Factors Predicting Innovative Work Behavior Among Nurses in Tertiary Hospitals in Yunnan Province, the People's Republic of China*

ปัจจัยทำนายพฤติกรรมสร้างนวัตกรรมในการทำงานของพยาบาลในโรงพยาบาลระดับตติยภูมิ มณฑลยูนนาน สาธารณรัฐประชาชนจีน*

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Abstract

In this era, innovation is a pivotal element in improving the efficacy and effectiveness of any organization, including in the fields of healthcare and nursing. Innovative work behavior (IWB) in nurses is a critical element needed for the production of nursing innovation. This descriptive predictive study aimed to examine the level of IWB and the prediction of transformational leadership (TL) and psychological empowerment (PE) on IWB among nurses in tertiary hospitals in Yunnan Province, the People's Republic of China. A stratified random sampling technique was used to select 379 nurses working at two tertiary hospitals in Kunming city. The research instruments included the Chinese Transformation Leadership Questionnaire (CTLQ), the Chinese Psychological Empowerment Questionnaire (CPEQ), and the Chinese version of the Innovative Work Behavior Questionnaire (IWBQ), translated by the researcher. The Cronbach's alpha coefficients of the instruments were .91, .80, and .85, respectively. Data were analyzed using descriptive statistics and binary logistic regression analysis.

The study results revealed that nurses' IWB was at a moderate level ($\bar{X}$ = 30.60, SD = 6.89). The dimension of idea generation was at a high level ($\bar{X}$ = 12.87, SD = 1.58), while the rest were at a moderate level, including idea exploration ($\bar{X}$ = 6.97, SD = 1.67), idea championing ($\bar{X}$ = 6.06, SD = 1.72) and idea implementation ($\bar{X}$ = 7.99, SD = 2.49). The factors predicting IWB among nurses were visionary for TL (OR = .90, 95% CI = .82-.99) and self-determination for PE (OR = 1.35, 95% CI = 1.14-1.61). Overall, all predictors could explain 10% (Nagelkerke R2) of the variability in IWB.

Nursing administrators should create effective strategies to improve the visionary TL abilities and the self-determination dimension of PE of head nurses. They should also promote PE self-determination among nurses by empowering and supporting them to meet their goals and to promote IWB.

Keywords: Innovative work behavior, Nurse, Psychological empowerment, Transformational leadership

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บทคัดย่อ

ในยุคนี้นวัตกรรมนับเป็นองค์ประกอบที่สำคัญในการปรับปรุงประสิทธิภาพและประสิทธิผลขององค์กรซึ่งรวมถึงองค์กรทางด้านสุขภาพและการพยาบาล ในขณะที่พฤติกรรมสร้างนวัตกรรมของพยาบาลเป็นส่วนสำคัญในการผลิตนวัตกรรมทางการพยาบาล วัตถุประสงค์ของการศึกษาพรรณนาเชิงทำนายนี้เพื่อศึกษา พฤติกรรมสร้างนวัตกรรมในการทำงาน และปัจจัยทำนาย ได้แก่ ภาวะผู้นำเชิงปฏิรูป และการเสริมสร้างพลังทางจิตวิทยา ต่อพฤติกรรมสร้างนวัตกรรมในการทำงานของพยาบาล ในโรงพยาบาลตติยภูมิ มณฑลยูนนาน ประเทศสาธารณรัฐประชาชนจีน โดยใช้การสุ่มตัวอย่างแบบจัดชั้นภูมิ ได้กลุ่มตัวอย่างเป็นพยาบาลที่ทำงานในโรงพยาบาลตติยภูมิเมืองคุนหมิง 2 แห่งจำนวน 379 คน เครื่องมือที่ใช้ในการศึกษาประกอบด้วย แบบสอบถามภาวะผู้นำเชิงปฏิรูปของจีน (CTLQ) แบบสอบถามการเสริมสร้างพลังทางจิตวิทยาของจีน (CPEQ) และแบบสอบถามพฤติกรรมสร้างนวัตกรรมในการทำงาน (IWBQ) แปลเป็นภาษาจีนโดยผู้วิจัย ซึ่งมีค่าสัมประสิทธิ์อัลฟาของครอนบาค (Cronbach's alpha) เท่ากับ .91, .80 และ .85 ตามลำดับ วิเคราะห์ข้อมูลโดยใช้สถิติเชิงพรรณนา และสถิติ binary logistic regression analysis

ผลการศึกษาพบว่า พฤติกรรมสร้างนวัตกรรมในการทำงานอยู่ในระดับปานกลาง ($\bar{X}$= 30.60, SD = 6.89). ด้านการก่อเกิดความคิดอยู่ในระดับสูง ($\bar{X}$= 12.87, SD = 1.58) ในขณะด้านที่เหลือ อยู่ในระดับปานกลาง ได้แก่ การสำรวจความคิด ($\bar{X}$= 6.97, SD = 1.67) การทำให้เกิดการยอมรับความคิด ($\bar{X}$= 6.06, SD = 1.72) และการนำความคิดสู่การปฏิบัติ ($\bar{X}$=7.99, SD = 2.49) ปัจจัยทำนายพฤติกรรมสร้างนวัตกรรมในการทำงาน 2 ปัจจัยได้แก่ ภาวะผู้นำเชิงปฏิรูปด้านการมีวิสัยทัศน์ (OR=.90, 95% CI=.82-.99) และการเสริมสร้างพลังทางจิตวิทยาด้านการตัดสินใจด้วยตนเอง (OR=1.35, 95% CI=1.14-1.61) โดยรวมปัจจัยทำนายทุกปัจจัยสามารถร่วมกันทำนายพฤติกรรมสร้างนวัตกรรมได้ร้อยละ 10 (Nagelkerke R^2)

ผู้บริหารการพยาบาลควรพัฒนากลยุทธ์ที่มีประสิทธิภาพในการปรับปรุงสมรรถนะภาวะผู้นำเชิงปฏิรูปด้านการมีวิสัยทัศน์และการเสริมสร้างพลังทางจิตวิทยาด้านการตัดสินใจด้วยตนเองในหัวหน้าหอผู้ป่วย และควรพัฒนาการเสริมสร้างพลังทางจิตวิทยาด้านการตัดสินใจด้วยตนเองในพยาบาลโดยการเสริมสร้างพลังอำนาจและสนับสนุนพยาบาลเพื่อให้บรรลุเป้าหมายของตนเองและเพื่อเสริมสร้างพฤติกรรมสร้างนวัตกรรมในการทำงาน

คำสำคัญ: พฤติกรรมสร้างนวัตกรรมในการทำงาน พยาบาล การเสริมพลังทางจิตวิทยา ภาวะผู้นำเชิงปฏิรูป

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Background and Significance

Presently, there is an increasing emphasis on providing high-quality nursing care in many countries, as well as in China. Innovation is a critical element for improving organizational efficacy and effectiveness in highly competitive and technologically advanced environments, including healthcare systems (Afsar & Badir, 2014). Innovation refers to new products, processes, procedures or protocols in any organization (Thomas, Reynolds, & O'Brien, 2006). It is a key strategy for quality management schemes in a work role, unit, organization or company (De Jong & Hartog, 2008). However, organizational innovation depends on the innovative work behavior (IWB) of the employees, and this has been recognized as a critical vehicle for the growth and competitiveness of organizations (Afsar & Badir, 2014). De Jong and Hartog (2010) define IWB as a set of individual actions to achieve initiation and intentional introduction within a work role, group or organization of new and useful ideas, processes, products or procedures. It is a key element of nurses to offer high-quality nursing service for patients (Bao, Zhang, & Wang, 2012). However, In China, as only 8.8% of registered nurses hold a baccalaureate degree or above, most nurses do not understand the meaning of innovation. Thus, they may not have ideas to create nursing innovation as they do not know the stages of IWB (Kulaixi, 2010). Nurses working in Kunming hospitals or in Yunnan province were able to utilize new technologies in their work, but few created nursing innovations by themselves. Further, there are some roadblocks to IWB in nursing practice including the nursing workload, the requirements of high-quality nursing care, and low consciousness of innovation.

Based on the literature review, several researchers have studied IWB among nurses around the world using different measurements of IWB. The findings of those studies revealed nurses' perceptions of IWB to be at different levels ranging from low to high (Jose & Bunpin, 2013; Tung, 2014; Xerri & Brunetto, 2013; Asfar & Masood, 2017). Only seven studies related to IWB were conducted in China and those findings also showed an inconsistent level of IWB, ranging from low to high (Afsar & Badir, 2014; Bao et al., 2013; Dan et al., 2018; Hua, 2015; Masood & Asfar; 2016; Tung, 2014; Xerri & Brunetto, 2013).

Furthermore, the inconsistent level of IWB among nurses and employees in China may be due to different measurements of IWB. Three studies researching nurses' IWB used Scott and Bruce's IWB instrument (Afsar & Badir, 2014; Masood & Asfar, 2016; Asfar & Masood, 2018). Another three studies used other different instruments to study IWB among nurses and revealed inconsistent levels of overall IWB from low to moderate (Bao et al., 2012). Only one study used the IWB scale of De Jong and Hartog (2010) among employees in an innovative company and the result reflected a high level of IWB. In short, the inconsistent results were due to different characteristics among different areas, fields and IWB instruments. However, no study was conducted in any hospital in China using De Jong and Hartog's IWBQ (2010) which includes the items exploring implementation of innovative ideas in the IWB process. Those studies' findings could not predict or represent the current IWB among nurses working at hospitals in Kunming. Coupled with the IWB problems among nurses mentioned above, it is important to verify and

explore nurses' perceptions of IWB using IWBQ in Kunming hospitals, Yunnan province.

In addition, to help nurse leaders find strategies to improve nurse IWB, it is necessary to examine the factors influencing IWB. Transformation leadership (TL) and psychological empowerment (PE) have been found as factors influencing IWB as presented in several studies below. Nevertheless, those studies revealed inconsistent findings that need to be explored as well.

Transformational leadership has been defined as a set of behaviors that head nurses use to inspire subordinates to exceed an organization's expectations through four aspects including morale modeling, charisma, vision and individualized consideration (Li & Shi, 2008). Leaders can illustrate the critical meaning of the tasks they are responsible for and provide an overarching vision to nurses, which is believed to enhance both idea generation and application behavior (De Jong & Hartog, 2007). Through the literature review, it was found that the TL of head nurses was associated with IWB among nurses. Most studies found that TL was significantly correlated with IWB among nurses (Asfar & Masood, 2018; Hui et al., 2019; Masood & Asfar, 2016), while one study showed a negative relationship between TL and IWB among nurses (Pieterse, Knippenberg, Schippers, & Stam, 2010). Further, no studies have explored the relationship between TL and IWB using the TLQ (Li & Shi, 2008) and the IWB scale (De Jong & Hartog, 2010) among nurses in tertiary hospitals in Kunming. Thus, it is valuable to explore the relationship between TL and IWB among nurses.

In addition, PE by a head nurse can affect IWB among nurses. Psychological empowerment refers to the intrinsic motivation of a nurse manifested in four cognitions: meaning, competence, self-determination and impact (Spreitzer, 1995). Psychological empowerment can strengthen task motivation, individual flexibility, and self-determination, and creates an environment without direct supervision or intervention (Asfar & Masood, 2018). It contributes to employees' IWB through their feeling of worth and their perception of meaningful and challenging tasks. The influence of PE can, in turn, enhance IWB and work task accomplishment. Through the literature, the results from two studies, one in the Netherlands (Knol & van Linge, 2009) and one in Thailand (Asfar, Cheema, & Saeed, 2017), show a strong positive relationship between PE and TL. In China, two studies investigated PE and IWB and found that PE is significantly positively correlated with IWB (Chang & Liu, 2008; Zhu, Yang, & Sun, 2014). However, fewer studies have been conducted among nurses using the PEQ of Li, Shi, and Chen (2006) or the IWB instrument of De Jong and Hartog (2007) in China.

This study aimed to explore factors predicting IWB among nurses who provide nursing care to patients directly. Examining such factors offers essential information for managers to improve nursing staff IWB to achieve a common goal or exceed organizational expectations. The strategies of motivating members' innovative behaviors are important for pursuing continuous adaption in an ever-changing world.

Objectives

This study aimed to examine the IWB and the predictability of IWB that can be explained by TL and PE among nurses in tertiary hospitals in Kunming city, Yunnan Province, the People's Republic of China.

Research Questions

1. What is the level of IWB among nurses in tertiary hospitals in Kunming city, Yunnan Province, the People's Republic of China?

2. How much of the predictability of IWB can be explained by TL and PE among nurses in tertiary hospitals in Kunming city, Yunnan Province, the People's Republic of China?

Conceptual Framework

This study was examined based on the IWB concepts of De Jong and Hartog (2010) and TL of Bass and Avolio (1997) modified by Li and Shi (2008); the PE of innovative work behavior refers to a set of nurses' actions for achieving the initiation and implementation of new and useful ideas, processes, products or procedures within an organization. It contains four continuous stages of nursing innovation, including idea exploration, idea generation, idea championing, and idea implementation. Transformational leadership refers to a set of behaviors that leaders use to inspire their subordinates to exceed the organization's expectations, and it is comprised of four dimensions: moral modeling, charisma, vision and individualized consideration. Psychological empowerment refers to the intrinsic motivation manifested as a set of cognition that reflects an individual's orientation in his or her work role. This cognition includes four aspects representing meaning, competence, self-determination and impact. Employees who perceive that their leaders' transformational behaviors are at the psychologically empowering stage are more likely to create innovations to improve their work performance and further organizational goals. The predictability of TL and PE on IWB was examined in this study.

Methodology

A descriptive predictive design was used in this study.

Population and Sample

The target population was 1841 nurses working in the two tertiary hospitals in Kunming, the capital of Yunnan province, China. The two hospitals were selected because they were regarded as the highest level of hospital which focus on providing a high level of specialized medical services, undertaking clinical practice, teaching and research activities on a large scale. According to Tabachnick and Fidell (2000), the barest minimum is to include in the regression equation and a ratio of 40 to 1 for stepwise. In this study, eight parameters of two variables were used to predict the dependent variable. Therefore, the sample size for this study was 320. Considering a possible loss of 20% of the participants (Israel, 1992), a total number of 384 nurses were selected

as participants. Then, the proportional stratified random sampling method was used to select participants from departments in each hospital. Finally, 91 nurses were selected from The Kunming Fourth People's Hospital, and 293 nurses were selected from The First People's Hospital of Yunnan province. The inclusion criteria for participants were: 1) nurses who had at least one year of working experience in his or her hospital; and 2) nurses who provided direct nursing care to patients. The exclusion criteria included: 1) nurses who were nurse managers; and 2) nurses who were on maternity leave, sick leave or in continuing education programs.

Research Instruments

Instruments used in this study included:

1. A demographic data form including age, gender, marital status, educational level, name of the tertiary hospital, working department, professional title, salary, work shift, self-learning time and years of work experience.

2. The 26-item CTLQ developed by Li and Shi (2008) based on the TL theory of Bass and Avolio (1997). This questionnaire uses a 5-point Likert-type scale ranging from 1 = strongly disagree to 5 = strongly agree, and is comprised of morale modeling (8 items), charisma (6 items), vision (6 items) and individualized consideration (6 items).

3. The 12-item CPEQ developed by Spreitzer (1995) and modified. This scale uses a 5-point Likert-type scale ranging from 1 = strongly disagree to 5 = strongly agree and includes the subscales of meaning, competence, self-determination and impact with three items for each subscale.

4. The 10-item IWBQ (De Jong & Hartog, 2010) which consists of four dimensions: idea exploration (2 items), idea generation (3 items), idea championing (2 items) and implementation of ideas (3 items). The items are scored on a 5-point Likert-type scale ranging from 1 = strongly disagree to 5 = strongly agree. The IWBQ was translated into Chinese by the researcher using translation and back-translation methods (Waltz, Strickland, & Lenz, 2005) without any modification. In this study, the range of overall score and scores for each dimension were classified into three equal intervals to interpret the level of IWB according to Best and Kahn (2003), and included a low, moderate, and high level.

The validity of the three instruments, including the TLQ, PEQ, and IWBQ, was already tested by the author and all of the results were acceptable. The reliability of TLQ, PEQ, and IWBQ was tested with 25 participants and the Cronbach's alpha coefficients were .91, .80 and .85, respectively.

Ethical Considerations

This research proposal was approved by the Research Ethical Committee (N0. 096/2020) of the Faculty of Nursing, Chiang Mai University on July 12th, 2020. Permission for data collection was obtained from the directors of the nursing departments in the two hospitals. To protect participants' rights, all were informed about the study objectives and research methods. They were notified that they had the right to refuse, stop, or withdraw at any time from this study.

Before collecting data, a research consent form was provided for each participant. Confidentiality and anonymity of individual responses were guaranteed by a statement included in a cover letter. Code numbers were used instead of names. The information offered by the participants was only used in this study and remains confidential. Only general findings will be published.

Data Collection

After receiving the approval letter for data collection, the researcher submitted the research packages, including the research proposal, instruments, information sheet and consent forms, to the nursing directors of each hospital. To obtain permission for collecting data, the two nursing directors were informed about the study's objectives and benefits. Two research coordinators were assigned to distribute and collect the questionnaires from August to September 2020. Then, the questionnaires were collected using a designated box placed in each department. Eventually, all of the 384 distributed questionnaires were returned (100%) of which five were incomplete (1.30%) and, therefore, excluded. Finally, 379 completed questionnaires (98%) were used for data analysis.

Data Analysis

After the researcher scrutinized the data, they were analyzed using the SPSS program (version 13.0). The analysis included four main methods: 1) Analyze the demographic data using descriptive statistics; 2) Analyze TL, PE and IWB using means and standard deviation; 3) Test multicollinearity, the underlying assumption for logistic regression. The value of the variance inflation factor (VIF) ranged from 1.639 to 4.218, which indicated no multicollinearity among the predictors; and 4) Apply binary logistic regression analysis. The analysis for the predictability of TL and PE on IWB was displayed with an adjusted odds ratio with a corresponding 95% confidence interval at a significance level of .05. The statistic of logistic regression was applied in this study because the PE and TL data were not normally distributed which is the basic assumption of using multiple regression.

Results

Demographic data

More than half of the participants were between 31 and 50 years of age (54.6%) with an average age of 33.68 years old (SD = 7.16). Most were married (65.7%) and held a bachelor's degree in nursing (74.4%). The majority were female (97.4%) and worked at the First People's Hospital of Yunnan Province (76.8%). Most participants worked in the medical department (46.7%). While half held a senior nurse title (51.2%), most nurses held a temporary contract (63.6%) and worked a rotating shift (60.9%). Almost half of the participants (48.5%) had a high salary of more than 5000 RMB per month. The majority of nurses spent less than an hour on self-learning every day (60.4%). Most of them had worked as a nurse in the hospital for 1-10 years (58%) while the average work years were 11.36 (SD = 8.25).

Innovative work behavior

The average score for overall IWB was at moderate level ($\bar{X}$ = 30.60, SD = 6.89). Likewise, the scores for idea exploration ($\bar{X}$ = 6.97, SD = 1.67), idea championing ($\bar{X}$ = 6.06, SD = 1.72) and idea implementation ($\bar{X}$ =7.99, SD = 2.49) were also at moderate levels. Only the average score for idea generation ($\bar{X}$ = 12.87, SD = 1.58) was at a high level (Table 1).

Table 1 Level of Innovative Work Behavior of Participants (n=379)

Variable	Mean	SD	Level
Overall IWB	30.60	6.89	Moderate
Dimension of IWB			
Idea exploration	6.97	1.67	Moderate
Idea generation	12.87	1.58	High
Idea championing	6.06	1.72	Moderate
Idea implementation	7.99	2.49	Moderate

Table 2 Descriptive Statistics and Level of Innovative Work Behavior of Participants by Item (n=379)

Innovative work behavior	Mean	SD
Idea exploration	30.60	6.89
1. How often do you pay attention to issues that are not part of your daily work?	3.46	1.02
2. How often do you wonder how things can be improved?	3.51	0.90
Idea generation	12.87	1.58
3. How often do you search out new working methods, techniques or instruments?	3.07	1.03
4. How often do you generate original solutions for problems?	3.30	0.86
5. How often do you find new approaches to execute tasks?	3.21	0.86
Idea championing	6.06	1.72
6. How often do you make important organizational members enthusiastic about innovative ideas?	3.00	0.92
7. How often do you attempt to convince people to support an innovative idea?	3.00	0.96
Idea implementation	7.99	2.49
8. How often do you systematically introduce innovative ideas into work practice?	2.80	0.96

Table 2 Descriptive Statistics and Level of Innovative Work Behavior of Participants by Item(n=379) (continued)

Innovative work behavior	Mean	SD
9. How often do you contribute to the implementation of new ideas?	2.65	0.93
10. How often do you put effort into the development of new things?	2.55	0.96

Factors predicting innovative work behavior

Only the visionary dimension of TL and the self-determination dimension of PE could predict IWB. The odds ratio indicated that for every one unit of increased visionary TL among head nurses, the likelihood of IWB among nurses increased almost 1 time (OR=.90, 95% CI=.82-.99). For each unit of increased self-determination of PE, the IWB among nurses increased about 1.4 times (OR=1.35, 95% CI=1.14-1.61). The remaining TL and PE factors could not predict IWB among staff nurses. All predictors could explain 10% (Nagelkerke R^2.=10) of variability in IWB (Table 3).

Table 3 Binary Logistic Regression Analysis of the Factors Predicting IWB (n=379)

Variables	B	SE	Wald	p-value	OR	95% CI
TL						
Visionary	-.11	.05	4.83	.03	.90	.82-.99
PE						
Self-determination	.30	.09	11.66	.00	1.35	1.14-1.61

Note. 1=Prominent; OR=Odds Ratio; CI=Confidence Interval;
R^2 (Cox & Snell) = .07; R^2 (Nagelkerke) = .10; **p < .05.

Discussion

Innovative Work Behavior

The findings of this study revealed that idea generation of IWB was high among nurses. Several factors might explain the high level of idea generation, which refers to generating innovative ideas to solve problems or to improve performance (De Jong & Hartog, 2010). One reason that nurses in this study needed to generate new ideas might be to address changes in the city health care system. The government in Yunnan province has emphasized providing more high-quality and comprehensive nursing care for citizens through a combination of medical treatment and online techniques (General Office of Yunnan Provincial People's Government, 2017). As such, this change might trigger nurses with "idea exploration" or an opportunity to start thinking about how to address the changes. In this study, a large number of nurses (76.2%) were either Generation-Y or Millennials, as their ages were between 21 and 41 years old. Also known as the "Net Generation" (Gurau, 2012), the outstanding characteristics of these generations are

that they are technologically savvy (Lundin, 2019) and are keen on using computers, smartphones, the internet and other new technologies. This way of learning has the potential to help nurses enhance both formal and informal learning. Thus, nurses could gain more knowledge and information related to nursing and health care via these technologies (Iqbal & Bhatti, 2015). As a consequence, by utilizing this knowledge, participants can generate new ideas, knowledge, approaches or products in their workplace (Jose & Bunpin, 2013). In addition, millennials are more likely to be open-minded and flexible (Lundin, 2019). It seems that this attribute helps ease their acceptance of new technologies or changes and adapt to new conditions more easily than previous generations.

Except for the dimension of idea generation, the above reasons can also explain why the overall IWB and the dimensions of idea exploration, idea championing and idea implementation among nurses in this study were at moderate levels. Further, as three of the four dimensions of IWB were at moderate levels, this could affect the overall level of IWB, which was at a moderate level. Another reason for the moderate level of overall IWB might be because most nurses in this study had a relatively high level of education. The majority of them held a bachelor's degree (74.4%), which indicated that they had sufficient theoretical knowledge of nursing. Employees with a higher level of education will have higher work ability, or occupational competence, by generating more ideas and activities (Wang, Whitehead, & Bayes, 2016). Higher education is the baseline for individual creativity, and this can boost subjects' behavior of sharing knowledge and creativity in their work roles (Yang, 2017).

However, some obstacles impeded nurses' IWB including national culture, hospital supervision and individual factors (Bao et al., 2013; Yang, 2017). Initially, the characteristics of national culture emphasized that top managers should be responsible, take control, give orders and know what is right (Li, Zhao, & Begley, 2015). Accordingly, staff nurses typically cannot make a decision by themselves during their work. Thus, it might be only the manager's ideas utilized during the implementation phase of innovation as they are the ones who make decisions. In addition, most employees might have low enthusiasm about contributing to nursing innovation as this task is often regarded as extra work (Bao et al., 2013). In this study, the majority of participants (60.9%) worked a rotating shift, leading to an irregular work-life schedule. Thus, they did not recognize problems or issues outside their routine work.

Another individual factor that may also be an obstacle preventing nurses from IWB is self-learning time (Jose & Bunpin, 2013), as self-directed learning ability was positively correlated with innovative behavior ($r = .35$, $p < .001$) (Yang, 2015). An individual with high self-directed learning ability can manifest a high level of IWB in their work role (Li, 2018). In this study, the majority of nurses (60.4%) spent less than one hour per day on self-directed learning. Therefore, this obstacle could impede nurse development of IWB. In terms of seeking and gaining support for idea implementation, Chinese nurses argued that this step was difficult as it requires persuading other invested parties to provide support. It was hard for nurses to get financial, human and material

support from organizational leaders as the leaders were often concerned about cost-effectiveness when implementing new ideas (Kulaixi, 2010). As a result, this might affect the idea implementation process.

Factors predicting innovative work behavior

In terms of the predictability of TL on the IWB of nurses in a tertiary hospital, the People's Republic of China, the results of this study showed that only the visionary dimension of TL could predict IWB, while the overall TL and the remaining dimensions of TL could not predict IWB among staff nurses. The findings revealed that the IWB of nurses would increase by almost 1 time if managers' visionary TL increased by 1 unit (OR = .90, 95% CI = .82-.99), which represented a relatively low influence of visionary TL on IWB.

A possible explanation of the above result might be the impact of Chinese culture on TL. In traditional Chinese culture, managers always act as role models for natural moral modeling (Li & Shi, 2008). Meanwhile, leaders are recognized as a model for their employees in the workplace. Employees usually imitate a leader's behaviors and thoughts. To some extent, this hinders the generation of new ideas and independent thinking when nurses encounter problems (Li & Shi, 2008). Furthermore, based on the influence of a leader's charisma, employees often consult a leader and get suggestions from them regarding new ideas, procedures or products in their daily work (Hui et al., 2019). Therefore, charisma could not be a predictor of IWB based on the Chinese context. Additionally, the high individual consideration and moral modeling of nurse leaders reflected a higher willingness of nurses to follow their leaders which indicated low nurse autonomy in solving problems or improving their current work (Xiang & Xu, 2018). Another possible explanation could be that nurse autonomy was low in this study as compared to previous studies. This might be because of the power features of Chinese organizations and managers (Xiang & Xu, 2018). However, that managerial characteristic was regarded as a critical barrier to promoting nursing innovation (Xiang & Xu, 2018). Staff nurses did not have autonomy in introducing a new method or idea into their work. De Jong and Hartog (2007), as well, argued that employees' innovative behaviors depend greatly on their interaction with others and autonomy in their work.

Regarding the prediction of PE on IWB, the findings revealed that only the dimension of self-determination affected IWB. Overall PE and the rest of the dimensions, including meaning, competence and impact, could not predict IWB among staff nurses. This study's results showed that the IWB of nurses increased almost 1.4 times if nurses' self-determination increased by 1 unit (OR = 1.35, 95% CI = 1.14-1.61). Self-determination of PE reflects an individual's autonomy and involves a sense of selection to perform actions or to participate in the decision-making process in the work environment (Spreitzer, 1995). Self-determination indicates that employees have enough control over the work-related aspects of their job and feel that that allows them to be more innovative (Singh & Sarkar, 2012).

The remaining dimensions of PE, including meaning, competence, and impact, could not predict IWB in this study. A probable explanation for this is because of the conflicting feelings of nurses about the outcome of their work when they perform tasks that they consider meaningful (Chang & Liu, 2008). In this study, PE refers to an investment of spiritual energy related to the task, and it includes the value of the task, goal or purpose and judgment (Conger & Kanungo, 1988). Nurses will feel that work is important and care deeply about what they do when the mission, goals and purpose of the activities they engage in are consistent with their work (Chang & Liu, 2008). Innovation mainly focuses on introducing a new idea, procedure, technology or product into a practice (De Jong & Hartog, 2010). It requires nurses to pay more attention to their daily work. Thus, nurses might not perceive the same work outcomes over time, which is part of the process of innovation in IWB (Zhang, Jiang, & Tan, 2015).

The results of this study were not consistent with previous studies in which PE had the greatest effect on IWB (Asfar et al., 2017; Hui et al., 2019). This discrepancy may be due to the cultural differences affecting the perception of empowerment among participants (Chang & Liu, 2008). In Chinese culture, employees sometimes do not perceive power as authority or participation in organizational decision-making, but as oppression. If the manager strengthens the internal task motivation before delegation, employees will actively perceive PE during the management assignment and improve their work-related attitudes (Zhang et al., 2015). In any work environment, sensitivity to the potential impact of culture on empowerment should be considered. Additionally, another explanation might be due to the different measurements of PE or IWB between this study and previous studies (Asfar et al., 2017; Hui et al., 2019).

Conclusions and recommendations

This study revealed that the overall IWB of nurses in the tertiary hospitals of Yunnan Province and three of the four dimensions of IWB, including idea exploration, idea championing and idea implementation, were at a moderate level. Only the dimension of idea generation was at a high level. The overall level of TL and PE could not predict IWB and only the visionary dimension of TL and the self-determination dimension of PE presented relatively low predictability on IWB.

Conclusions and implications

The findings of this study revealed that IWB among nurses was at a moderate level. Hence, nursing administrators should create effective strategies to improve visionary TL abilities and the self-determination dimension of PE of head nurses through training or continuing education programs. On the other hand, they should also promote PE self-determination among nurses by empowering and supporting them to meet their goals and to promote IWB.

Recommendations

The findings of the current study could be used as baseline data for further research in

the area of IWB among nurses. Further studies should be conducted to verify this study in other types and levels of hospitals or other regions in China, and should compare nurses' perceptions of IWB, as the research among nurses of the two hospitals in this study cannot be representative of all hospitals in China.

References

Afsar, B., & Badir, Y. (2014). Transformational leadership and innovative work behavior. *Industrial Management and Data Systems, 114*(8), 1270-1300.

Asfar, B., Cheema, S., & Saeed, B. B. (2017). Do nurses display innovative work behavior when their values match with hospitals' values? *European Journal of Innovation Management, 21*(1), 157-171.

Asfar, B., & Masood, M. (2018). Transformational leadership, creative self-efficacy, trust in supervisor, uncertainty avoidance, and innovative work behavior of nurses. *The Journal of Applied Behavioral Science, 54*(1), 36-61.

Bao, L., Zhang, Y., & Wang, L. (2012). Development and analysis of reliability and validity of nurses' innovative behavior scale. *Journal of Shanghai Jiaotong University Medical Science, 32*(8), 1079-1082.

Bao, L, Zhang, Y., Zhang, Y., Wang, H., & Qian, Y. (2013). Status quo and influencing factors of innovative behavior of nurses. *Journal of Shanghai Jiaotong University Medical Science, 33*(5), 593-596.

Bass, B. M., & Avolio, B. J. (1997). Personal selling and transactional/transformational leadership. *Journal of Personal Selling & Sales Management, 17*(3), 19-28.

Best, J. W., & Kahn, J. V. (2003). *Research in education.* Berlin: Prentice-Hall.

Chang, L. C., & Liu, C. H. (2008). Employee empowerment, innovative behavior and job productivity of public health nurses: A cross-sectional questionnaire survey. *International Journal of Nursing Studies, 45*(10), 1442-1448.

Conger, J. A., & Kanungo, R. N. (1988). The empowerment process: Integrating theory and practice. *Academy of Management Review, 13*(3), 471-482.

Dan, X., Xu, S., Liu, J., Hou, R., Liu, Y., & Ma, H. (2018). Relationships among structural empowerment, innovative behaviour, self-efficacy, and career success in nursing field in mainland China. *International Journal of Nursing Practice, 24*(5), 1-9.

De Jong, J. P. J., & Hartog, D. N. (2007). How leaders influence employees' innovative behavior. *European Journal of Innovation Management, 10*(1), 41-64.

De Jong, J. P. J., & Hartog, D. N. (2008). *Innovative work behavior: Measurement and validation. Zoetermeer: Scientific analysis of entrepreneurship and SMEs: SCALES.* Unpublished Manuscript.

De Jong, J. P., & Hartog, D. N. (2010). Measuring innovative work behavior. *Creativity and Innovation Management, 19*(1), 23-36.

General Office of Yunnan Provincial People's Government. (2017). *Implementation opinions of the general office of the People's Government of Yunnan Province on promoting the construction and development of medical consortium.* Retrieved from http://www.yn.gov.cn/zwgk/zcwj/zxwj/201707/t20170728_ 144337.html

Gurau, C. (2012). A life-stage analysis of consumer loyalty profile: Comparing Generation X and Millennial consumers. *Journal of Consumer Marketing, 29*(2), 103-113.

Hua, Y. (2015). Study on the correlation of between self-directed learning ability and innovative behavior of clinical nurses. Department of Cardiology, the First People' s Hospital of Jining City in Shandong Province. *Journal Article, 22*(17), 6-21

Hui, L., Nazir, S., Qun, W., Asadullah, M. A., Zeb, K., & Shafi, A. (2019). Influence of transformational leadership on employees' innovative work behavior in sustainable organizations: Test of mediation and moderation processes. *Journal of Sustainability, 11,* 1594-1610. doi:10.3390/su11061594

Iqbal, S., & Bhatti, Z., A. (2015). An investigation of university student readiness towards M-learning using technology acceptance model. *The International Review of Research in Open and Distributed Learning, 16*(4), 83-103.

Israel, G. D. (1992). *Determining sample size.* Institute of Food and Agriculture Sciences, University of Florida Cooperative Extension Service. Retrieved from http://edis.ifas.ufl.edu/pd006ttml

Jose, J., & Bunpin, D., III (2013). *Registered nurse individual innovative behavior, research utilization, and the quality and safety of patient care.* Retrieved from https://www.proquest.com/openview/96f1c5f8d475356a4a53fb4245aaffc7/1

Knol, J., & Van Linge, R. (2009). Innovative behaviour: The effect of structural and psychological empowerment on nurses. *Journal of Advanced Nursing, 65*(2), 359-370.

Kulaixi, X. (2010). The method of improving nurse innovative competence. *Chinese and Foreign Medical Research, 8*(16), 145-147.

Li, C., & Shi, K. (2008). The structure, measurement and mechanism of transformational leadership. *Frontiers of Business Research in China, 2*(4), 571-590. doi:10.1007/s11782-008-0032-5.

Li, C., Zhao, H., & Begley, T. B. (2015). Transformational leadership dimensions and employee creativity in China: A cross-level analysis. *Journal of Business Research, 68*(6), 1149-1156.

Li, J. (2018). Relationship between organizational climate and innovative behavior among nurse staff. *Journal of Nursing Science, 33*(11), 1860-1865.

Lundin, L. L. (2019). *Millennial generation.* Salem Press Encyclopedia. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=ers&AN=89550608&site=eds-live&custid=s5150876

Masood, M., & Asfar, B. (2016). Transformational leadership and innovative work behavior among nursing staff. *Nursing Inquiry, 24*(4), 17-27.

Pieterse, A. N., Knippenberg, D. V., Schippers, M. L., & Stam, D. (2010). Transformational and transactional leadership and innovative behavior: The moderating role of psychological empowerment. *Journal of Organizational Behavior, 31*(4), 609-623. doi:0.1002/job.650

Spreitzer, G. M. (1995). Social structural characteristics of psychological empowerment. *Academy of Management Journal, 39*(2), 483-504.

Tabachnick, B. G., & Fidell, L. S. (2000). *Using multivariate statistics* (7th ed.). New York: Pearson Education.

Thomas, L. M., Reynolds, T., & O'Brien, L. (2006). Innovation and change: Shaping district nursing services to meet the needs of primary health care. *Journal of Nursing Management, 14*(6), 447- 454.

Tung, L. V. (2014). *Factors related to innovation behavior among nurses in tertiary general hospitals, the Central Region, The Socialist Republic of Vietnam* (Unpublished master's thesis). Chiang Mai University, Thailand.

Waltz, C., Strickland, O., & Lenz, E. (2005). *Measurement in nursing and health research* (3rd ed.). New York: Springer Publishing.

Wang, C. C., Whitehead, L., & Bayes, S. (2016). Nursing education in China: Meeting the global demand for quality healthcare. *International Journal of Nursing Sciences, 3*(1), 131-136.

Xerri, M. J., & Brunetto, Y. O. (2013). Fostering innovative behaviour: The importance of employee commitment and organisational citizenship behavior. The *International Journal of Human Resource Management, 24*(16), 3163-3177.

Xiang, Y. T., & Xu, L. J. (2018). Study status quo of the relationship between transformational leadership and nurse innovation behavior. *Nursing Research, 32*(14), 2179-2182.

Yang, H. (2015). Study on the correlation between self-directed learning ability and innovative behavior of clinical nurses. *Department of Cardiology, the First People's Hospital of Jining City in Shandong Province, Jining, 22*(17), 6-17.

Yang, T. (2017). *Factors related to innovative behavior of nurses in autonomous hospitals, the People's Republic of China* (Unpublished master's thesis). Chiang Mai University, Thailand.

Zhu, Q., Y., Yang, Q., Y., & Sun, D., J. (2014). The effect of psychological empowerment on the innovation behavior of nurses. *Chinese Nursing Management, 14*(3), 243-245.

Zhang, L., Jiang, Y., & Tan, L. (2015). The impact of head nurse's transformational leadership style on emotional labor and psychological empowerment of nurses. *Chinese Journal of Practical Nursing, 31*(13),1006-1008.