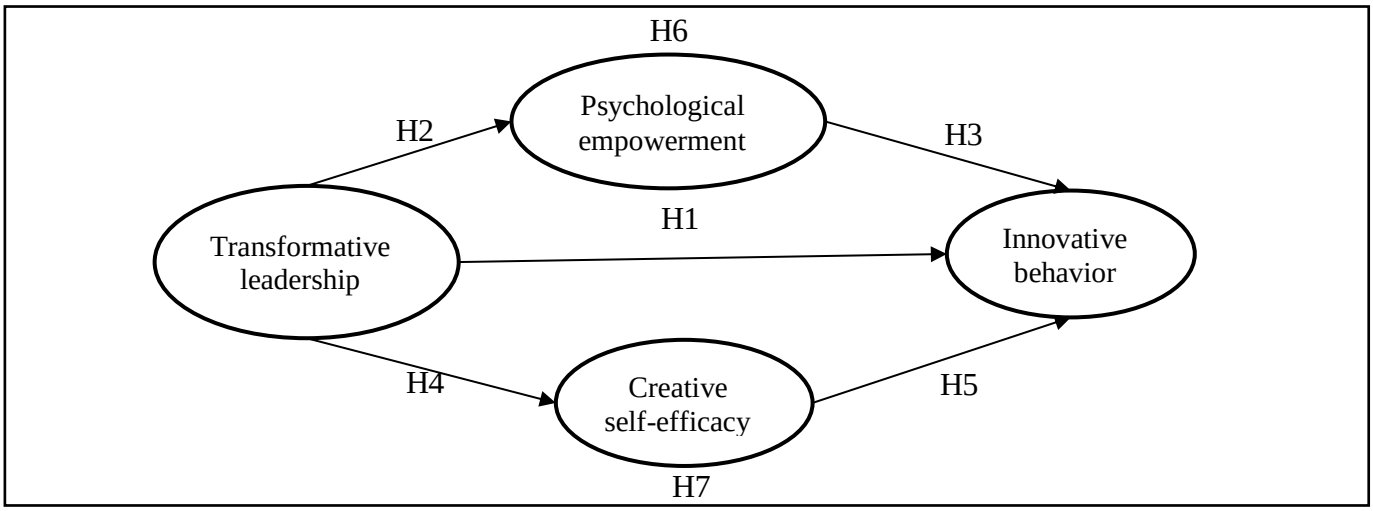
Nowadays, creative self-efficacy has gained increased interest from researchers as a mediator variable in predicting innovative behaviors. Specifically, creative self-efficacy is believed to mediate the relationship between transformative leadership and innovative behavior. This is because the impact of transformative leadership on employees' self-efficacy beliefs may be limited and may not always effectively enhance employees' work tasks in the context of transformative leadership (Afsar et al., 2014; Afsar & Masood, 2017). Thus, creative self-efficacy can be an important mediating variable that is necessary for employees to act upon the motivational influences of transformative leadership and engage in innovative

behavior. As discussed earlier, there is an understanding of the relationship between transformative leadership and creative self-efficacy, as well as between creative self-efficacy and innovative behavior. This research aims to further contribute to the existing literature by providing a deeper understanding of the effect of creative self-efficacy on the relationship between transformative leadership and innovative behavior through empirical investigation. Therefore, our final hypothesis is:

> H7: Creative self-efficacy positively mediates the relationship between transformative leadership and innovative behavior.

Figure 1

The Proposed Conceptual Framework



Method

Participants

This study used a cross-sectional design and collected primary data through a survey questionnaire. The participants in this study were selected from staff members of a medical school in Thailand. The participants were selected using non-probability sampling techniques. This study distributed questionnaires to 26 departments related to the medical curriculum at this medical school, providing 15 copies per department. In total, 390 copies were distributed, and data collection from September 2022 to November 2022. A total of 193 questionnaires were returned, representing a response rate of 49.50%. After removing the outlier, a total of 153 valid responses were collected, accounting for (39.23%) of the distributed questionnaires. Most of the participants were female, which was equal to 62.10% (*n* = 95), whereas the male samples accounted for 36.60% (*n* = 56) and the LGBTQ for 1.30% (*n* = 2). Respondents aged 20–30 years were 17.60% (*n* = 27), 31–40 years were 56.20% (*n* = 86), 41–50 years were 22.20% (*n* = 34), and over 50 years were 3.90% (*n* = 6). As for medical education work experience, 25.50% (*n* = 39) had less than 5 years of experience, 33.30% (n = 51) had between 5–10 years of experience, and 41.20% (*n* = 63) had more than 10 years of experience. Regarding the educational background, 2.00% (*n* = 3) held an undergraduate university degree, 66.70% (*n* = 102) held an undergraduate university degree, 26.10% (*n* = 40) held a master's degree, and 5.20% (*n* = 8) held a doctorate degree. Finally, the majority of the participants worked as educators, accounting for 81.00% (*n* = 124). Furthermore, 11.10 % (*n* = 17) were medical teachers, 5.20% (*n* = 8) did not specify their role, and 2.60% (*n* = 4) were engineers.

Instruments

The items used to measure the research constructs of this study were based on existing measures. All items were scored using a seven-point rating scale ranging from "strongly disagree" (1) to "strongly agree" (7) and utilized a self-reported questionnaire.

Transformative leadership (TFL) was measured using the MLQ (5X) developed by Avolio et al. (1999) and Bass and Riggio (2005). Sample items included “My leader or I ask questions that prompt members' team to think for the benefit to creating educational innovations in medical education”. The scale’s internal consistency factor, Cronbach’s alpha, was .78.

Psychological empowerment was measured using the scale developed by Spreitzer (1995). Sample items included "The work I do is meaningful to me" and "I have mastered the skills necessary to creating educational innovations in medical education". The scale’s internal consistency factor, Cronbach’s alpha, was .71.

Creative self-efficacy (CSE) was measured using a set of questions from Tierney and Farmer (2002). The sample items included “I feel that I am good at generating new ideas”. The scale’s internal consistency factor, Cronbach’s alpha, was .85.

Innovative behavior (IB) was measured using the scale developed by De Jong and Den Hartog (2010). Sample items included “I wonder how things can be improved”, “I searches out new working methods, techniques, or instruments”, “I makes important in organizational members enthusiastic for innovative ideas”, and “I contributes to the implementation of new ideas”. The scale’s internal consistency factor, Cronbach’s alpha, was .83.

Ethical Considerations

This study has been carefully reviewed and approved by the research ethics committee of the graduate school, Chulalongkorn University, Thailand, and received an IRB ethics certificate of approval on September 7, 2022 (reference number 650172).

Results

The objectives of this study were to examine the effect of transformative leadership on innovative behavior and to investigate the mediating role of psychological empowerment and creative self-efficacy. To analyze the data, the current study used descriptive statistics, correlation analysis, and structural equation modeling techniques (the PLS-SEM technique was employed for multiple mediations with two mediators, and the bootstrap resampling method was used to test hypotheses). Data processing with AMOS 28 for measurement model validation and model fit tests, Hayes' SPSS multiple-mediator PROCESS 3.3 macro was used to test indirect effects (Hayes, 2009, 2013); and SPSS 28 software for descriptive statistics and reliability calculations.

Reliability, Validity, and Testing Model Fit

Reliability, composite reliability (CR), and Cronbach's alpha coefficient of all the constructs have values greater than 0.70 and are statistically significant at the 5% confidence level. Moreover, indicator reliability: the outer factor loading threshold value for each latent variable should be 0.40, and 0.70 can be taken into account if outer loading less than 0.4 must always be removed (Al-Sa’di et al., 2017).

Confirmatory factor analysis (CFA) was conducted using AMOS 28 to validate the measurements and assess the model fit based on several general indexes: $\chi 2/df$, TLI, CFI, GFI, RMSEA, and SRMR. Acceptable cutoff values were established as less than 2.00 for $\chi 2$, greater than 0.90 for TLI, GFI, and CFI, and less than 0.08 for RMSEA and SRMR (Hooper et al., 2008). Additionally, the average variance extracted (AVE) value, recommended by Fornell and Larcker (1981), should exceed 0.50 for each construct (Ab Hamid et al., 2017; Hair et al., 2011; Hair et al., 2012).

The result of the confirmatory factor analysis confirmed the validity and reliability of all measures. The fit indexes indicated a good fit for our hypothesized model, with $\chi 2/df = 1.26$, CFI = .99, TLI =.98, GFI

= .95, RMSEA = .04, SRMR; .05; $p < .05$. All measurements' validity and reliability were accepted, and the recommended threshold value is presented in Table 1. The outer factor loadings of the measurement model also aligned with the recommended threshold value, as presented in Table 2. Based on the quality fit indices, the results of the CFA analysis confirmed the appropriateness of the data, allowing for the subsequent structural equation modeling analysis. Furthermore, Table 1 also presents the means, standard deviations, and inter-variable correlations.

Table 1

Means, Standard Deviations, Correlations, and Variance Extracted Testing

Variables	*M*	*SD*	1	2	3	4	AVE	CR
Recommended Threshold							> .5	> .7
1.TFL	6.21	.39	1.00				.46	.77
2. PE	6.07	.35	.70**	1.00			.52	.83
3. CSE	6.00	.46	.71**	.61**	1.00		.64	.84
4. IB	6.21	.45	.79**	.63**	.84**	1.00	.55	.83

Note. * $p < .05$. ** $p < .01$. *** $p < .001$., n = 153, TFL = transformational Leadership, PE = psychological empowerment, CSE = creative self-efficacy, IB = innovative behavior

Table 2

Outer Factor Loadings of the Measurement Model (CFA)

Indicators	Factor Loading	Standard Error	C.R.
TFL1	.77	.07	10.10***
TFL2	.51	.09	6.28***
TFL3	.50	.09	4.87***
TFL4	.65	.09	8.08***
TFL5	.76	-	-
PE1	.64	.07	8.01***
PE2	.66	.08	8.16***
PE3	.59	.07	4.94***
PE4	.86	-	-
CSE1	.88	.08	12.12***
CSE2	.72	.08	10.12***
CSE3	.85	-	-
IB1	.69	.10	9.43***
IB2	.75	.09	10.49***
IB3	.78	-	-
IB4	.74	.0	9.93***

Note. * $p < .05$. ** $p < .01$. *** $p < .001$., n = 153, TFL = transformational leadership, PE = psychological empowerment, CSE = creative self-efficacy, IB = innovative behavior

Hypotheses Testing

The research hypotheses were tested using the structural equation modeling technique and the bootstrap re-sampling method. This method is suitable for studies where the sample size is not large enough (Al-Sa'di et al., 2017; MacKinnon et al., 2004). Path analysis was employed to examine the hypothesized relationships between the exogenous and endogenous variables used in the study (see Table 3 and Figure 2).

Table 3

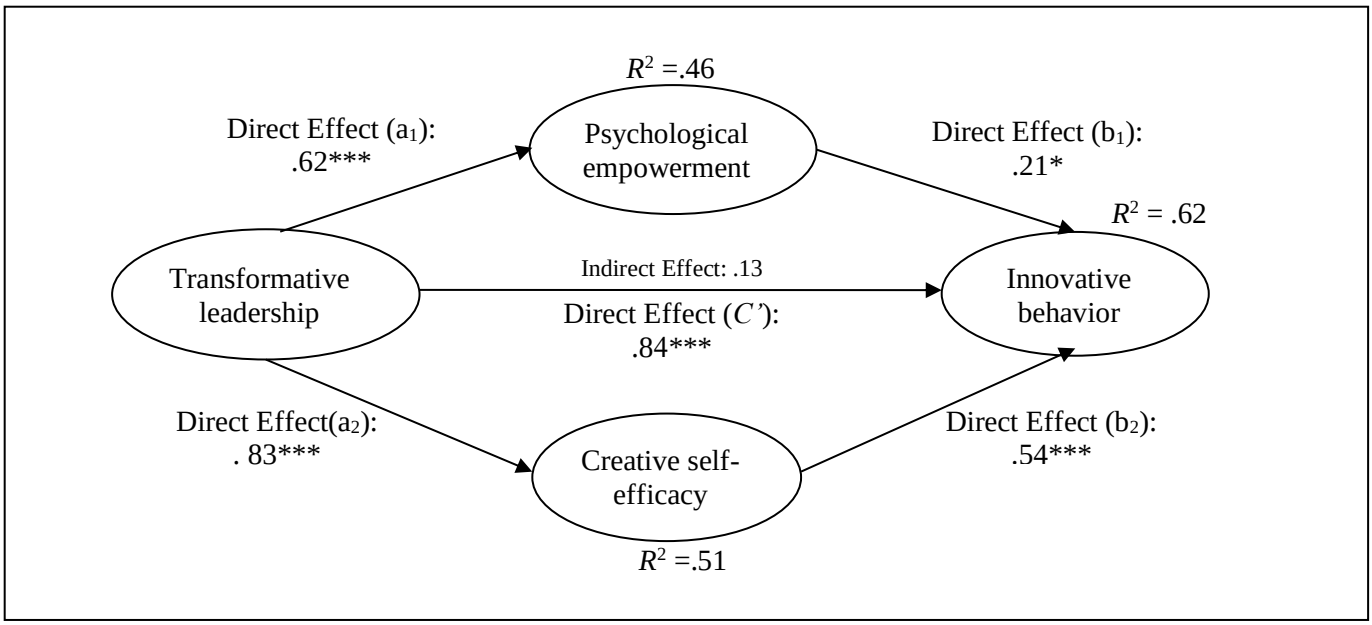
Regression Results for Multiple Mediation Analyses

Model	R^2	Path Coefficient	*t*	*SE*	Bias corrected bootstrap 95% confidence interval Lower	Upper	Hypothesis Result
X on mediator (a paths)							
TFL➔ PE (a1)	.49	.62***	11.92	.05	.52	.72	H2: Supported
TFL➔ CSE (a2)	.51	.83***	12.47	.07	.69	.96	H4: Supported
Mediators on Y (b paths)							
PE➔ IB (b1)		.21*	2.40	.09	.04	.38	H3: Supported
CSE➔ IB (b2)		.54***	10.00	.05	.44	.65	H5: Supported
Total effect of X on Y (c' path)							
TFL➔ IB	.61	.84***	15.72	.05	.78	1.00	H1: Supported
Indirect effects (mediating)							
Total (1) + IB (2)		.58					
PE		.13		.11	-.13	.32	H6: Not supported
CSE		.49		.07	.26	.55	H7: Supported

Note. * $p < .05$. ** $p < .01$. *** $p < .001$., Based on 5,000 bootstrap samples, a = independent variable effects mediator variable, b = mediator variable effects dependent variable, c' = the direct effect is excluding the indirect effect of the mediator.

Figure 2

Direct and Indirect (mediating) Effects of PE and CSE in Multiple Mediator Model with Two Mediators



Note. Indirect effect for psychological empowerment = a1·b1= (.62) * (.21) = 0.13, indirect effect for creative self-efficacy = a2·b2= (.82) * (.54) =.45, *** $p < .001$.

Direct Effects

The findings of this study confirmed that transformational leadership has a significant direct effect on innovative behavior (β =.84; t = 15.71; $p < .001$). Transformational leadership has a significant direct effect on psychological empowerment (β = .62; t = 11.92; $p < .001$), and psychological empowerment has a significant direct effect on innovative behavior (β =.21; t = 2.40; p = .05). Therefore, H1, H2, and H3 were supported. Furthermore, the study revealed transformational leadership has a significant direct effect on creative self-efficacy (β = .83; t = 12.47; $p < .001$), and creative self-efficacy has a significant direct effect on innovative behavior (β = .54; t = 10.00; $p < .001$). Thus, H4 and H5 were supported as well.

The Mediating Role of Psychological Empowerment and Creative Self-Efficacy

This study used the approach and concept described by Hayes (2013) and Cepeda-Carrion et al. (2018) to test a multiple-mediator model. The 95 percent bias-corrected confidence intervals were calculated using the recommended 5,000 bootstrap samples. The upper and lower bound results, excluding zero for the mediator, indicate the significance of the effect by conventional standards. Hayes's SPSS multiple-mediator PROCESS macro was used to test the significance of the indirect effect (Cepeda-Carrion et al., 2018; Hayes, 2013; Liu et al., 2019; MacKinnon et al., 1995; Shrout & Bolger, 2002).

The result demonstrated that the model of multiple mediation with transformational leadership predicting innovative behavior via psychological empowerment and creative self-efficacy was significantly different from zero at the.05 level and indicated a good fit model ($\chi 2/df$ = 1.22; CFI = .99; TLI = .98; GFI = .93; RMSEA = .03; SRMR = .04; $p < .05$). H6 predicted that psychological empowerment would mediate the relationship between transformational leadership and innovative behavior. However, the indirect relationship between transformational leadership and innovative behavior via psychological empowerment (β = .01, *SE* =.114, $p < .05$, 95% *CI* [-0.13, 0.32]) was found to be insignificant, as the confidence interval contains zero. Therefore, H6 was not supported. On the other hand, H7 predicted that creative self-efficacy would mediate the relationship between transformational leadership and innovative behavior. The indirect relationship between transformational leadership and innovative behavior via creative self-efficacy was .45, (*SE* = .07, $p < .05$, 95% *CI* [0.26, 0.55]) and was found to be significant, as the confidence interval does not contain zero. Therefore, H7 was supported.

Discussion and Conclusion

Discussion of Main Results

The purpose of this study was to examine the relationship between transformational leadership and innovative behavior, as well as the mediating role of psychological empowerment and creative self-efficacy. According to the results, the present study confirmed that transformational leadership has a positive impact on psychological empowerment, creative self-efficacy, and innovative behavior. Additionally, both psychological empowerment and creative self-efficacy positively influence innovative behavior. The mediation analysis reveals that only creative self-efficacy significantly mediates the relationship between transformational leadership and innovative behavior, while psychological empowerment does not.

The statistical analysis for H1 confirmed a significant and positive relationship between transformational leadership (β = .89; t = 15.71; $p < .001$) and innovative behavior. This finding supports the notion that transformational leadership plays a crucial role in enhancing the innovative behavior of staff in medical school. From a theoretical perspective, transformational leadership can effectively improve and increase the ability of employees to constantly generate new ideas. The results align with the perspectives of Bass and Avolio (1990), Hammond et al. (2011), Afsar and Masood (2017), and Hansen and Pihl-Thingvad (2019), who emphasize the strong positive association between transformational leadership and innovative behavior. This finding is also consistent with a recent study by Karimi et al. (2023), which highlights the generation of new ideas by employees with transformative leadership. Moreover, it strengthens previous studies revealing the positive contribution of transformative leadership support to employee innovative behavior (Afsar & Umrani, 2019; Afsar & Umrani, 2020; Amankwaa et al., 2019; Bak et al., 2021; Gemeda & Lee, 2020; Pradhan & Jena, 2019; Sharifirad, 2013; Suhana et al., 2019).

The results indicate a significant and positive relationship between transformational leadership (β = .62; t = 11.92; $p < .001$) and psychological empowerment, supporting H2. This finding suggests the fact that staff in a medical school, under the influence of transformational leadership, are motivated to generate new ideas and seek different perspectives to solve problems, thus creating opportunities for innovation tasks in medical education. This finding is consistent with Dust et al. (2014) and Gumusluoglu and Ilsev (2009),

who confirmed and highlighted how transformational leadership enhances psychological empowerment by emphasizing listening, understanding followers, and motivating followers to engage in performance work and teamwork behaviors. Psychological empowerment fosters a participative and proactive approach to work, allowing employees to express their work methods and aligning with self-concept-based theories of transformational leadership. The result of H3 reveals a significant and positive relationship between psychological empowerment (β =.21; t = 2.40; p = .05) and innovative behavior, supporting H3. This finding suggests that staff with psychological empowerment, driven by intrinsic motivation, play a significant role in contributing to the generation of novel ideas. This finding is in line with Dedahanov et al. (2019), who demonstrate that psychological empowerment helps employees create new ideas through dimensions of psychological empowerment, which provide opportunities for innovation.

The analysis reveals a significant and positive relationship between transformational leadership (β = .83; t = 12.47; p < .001) and creative self-efficacy, supporting H4. The finding supports the idea that transformational leadership enhances employees' belief in their capacity to generate creative ideas and develop independent thinking skills, thereby promoting creative self-efficacy. The finding aligns with Yasir et al. (2021) and Mittal and Dhar (2015), who emphasize the role of transformational leadership in motivating and supporting followers to have confidence in their abilities to generate creative ideas and develop independent thinking skills by promoting their creative self-efficacy. It is also consistent with empirical findings from studies by (Kazmi et al., 2020; Mittal & Dhar, 2015; Wang et al., 2014). Additionally, the analysis reveals a significant and positive relationship between creative self-efficacy (β = .54; t = 10.00; p < .001) and innovative behavior, supporting H5. This finding suggests that individuals who possess creative self-efficacy are more likely to generate novel ideas and initiatives. It aligns with the concepts put forth by Amabile (1988) and Amabile and Amabile (1983), highlighting the importance of assessing confidence in abilities such as creative thinking, identifying possibilities, and generating new ideas and solutions, Previous studies (Bandura, 1999; Bagheri et al., 2020; Javed et al., 2018; Li et al., 2018; Nisula & Kianto, 2016; Sarwat & Abbas, 2020; Su et al., 2019) also support this relationship.

Finally, the mediating role of psychological empowerment, H6 was not supported, as the relationship between transformational leadership and innovative behavior via psychological empowerment was found to be insignificant. This finding of H6 suggests that staffs' perceptions of psychological empowerment in medical education contexts and industrial contexts may differ because they are not profit-driven and the competition for an advantage is not as intense as in the business context. Possibly because of the findings of psychological empowerment as a mediator from previous research, most of the findings were conducted in business and industrial contexts. The lack of intensity in competition for advantage in medical education may contribute to this result, consistent with the findings of (Saeed et al., 2019). However, the results of H7 indicated that the mediating role of psychological empowerment in the relationship between transformational leadership and innovative behavior was positive and significant. On the other hand, H7 was supported, indicating that creative self-efficacy significantly mediates the relationship between transformational leadership and innovative behavior. The finding of H7 suggests that when staff feel confident in their knowledge and skills, they are more likely to use transformational leadership to collaborate with others, generate innovative ideas, and implement them. This result aligns with the concept of (Iqbal et al., 2020; Jiang & Gu, 2017), and it is consistent that it highlights the mediating role of creative self-efficacy as a mediating role in the relationship between transformational leadership and innovative behavior (Afsar & Masood, 2017; Lei et al., 2020; Yang et al., 2021).

Limitations

This study has some limitations, including the fact that the participation of the population in answering questionnaires is too small, the absence of qualitative data collection, and a limited geographic scope. The study applied a quantitative research approach. This was done by developing a linear quantitative strategy for each variable. Future research could benefit from incorporating qualitative methods to gain further insights into the factors influencing innovative behavior. Additionally, the study was

conducted at only one medical school in Thailand, limiting the generalizability of the findings. Further studies should include multiple medical schools and consider cross-country comparisons, while also exploring other behavioral factors as potential mediating variables.

Implications for Behavioral Science

This study demonstrates the relevance and applicability of social exchange theory and social cognitive theory to innovative behavior, specifically in the context of a medical school. The theories predict that employees exhibit cognition, attitudes, skills, and self-efficacy, which contribute to their innovative behavior (Hughes et al., 2018; McCormick, 2001). This study contributes to the behavioral science literature by examining the role of creative self-efficacy and psychological empowerment in the relationship between transformative leadership and innovative behavior. The findings suggest that transformative leadership is a crucial predictor of innovative behavior among medical school staff, promoting medical educational innovation. Managers and educators should focus on strengthening employees' transformative skills and self-efficacy abilities to foster collaboration and enhance the generation of innovative ideas. (Hughes et al., 2018; Slatten, 2014). Additionally, the findings also suggest further research on the relationship between transformational leadership, innovative behavior, and the moderating role of psychological empowerment, in line with Grošelj et al. (2020), who found that the effect of transformational leadership is stronger when the level of psychological empowerment is higher. Overall, these findings have significant implications for management practices, emphasizing the importance of leadership and creative self-efficacy in driving innovation behavior in the medical education field.

Conclusion

Drawing on social exchange theory and social cognitive theory, the present study examined the effects of transformational leadership on innovative behavior, both directly and indirectly via psychological empowerment and creative self-efficacy, in a medical school in Thailand. Based on the empirical findings, it was established that transformational leadership has a significant positive impact on innovative behavior. Transformative leadership has a significant positive impact on both psychological empowerment and creative self-efficacy. Both psychological empowerment and creative self-efficacy have a significant positive impact on innovative behavior. It was also confirmed that creative self-efficacy partially mediates transformational leadership and innovative behavior, but psychological empowerment does not. Thus, managers of medical schools aiming at improving employees' innovative behavior must focus on increasing transformational leadership and creative self-efficacy. Transformational leadership is related to social exchange theory and social cognitive theory and corresponds to an individual's self-efficacy perception of confidence in their capabilities to perform, generate new ideas, and participate in medical educational innovation activities to achieve the set goals.

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