Factors Related to Innovative Behavior of Nurses in Autonomous Hospitals, the People's Republic of China*

ปัจจัยที่เกี่ยวข้องกับพฤติกรรมสร้างสรรค์ของพยาบาลในโรงพยาบาลในกำกับสาธารณรัฐประชาชนจีน*

หยาง	ถิง**	Yang	Ting**
เพชรสุนีย์	ทั้งเจริญกุล***	Petsunee	Thungjaroenkul***
กุลวดี	อภิชาตบุตร****	Kulwadee	Abhicharttibutra****

Abstract

Innovative behavior is an important factor in introducing innovative nursing care practices. The purposes of this study were to explore nurses' innovative behavior and to explore the factors related to innovative behaviors among nurses in autonomous hospitals in the People's Republic of China. Participants included 385 nurses selected from 8 clinical departments in three autonomous hospitals by simple random sampling. Data were collected by a set of questionnaires consisting of four parts: a demographic data form, the Chinese version of the Knowledge Sharing Behavior Scale (KSBS), the Chinese version of the Work Autonomy Scale (WAS), and the Nurse Innovative Behavior Scale (NIBS). Regarding reliability, the Cronbach's alpha coefficients for the KSBS, the WAS and the NIBS were 0.95, 0.92, and 0.89, respectively. Descriptive statistics, Pearson's product-correlation coefficient, and multiple regression analysis were used for data analysis.

The study's findings are presented as follows:

1. Nurses reported that they performed activities related to innovative behavior at a moderate level ($\bar{X}$ = 3.12, SD = .56). The activities related to innovative behavior included idea generation, support-obtaining, and idea realization. The results illustrated that nurses had the highest mean scores for idea generation ($\bar{X}$ = 3.52, SD = .58), followed by support-obtaining ($\bar{X}$ = 2.82, SD = .60), and idea realization ($\bar{X}$ = 3.04, SD = .79).

2. Knowledge sharing ($r = .63$, $p < .001$) and job autonomy ($r = .20$, $p < .001$) were associated with innovative behavior. However, only knowledge sharing could explain the variability in innovative behavior ($\beta = .61$, $p < .01$; $R^2 = .40$).

The findings of this study suggest that knowledge sharing is a key factor influencing nurses' innovative behavior. Therefore, nursing managers should establish knowledge sharing activities in order to increase innovative behavior among nurses.

Keywords: Innovative behavior; Knowledge sharing; Job autonomy; Nurse; The People's Republic of China

* Master's thesis, Master of Nursing Science program (International Program), Faculty of Nursing, Chiang Mai University

** Graduate Student of Nursing Science program (International Program), Faculty of Nursing, Chiang Mai University

*** Corresponding author, Associate Professor, Faculty of Nursing, Chiang Mai University; e-mail: petsunee @gmail.com

**** Associate Professor, Faculty of Nursing, Chiang Mai University

Received 29 May 2017; Revised 23 June 2017; Accepted 21 July 2017

บทคัดย่อ

พฤติกรรมสร้างสรรค์ของพยาบาลเป็นปัจจัยสำคัญที่นำไปสู่การปฏิบัติการพยาบาลอย่างสร้างสรรค์ การศึกษานี้มีวัตถุประสงค์เพื่อศึกษาพฤติกรรมสร้างสรรค์ของพยาบาล และหาปัจจัยที่มีผลต่อพฤติกรรมสร้างสรรค์ของพยาบาลในโรงพยาบาลในกำกับ สาธารณรัฐประชาชนจีน กลุ่มตัวอย่างคือพยาบาลวิชาชีพจำนวน 385 ราย ที่สุ่มแบบง่ายมาจาก 8 แผนกของโรงพยาบาลในกำกับจำนวน 3 แห่ง เก็บข้อมูลโดยใช้แบบสอบถามซึ่งประกอบด้วย 4 ส่วน คือ แบบบันทึกข้อมูลส่วนบุคคล แบบวัดพฤติกรรมการแบ่งปันแลกเปลี่ยนความรู้ฉบับภาษาจีน แบบวัดความอิสระในการทำงานฉบับภาษาจีน และแบบวัดพฤติกรรมสร้างสรรค์ ค่า Cronbach's alpha coefficient ของแบบวัดพฤติกรรมการแบ่งปันแลกเปลี่ยนความรู้ฉบับภาษาจีน แบบวัดความมีอิสระในการทำงาน และแบบวัดพฤติกรรมสร้างสรรค์ มีค่าเท่ากับ 0.95, 0.92 และ 0.89 ตามลำดับ วิเคราะห์ข้อมูลด้วยสถิติเชิงพรรณนา สถิติ Pearson's product correlation coefficient และ multiple regression analysis

ผลการศึกษาพบว่า

1. พยาบาลมีการปฏิบัติกิจกรรมที่เกี่ยวข้องกับพฤติกรรมสร้างสรรค์ในระดับปานกลาง ($\bar{X}$ = 3.12, SD = .56) กิจกรรมที่เกี่ยวข้องกับพฤติกรรมสร้างสรรค์ ได้แก่ การริเริ่มแนวคิด การได้รับการสนับสนุน และการทำให้ความคิดเป็นจริง ผลการศึกษาพบว่า พยาบาลให้คะแนนในกิจกรรมการริเริ่มแนวคิดมากที่สุด ($\bar{X}$ = 3.52, SD = .58) ตามด้วยการได้รับการสนับสนุน ($\bar{X}$ = 2.82, SD = .60) และการทำให้ความคิดเป็นจริง ($\bar{X}$ = 3.04, SD = .79)

2. การแลกเปลี่ยนความรู้ ($r = .63, p < .001$) และความมีอิสระในการทำงาน ($r = .20, p < .001$) มีความสัมพันธ์กับพฤติกรรมสร้างสรรค์ แต่มีเพียงการแลกเปลี่ยนความรู้เท่านั้นที่สามารถอธิบายความแปรปรวนของพฤติกรรมสร้างสรรค์ได้ ($\beta = .61, p < .01; R^2 = .40$)

ผลการวิจัยนี้สนับสนุนว่าการแลกเปลี่ยนความรู้เป็นปัจจัยที่มีอิทธิพลต่อพฤติกรรมสร้างสรรค์ของพยาบาล ดังนั้นผู้บริหารการพยาบาลควรจัดกิจกรรมการแลกเปลี่ยนความรู้เพื่อทำให้พยาบาลมีพฤติกรรมสร้างสรรค์มากขึ้น

คำสำคัญ: พฤติกรรมสร้างสรรค์ การแลกเปลี่ยนความรู้ ความมีอิสระในการทำงาน พยาบาล สาธารณรัฐประชาชนจีน

* วิทยานิพนธ์หลักสูตรพยาบาลศาสตรมหาบัณฑิต (หลักสูตรนานาชาติ) คณะพยาบาลศาสตร์ มหาวิทยาลัยเชียงใหม่
** นักศึกษาหลักสูตรพยาบาลศาสตรมหาบัณฑิต (หลักสูตรนานาชาติ) คณะพยาบาลศาสตร์ มหาวิทยาลัยเชียงใหม่
*** ผู้เขียนหลัก รองศาสตราจารย์ คณะพยาบาลศาสตร์ มหาวิทยาลัยเชียงใหม่ e-mail: petsunee @gmail.com
*** รองศาสตราจารย์ คณะพยาบาลศาสตร์ มหาวิทยาลัยเชียงใหม่

วันที่รับบทความ 29 พฤษภาคม 2560 วันที่แก้ไขบทความ 23 มิถุนายน 2560 วันที่ตอบรับบทความ 21 กรกฎาคม 2560

Background and Significance

Healthcare organizations are pursuing change and innovation because of market changes which influence aspects such as the expansion of patients' rights, the emergence of consumerism, and increased competition among medical institutions (Kim & Park, 2015). As core members of health care, nurses are in a vital position to provide creative and innovative actions, processes, care plans, and services. Therefore, it is necessary to cultivate nurses who have innovative behavior because this will directly influence the innovative ability of the whole hospital (Dong, 2012), as well as hospitals' reputations and customer satisfaction towards hospitals (Kim & Park, 2015).

Innovative behavior (IB) is defined as the act of seeking and developing new methods, techniques, and work patterns, and then introducing and applying these new ideas into nursing work (Bao, Wang, & Zhang, 2012). It consists of three stages, including idea generation, support obtaining, and idea realization (Bao et al., 2012). Innovative behavior is influenced by many factors. Numerous studies have stated that job title has a strong positive relationship with innovative behavior (Bao, Zhang, Zhang, Wang, & Qian, 2013; Lin & Guo, 2013; Wang & Ding, 2012; Zhu, Yang, & Sun, 2014). Nurses with higher job titles may have more experience in innovation. An incentive from the organization can stimulate them, and they may perform more innovative behavior beyond their responsibilities (Zhao & Wang, 2013). Li (2014) considered a nurse with a higher level of job title as one who may obtain more opportunities to learn new knowledge and skills. The nurse positioned at a higher level is usually the mainstay nurse in a team and is usually more respected by their peers. Thus, it is more probable and easier for these nurses in leadership positions to implement a new idea or activity with sufficient support from co-workers (Wang, 2015).

Educational attainment, which refers to the highest level of education that an individual has completed (Census Bureau, 2016), is another factor related to innovative behavior. Nurses with higher degrees usually master certain management and research skills, and they may undertake different nursing tasks than lower degree holders. Therefore, they may obtain more opportunities to share and gain knowledge in different areas to generate ideas (Xue & Li, 2010). Consequently, nurses with higher education may exhibit more innovative behavior. Several Chinese studies have explored the relationship between educational attainment and innovative behavior (Bao et al., 2013; Wang & Ding, 2012; Zhu et al., 2014). However, there are inconsistent results regarding their relationships. Therefore, it would be valuable to replicate a study on this issue.

Knowledge sharing is a factor which influences nurses' innovative behavior and which can stimulate individuals to think more critically and creatively (Aulawi, Sudirman, Suryadi, & Govindara, 2009). Individuals can obtain and share knowledge via knowledge sharing; thus, innovative nurses can recombine internal and external knowledge into new forms to create new knowledge (Bao et al., 2012). These innovative nurses can also seek sponsorship via communi-

cation and build coalitions, while coordinating and integrating different sets of knowledge with other individuals or teams (Tucker, Nembhard, & Edmondson, 2007). A study by Aktharsha and Sengo-tuvel (2016) confirmed the association between knowledge sharing and innovative behavior, but few studies have illustrated their relationship.

In terms of job autonomy, this factor influences nurses' innovative behavior through increasing individuals' sense of responsibility and ownership at work, as well as their breadth of understanding and perspective-taking. Job autonomy can also facilitate incremental learning along with the development of expertise, and individuals control beliefs to promote and implement change. These mechanisms enhance the likelihood that employees will engage in the generation and pursuit of ideas (Wu, Parker, & De Jong, 2014).

Although the literature reveals studies about nurses' innovative behavior in China, there are gaps in the knowledge about this issue. In the PRC, several hospitals have held nursing innovation competitions or set aside funds for nursing innovation, as well as set specific policies on nursing innovation in order to motivate and support nurses to perform more innovative behavior (Gao, Li, & Chen, 2016). In contrast, there have been fewer measures adopted to motivate nurses to perform more innovative behavior in other hospitals, such as at Dali Bai autonomous hospitals. These situations may influence the innovative behavior of nurses in the Dali Bai hospitals. However, no studies have been conducted to explore the innovative behavior of nurses in autonomous hospitals in Yunnan province. The literature also supports four factors, job title, educational attainment, knowledge sharing, and job autonomy, which are positively related to nurses' innovative behavior. However, no studies have addressed which factors influence the innovative behavior of nurses in autonomous hospitals in the PRC. Therefore, this study has been conducted to fill these gaps in the knowledge.

Objectives

The objectives of this study were to explore the level of innovative behavior of nurses and to investigate the influence of job title, educational attainment, knowledge sharing, and job autonomy on innovative behavior among nurses in autonomous hospitals in the PRC.

Conceptual Framework

The conceptual framework of this study is based on the literature review. Innovative behavior is defined as an act of seeking and developing new methods, techniques, and work patterns, and introducing and applying these new ideas to one's work (Bao et al., 2012). According to the literature review, four factors related to innovative behavior have been found, including job title, educational attainment, knowledge sharing and job autonomy. In this study, knowledge sharing is a set of individual behaviors involving sharing ones' work-related knowledge and expertise (Yi, 2009), and job autonomy is the degree or discretion that a worker can exercise with respect to three facets of autonomy (Breaugh, 1985). Senior nurses have more experience, and under incentives from the organization, they may perform more innovative behavior than junior

nurses. In terms of educational attainment, nurses who have obtained a bachelor's degree may have more platforms and opportunities for sharing knowledge. Knowledge sharing provides platforms and opportunities to nurses for obtaining knowledge, communicating, and developing new ideas. Job autonomy increases nurses' sense of responsibility. They may be willing to find or generate new ideas or solutions to improve quality of nursing care. In the present study, the relationships between innovative behavior and its four factors were examined.

Methodology

A descriptive correlation design was used for the present study.

Population and Sample

The population consisted of 2,357 staff nurses in three autonomous hospitals in the PRC. Sample size was calculated by Yamane's formula (Yamane, 1978). Considering the possible loss of subjects, 20% of the sample size was added, resulting in a total number of 410 staff nurses who had worked for at least one year in one of eight clinical departments. Nurse managers, assistant chief senior nurses, chief senior nurses, and nurses who were on vacation or pursuing continuing education were excluded from this study. Finally, 385 questionnaires were completed with a valid return rate of 93.9%.

Research Instruments

The research instruments used in this study included a set of questionnaires, as follows:

Part 1: The demographic data form was developed by the researcher and consisted of gender, age, marital status, educational attainment, job title, department, years of working, and employment status.

Part 2: The Nurse Innovative Behavior Scale (NIBS) was developed by Bao et al. (2012). This scale contains 10 items within three stages, including idea generation (3 items), support obtaining (3 items), and idea realization (4 items). It is measured using a 5-point Likert scale (1 = never, 5 = always). Possible total scores range from 10 to 50 and are interpreted at three levels, as approved by Bao, Wang and Zhang (2012), as follows: low (1.00 - 2.09), moderate (2.10 - 4.09), and high (4.10 - 5.00).

Part 3: The Chinese Knowledge Sharing Behavior Scale (KSBS) was developed by Chen and Wu (2015). This scale includes 19 items within 4 dimensions, including written contributions (4 items), organizational communication (5 items), personal interactions (5 items), and communities of practice (5 items). Items were measured on a 5-point Likert scale (1 = never, 5 = always). Total scores ranged from 19-95, and higher scores indicated more knowledge sharing behavior. Levels of knowledge sharing were divided into four levels using the class interval method (Stevens, 1946), as follows: low level (1.00 - 1.99), quite low level (2.00 - 2.99), quite high level (3.00 - 3.99), and high level (4.00 - 5.00).

Part 4: Work Autonomy Scale (WAS) was developed by Breaugh (1985). After obtaining permission from the developer, this scale was translated into Chinese via the back-translation

method (Waltz, Strickland, & Lenz, 2010). This scale consists of 9 items within 3 dimensions, including work method autonomy (3 items), work scheduling autonomy (3 items), and work criteria autonomy (3 items). Items were measured on a 7-point response scale (1 = strongly disagree, to 7 = strongly agree) with total scores ranging from 9 to 63. Higher scores indicated a higher degree of autonomy at work. Levels of job autonomy were divided into four levels using the class interval method (Stevens, 1946), as follows: low level (1.00 - 2.49), quite low level (2.50 - 3.99), quite high level (4.00 - 5.49), and high level (5.50 - 7.00).

Validity and reliability of the instrument

With permission from the authors, the KSBS, WAS, and NIBS were used without any modification; therefore, the researcher did not test validity prior to the study. The reliabilities of the three instruments were tested among 20 nurses from Dali Bai Autonomous Prefecture People's Hospital. The Cronbach's alpha coefficient of the overall NIBS was 0.89, while for each stage, it ranged from 0.59 to 0.94. The Cronbach's alpha coefficient of the overall Chinese KSB was 0.95, and for the overall WAS, was 0.92.

Ethical Considerations

The study was approved by the Ethics Committee of the Faculty of Nursing, Chiang Mai University, Thailand. Permissions for data collection were obtained from the directors of the nursing departments in the three hospitals. Furthermore, before collecting data, a consent form was signed by the nurses who were willing to participate in this study, and they were informed of the relevant information about the study. Additionally, all data in this study were kept confidential and anonymous.

Data Collection

Data were collected in three autonomous hospitals in Yunnan province in the PRC. After obtaining permission from the Ethics Committee at the Faculty of Nursing, CMU, and directors of nursing departments in these three hospitals, the researcher selected participants from the name lists of each department by using simple random sampling. The researcher and two coordinators distributed a questionnaire, an information sheet, an envelope, and a consent form to each participant. After the participants completed the questionnaires, the researcher or the coordinators collected the questionnaires and consent forms from the locked box which was provided outside the nursing department office within two weeks.

Data Analysis

Data was analyzed using SPSS version 13.0. Descriptive statistics were used to analyze demographic data, innovative behavior, knowledge sharing, and job autonomy. The results of the Kolmogorov Smirnov test showed all data were normally distributed; thus, Pearson's product correlation was used to test the relationships among all variables, and multiple regression analysis was used to explore the factors for predicting innovative behavior. The significance level was 0.05.

Results

The sample for this study consisted of 385 nurses. The majority were female (97.40%), 63.64% of participants were aged 21-30 years old, and 72.47% were married. Diploma and associate degree holders (51.43%) made up more than bachelor's degree holders (48.57%). More than half of the participants were senior nurses (64.42%) or junior nurses (35.58%). Regarding years of work, most participants had worked 2 - 10 years (69.61%), and more than half of the participants were temporary nurses (68.57%). In addition, 33.53% of the participants worked in the medical department, and 29.53% worked in the surgical department.

The results showed that the participants performed activities related to innovative behavior at a moderate level ($\bar{X}$ = 3.12, SD = .56), practiced knowledge sharing at a quite low level ($\bar{X}$ = 2.68, SD = .59), and had job autonomy at a quite high level ($\bar{X}$ = 4.54, SD = 1.07) (Table 1).

Regarding the association between factors and innovative behavior, Table 2 illustrates that knowledge sharing and job autonomy ($r = .20$, $p < .001$) were associated with innovative behavior ($r = .63$, $p < .001$), and job autonomy was associated with innovative behavior ($r = .20$, $p < .001$). However, only knowledge sharing could explain the variability in innovative behavior ($\beta = .61$, $p < .01$; $R^2 = .40$) (Table 3).

Table 1 Mean, SD, and level of total and each stage of innovative behavior, knowledge sharing and job autonomy (n = 385)

Variables	$\bar{X}$	SD	Level
Innovative behavior	3.12	.56	Moderate
Idea generation	3.52	.58	Moderate
Support obtaining	3.04	.79	Moderate
Idea realization	2.82	.60	Moderate
Knowledge sharing	2.68	.59	Quite low
Job autonomy	4.54	1.07	Quite high

Table 2 Pearson's product-moment correlation among innovative behavior, job title, educational attainment, knowledge sharing, and job autonomy (n = 385)

Variables	Job Title	Educational Attainment	Knowledge Sharing	Job Autonomy	Innovative Behavior
Job Title	1	.30**	.07	.05	.07
Educational Attainment	.30**	1	.09	.01	.10
Knowledge sharing	.07	.09	1	.22**	.63**
Job Autonomy	.05	.01	.22**	1	.20**
Innovative Behavior	.07	.10	.63**	.20**	1

** $p < .01$

Table 3 Multiple regression analysis of the factors predicting innovative behavior (n = 385)

Variables	B	β	t	P value
Job Title	.01	.01	.28	.78
Educational Attainment	.04	.04	.89	.38
Knowledge sharing	.58	.61	14.98	.00*
Job Autonomy	.04	.07	1.75	.08

R = .64, R^2 = .40, Adjusted R^2 = .40, F = 64.36, *p < .01

Discussion

The results of this study showed a moderate level of innovative behavior among nurses in autonomous hospitals in the PRC. The possible explanation may be that increasing opportunities were provided to nurses for presenting their ideas within the department and hospital, so this may promote nurses to generate ideas. Commonly, in all hospitals, nurses share knowledge via hospital conferences, lectures, nursing rounds and consultations, clinical nursing teaching, and nursing documents (Jin, 2004). In autonomous hospitals, the Quality Control Circle and mentoring teaching mode have been applied in nursing areas in recent years. More opportunities have been provided to nurses for sharing their ideas and obtaining others' knowledge, and nurses may create more new ideas and methods.

However, the nurses in autonomous hospitals in the PRC did not perform well at the stages of support-obtaining or idea realization. One possible explanation may be that approximately 63.64% of nurses in the study were young nurses between 21-30 years old. Moreover, 68.57% (n = 264) of participants were temporary nurses which may lead to be a lack of competencies to obtain support from organizations, particularly technical and financial support. Innovative behavior is a complex process (Scott & Bruce, 1994), and junior nurses with limited knowledge and experience may not understand the whole process well. Additionally, they may not obtain systematic technical guidance within clinical departments due to the lack of nurses who have more experience with innovation in clinical departments, as fewer trainings were provided to nurses (Ku, 2010). This may lead to a lack of competencies in providing qualified proposals for new solutions to persuade leaders and obtain financial support. Furthermore, most hospitals in the PRC do not issue specific regulations for guiding, motivating, or enhancing nurses' innovative behavior. In recent years, nursing innovation competitions have occasionally been organized in some tertiary hospitals, and these have done more to motivate nurses to participate in innovation during a short time (Tian, 2016; Wang & Tian, 2016). However, the lack of a long-term incentive mechanism may not motivate nurses to perform innovative behavior in their daily work. The results of this study were consistent with a previous study (Liu, Li, Fan, & Zheng, 2015) which indicated that nurses in tertiary hospitals had a moderate level of innovative behavior ($\overline{X}$ = 3.25, SD = 6.4).

The results of this study illustrated a strong significantly positive relationship between knowledge sharing and innovative behavior ($r = .63$, $p < 0.01$; Table 2) and also showed that knowledge sharing could predict the variance of innovative behavior when controlling other factors ($\beta = .61$, $p < .01$; Table 3). This result was similar with that of other previous findings (Kim & Park, 2015; Yu, Yu-Fang, & Yu-Cheh, 2013). This means the more experience in knowledge sharing, the more innovative behavior there is among nurses. Nurses can share and obtain knowledge via knowledge sharing (Hooff & De Ridder, 2004). The combination and integration of external and internal knowledge stimulates nurses to think more creatively and critically (Aulawi et al., 2009). Knowledge sharing provides the way for communities of practice (Yi, 2009). The community is a group which consists of nurses who have the same interests and are eager to practice new methods (Chen & Wu, 2015). All group members will contribute to coordinate and integrate different sets of knowledge for forming a new prototype or model, and then apply, evaluate, and revise in their daily work (Howell & Sheab, 2001). Finally, the new idea is realized.

There was a weak positive bivariate relationship between job autonomy and innovative behavior ($r = .20$, $p < 0.01$; Table 2). However, job autonomy could not explain the variances of innovative behavior when controlling the effect of knowledge sharing ($\beta = .07$, $p > 0.05$; Table 3). This means that without knowledge sharing, job autonomy could not independently affect innovative behavior. A study by Foss, Minbaeva, Pedersen, & Reinholt (2009) supported the strong relationship between job autonomy and knowledge sharing and indicated that the more job autonomy that was given to individuals, the higher the level of intrinsic motivation of individuals to share knowledge. Accordingly, when nurses felt that they had a lot of freedom to control or ability to exercise judgement in their job, they will share more ideas and knowledge with others, resulting in performance of innovative behavior, as well. This creates a sense of responsibility and ownership because it enables nurses to not only perform their tasks, but also search for and develop better ways to do these tasks (De Spiegelaere, Van Gyes, De Witte, & Hootegem, 2015). Therefore, job autonomy enhances the likelihood that nurses perform more behavior in the stage of idea generation (Wu et al., 2014). During the realization of new ideas, job autonomy empowers nurses with the flexibility to manage their own time, resources, and responsibilities. This leads to nurses having more power to control the outcome of their activities (Sazandrishvili, 2009).

There was no significant relationship between job title and innovative behavior of nurses in the present study ($r = .07$, $p > 0.05$; Table 2) meaning that senior and junior nurses had no difference in innovative behavior experience. This result does not support the results of previous studies in which job title was positively correlated with innovative behavior (Bao et al., 2012; Zhu et al., 2014). A possible explanation of this result may be that nurses lacked motivation to perform innovative behavior. In autonomous hospitals, there are no more incentives for nurses to generate new ideas and improve their jobs. Some hospitals may occasionally organize nursing competitions

to reward nurses, but this is not the best way to motivate nurses to perform innovative behavior in their daily work (Zhang, 2015). Nevertheless, even if innovative nurses generated new ideas, there may be a lack of financial and technical support. Some strategies were not adopted in autonomous hospitals, such as special awards and funds for nursing innovation, as well as platforms for assisting nurses to transfer new ideas into products (Zhang, 2015). Results also showed no significant relationship between educational attainment and innovative behavior of nurses in the current study ($r = .10$, $p > 0.05$; Table 2). This means nurses who are diploma holders or bachelor's degree holders have no difference in experience of innovative behavior. This result was congruent with a previous study (Zhu et al., 2014). However, it contradicted a previous study (Bao et al., 2013). Nurses with bachelor's degrees accepted knowledge on nursing management and research; however, in several Chinese hospitals, including autonomous hospitals, all nurses still have the same job responsibility to provide basic nursing care and have the same opportunities to contribute their ideas or knowledge in nursing teams (Xue & Li, 2010).

Conclusion

The results indicated that innovative behavior of nurses was at a moderate level. There was a strong positive relationship between knowledge sharing and innovative behavior, and knowledge sharing could explain the variance of innovative behavior, as well as a weak positive relationship between job autonomy and innovative behavior. However, job autonomy could not independently affect innovative behavior without knowledge sharing. There were no correlations between innovative behavior, and job title or educational attainment.

Implications of Research Findings

The results provide useful information on innovative behavior, knowledge sharing, and job autonomy of nurses for nursing administration in autonomous hospitals in the PRC. Nursing administrators should make effective strategies to give financial and technical support, such as building nursing innovation funds, cooperating with factories to assist nurses to translate new ideas into objects, and organizing trainings on nursing innovation to enhance nurses' innovative awareness and behavior. Additionally, nursing administrators should build specific platforms for nursing, or adequately utilize current resources and information, for example, building hospital databases and establishing discussion groups on social media platforms, and nursing managers should provide extra space and time for nurses to participate in communities.

Recommendations for Future Research

Future research needs to be carried out to replicate this study in other regions of China or in secondary or private hospitals. Interventions also need to be designed and implemented for improving nurses' knowledge sharing, job autonomy, and innovative behavior.

Acknowledgements

Sincere appreciation is expressed to Chiang Mai University and to all the people who supported me during my study.

References

Aktharsha, U. S., & Sengottuvel, A. (2016). Knowledge sharing behavior and innovation capability: HRM practices in hospitals. *SCMS Journal of Indian Management, 13*(1), 118-130.

Aulawi, H., Sudirman, I., Suryadi, K., & Govindaraju. R. (2009). Knowledge sharing behavior, antecedent and their impact on the individual innovation capability. *Journal of Applied Sciences Research*, *5*(12), 2238-2246.

Bao, L., Wang, L., & Zhang, Q. Y. (2012). Development and analysis of reliability and validity of nurse innovation behavior scale. *Journal of Shanghai Jiao Tong University (Medical Science)*, *32*(8), 1079-1081.

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

Breaugh, J. A. (1985). The measurement of work autonomy. *Human Relations*, *38*(6), 551-570.

Census Bureau. (2016). *Educational attainment*. Retrieved from https://www.census.gov/hhes/socdemo/education/about/index.html

Chen, G. Y., & Wu, P. Y. (2015). Reliability and validity of Chinese version of the knowledge sharing behavior scale in clinical nurses. *Journal of Nursing Science*, *30*(22), 66-69.

De Spiegelaere, S., Van Gyes, G., De Witte, H., & Hootegem, G. V. (2015). Job design, work engagement and innovative work behavior: A multi-level study on Karasek's learning hypothesis. *Management Revue*, *26*(2), 123-137.

Dong, M. (2012). The relationship among nurses' innovative behavior, work motivation and organizational innovation climate. *Nurse Practice and Research*, *9*(24), 151-153.

Foss, N. J., Minbaeva, D. B., Pedersen, T., & Reinholt, M. (2009). Encouraging knowledge sharing among employees: How job design matters. *Human Resource Management, 48*(6), 871-893.

Gao, Y., Li, M. X., & Chen, G. Y. (2016). The relationship between knowledge sharing behavior and core competency of clinical nurses. *Chinese Nursing Management, 16*(10), 1347-1351.

Hooff, V. D., & De Ridder, J. A. (2004). Knowledge sharing in context: The influence of organizational commitment, communication climate and CMC use on knowledge sharing. *Journal of Knowledge Management, 8*(6), 117-130.

Howell, J. M., & Sheab, C. M. (2001). Individual differences, environmental scanning, innovation framing, and champion behavior: Key predictors of project performance. *Journal of Product Innovation Management, 18*(1), 15-27.

Jin, F. J. (2004). The effect of hospital-wide nursing consultation on building up nursing professional work. *Chinese Nursing Management, 4*(5), 59-60.

Kim, S. J., & Park, M. (2015). Leadership, knowledge sharing, and creativity: The key factors in nurses' innovative behaviors. *Journal of Nursing Administration, 45*(12), 615-621.

Ku, X. L. (2010). How to improve nurses' innovative ability. *Chinese and Foreign Medical Research, 8*(16), 134-135.

Li, J. (2014). Relationship between organizational climate and innovative behaviors among nursing staff. *Journal of Nursing Science*, *29*(14), 59-61.

Lin, L. S., & Guo, X. X. (2013). Effect of psychological contract on innovative behavior in nurses. *Chinese Journal Behavioral Medicine and Brain Science*, *22*(12), 1122-1123. (in Chinese)

Liu, Q. S., Li, J. Q., Fan, Y. Y., & Zheng, L. Q. (2015). The correlation between nurses' achievement motivation and innovation behavior. *Chinese Nursing Management, 15*(9), 1049-1050. (in Chinese)

Sazandrishvili, N. (2009). *Contextual and personal antecedents of innovative behavior* (Unpublished master's thesis*).* University of Twente, Netherlands.

Scott, S. G., & Bruce, R. A. (1994). Determinants of innovative behavior: A path model of individual innovation in the workplace. *Academy of Management Journal*, *37*(3), 580-607.

Stevens, S. S. (1946). On the theory of scales of measurement. *Science, New Series, 103*(2684), 677-680.

Tian, R. R. (2016). *Hospital News*. Retrieved from http://www.hnfph.com.cn/a/yydt/2016/1229/2953.html

Tucker, A. L., Nembhard, I. M., & Edmondson, A. C. (2007). Implementing new practices: An empirical study of organizational learning in hospital intensive care units. *Management Science*, *53*(6), 894-907.

Waltz, C. F., Strickland, O. L., & Lenz, E. R. (Eds.). (2010). *Measurement in nursing and health research*. New York: Springer.

Wang, F. S., & Tian, M. L. (2016). *News*. Retrieved from http://mt.sohu.com/20161021/n470966518.shtml

Wang, M. X. (2015). Research on innovative behavior of registered nurses and influencing factors in Fuzhou. *Journal of Clinical Nursing*, *14*(5), 10-12. (in Chinese)

Wang, N. W., & Ding, F. F. (2012). Study on organizational support, knowledge sharing and innovative behavior in nurses. *Journal of Nursing Science*, *27*(24), 67-69.

Wu, C. H., Parker, S. K., & De Jong, J. P. (2014). Need for cognition as an antecedent of individual innovation behavior. *Journal of Management*, *40*(6), 1511-1534.

Xue, M., & Li, Q. Y. (2010). Review of the hierarchical use of nurses with different levels in China. *Journal of Nursing Administration, 10(9)*, 652-654.

Yamane, T. (1978). *Statistic: An introductory analysis*. Tokyo: Harper International.

Yi, J. L. (2009). A measure of knowledge sharing behavior: Scale development and validation. *Knowledge Management Research & Practice*, *7*(1), 65-81.

Yu, C., Yu-Fang, T., & Yu-Cheh, C. (2013). Knowledge sharing, organizational climate, and innovative behavior: A cross-level analysis of effects. *Social Behavior and Personality: An International Journal*, *41*(1), 143-156.

Zhang, C. (2015). *Nursing administration: How to encourage nurses' innovation?* Retrieved from http://www.vccoo.com/v/715621

Zhao, J., & Wang, P. Z. (2013). The current status of research on nurse innovative behavior. *Journal of Qilu Nursing*, *19*(14), 49-51.

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