RESEARCH ARTICLE

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Research ability and research motivation of postgraduate nursing students in traditional Chinese medicine colleges

Jia-Hui Zhang [ID] | Shu-Qin Pang | Li Ge | Guan-Ming Wang | Zong-Ting Luo |
Xue-Pei Hong | Xin-yu Li

School of Nursing, Fujian University of Traditional Chinese Medicine, Fuzhou, China

Correspondence
Shu-Qin Pang, School of Nursing, Fujian University of Traditional Chinese Medicine, Fuzhou, China.
Email: pang-shuqin@fjtcm.edu.cn

Abstract

Aim: To investigate the relationship between research ability and research motivation of postgraduate nursing students in traditional Chinese medicine colleges and identify other factors that may have an impact on the research ability of postgraduate nursing students.

Design: A cross-sectional electronic survey was used to collect data from 191 postgraduate nursing students.

Methods: A total of 191 postgraduate nursing students from seven traditional Chinese medicine colleges were investigated from October to November 2020 using self-rated scales for research ability and research motivation. The relationship between the variables affecting the research ability of postgraduate nursing students in traditional Chinese medicine colleges was determined.

Results: There was a positive correlation between the score of self-rated research ability and research motivation among 191 postgraduate nursing students in traditional Chinese medicine colleges. Multiple stepwise regression analysis showed that grade, research motivation, age and active participation in class discussions were the main factors affecting the self-rated research ability.

Conclusion: The self-rated research ability of postgraduate nursing students in traditional Chinese medicine colleges is positively correlated with research motivation. According to the research motivation orientation, adopting targeted training methods and establishing correct professional understanding may improve the research ability of postgraduate nursing students.

KEYWORDS
ability, education, graduate, motivation, nursing research

1 | INTRODUCTION

The cultivation of nursing research ability has been recognized as a significant challenge worldwide (Ballesteros-Rodriguez et al., 2020; Powers, 2020; Spoelstra et al., 2018). However, the literature indicated that research ability in the field of nursing continued to be inadequate worldwide (Chen et al., 2019; Hu et al., 2019; Segrott et al., 2006). As the main force of nursing research, postgraduate

nursing students are the key trainees in nursing education (Bruce et al., 2019; Yan et al., 2019). Their research ability has a direct impact on the development of nursing. As a result, many nursing schools developed the research ability and output of postgraduate nursing students (Phillips, 2014; Segrott et al., 2006). At present, the research ability of postgraduate nursing students is uneven (Liao et al., 2015; Wang et al., 2017). In addition, interest of postgraduate nursing students in pursuing scientific careers has declined markedly (Bruce et al., 2019; Chang & Ramnanan, 2015). It is urgent to know what motivates or discourages postgraduate nursing students in their consideration for conducting research in order to prevent their research ability declining (Li et al., 2019; Ommering et al., 2018; Ommering et al., 2020). Research motivation is the psychological motivation that drives researchers to actively participate in research activities and has the functions of activating, maintaining and regulating research behaviours. High levels of motivation can trigger and sustain individuals' efforts to achieve their goals (Chen et al., 2020; Ji, 2013; Peng & Gao, 2019). Considering that research ability is the core competence of postgraduate nursing students in scientific research exploration. Therefore, it is necessary to understand the relationship between research ability and research motivation. In this study, self-rated scales were used to measure the research ability and research motivation of postgraduate nursing students in order to further explore the relationship between them.

2 | BACKGROUND

Over the past three decades, many countries and organizations have worked together to develop and enhance the research ability of nursing discipline (O'Byrne & Smith, 2011; Turjanica et al., 2013). Nursing research ability refers to the knowledge, skills and experience necessary for an individual to carry out nursing research activities in a given environment (Qiu et al., 2019), including the following: (i) Systematic review of clinical experience and literature to identify research able issues and develop innovative research issues related to nursing. (ii) Collecting, analysing and interpreting the relevant data. (iii) The knowledge accumulated in this way is used to solve problems creatively (Pan & Cheng, 2011).

In the field of nursing, research ability mainly focusses on clinical nurses and undergraduates. At present, many barriers have been identified that affect clinical nurses or undergraduates to carry out research exploration and improve their research ability. Personal barriers include lack of research knowledge (Corchon et al., 2011; Higgins et al., 2010), nurses' attitudes (Edwards et al., 2009; Timmins et al., 2012), lack of interest (Akerjordet et al., 2012), lack of critical thinking (Chen et al., 2020), lack of confidence (McKee et al., 2017; Timmins et al., 2012) and need for research skills (Caldwell et al., 2017; Comiskey et al., 2015). In order to improve the research ability, a large number of researchers took a lot of interventions, such as implementing relevant policies, improving course content, establishing training models and so on, but none of them can significantly improve the limited nursing research ability (McKee

et al., 2017; Powers, 2020; Zhang et al., 2020). It is necessary to conduct more research on how to improve nursing research ability (Chen et al., 2019; O'Byrne & Smith, 2011).

Postgraduate nursing students are not only the future health care providers, but also the main force of nursing science research (Abuhammad et al., 2019; Wu et al., 2019). It is one of the emphases of teaching reform to improve the research ability of postgraduate nursing students, help students be familiar with research and inspire their enthusiasm. According to the literature, the factors affecting research ability of postgraduate nursing students can be roughly divided into intelligence factors and non-intelligence factors. Non-intelligence factors include grade (Wang et al., 2019), source of students (Chang et al., 2018), self-efficacy of nursing research (Luo et al., 2020), literature reading (Tian, 2016), research experience (Li et al., 2019) and so on. More and more attention has been paid to the research ability of postgraduate nursing students, which leads nursing educators to pay special attention to it and related factors.

As a non-intellectual factor, research motivation is the internal power that drives people to carry out research activities to meet certain needs and achieve goals (Ji, 2013). According to motivation theory, research motivation can be divided into intrinsic motivation, extrinsic motivation and failure avoidance motivation. Different types and intensities of research motivation directly affect individual research behaviour (Deemer et al., 2010; Smith et al., 2014). Existing researches were reported on the close relationship between motivation and research productivity among scholars in economics and other disciplines (Ballesteros-Rodriguez et al., 2020; Horodnic & Zait, 2015; Stupnisky et al., 2019). Research ability is the basic skill of scientific exploration and the foundation of research productivity. This suggests that there may be a direct relationship between research ability and research motivation. At present, research pointed out that there was a correlation between clinical nurses' research ability and research motivation (Fan & Wu, 2019), but this finding was not verified in postgraduate nursing students in traditional Chinese medicine (TCM) colleges. The aim of this study is to analyse the relationship between the research ability and research motivation of postgraduate nursing students in TCM colleges by self-rated scales (This survey measured the self-rated research ability of postgraduate nursing students, hereinafter referred to as the research ability), so as to provide a basis for reforming the education of postgraduate nursing students in TCM colleges and improving their research ability. It addresses the following two research questions:

2.1 | Research question 1

What is the research ability level of postgraduate nursing students in TCM colleges?

2.2 | Research question 2

What is the relationship between demographic characteristics, different types of research motivation and research ability?

3 | METHOD

3.1 | Design

This study is a descriptive quantitative study to analyse the relationship between the research ability and research motivation and investigate the factors affecting the research ability of postgraduate nursing students in TCM colleges.

3.2 | Sample and setting

The study investigated academic, professional and on-the-job postgraduate nursing students from seven TCM colleges at the same level by convenience sampling. A total of 191 postgraduate nursing students participated in this study, including 83 academic postgraduates, 66 professional postgraduates and 42 on-the-job postgraduates.

In China, there are three types of postgraduate nursing students, namely academic postgraduates, professional postgraduates and on-the-job postgraduates. They all need to complete one thesis in three years of graduate study to earn a master's degree. The difference is that academic and professional postgraduates are full-time learning, that is, under the guidance of supervisors, strictly following the school schedule, studying in school or doing clinical practice. However, on-the-job postgraduates receive part-time learning. In their first year of graduate study, they complete their graduate courses. In the next two years, they have to work while implementing their graduation projects. During this period, if they encounter difficulties, the supervisors will give guidance timely to help them complete the projects smoothly and improve their research ability. In addition to courses, postgraduate nursing students also need to actively participate in extracurricular activities, such as expert lectures or academic competitions organized by schools or hospitals, to further improve their comprehensive abilities. As a learning task, some TCM colleges will set minimum limits on the number of extracurricular activities they participate in each year, and even require them to keep detailed records of their learning.

3.3 | Data collection

This study selected the data of 191 postgraduate nursing students from seven TCM colleges from October to November 2020. Used the network questionnaire survey method, the researchers distributed the link of the questionnaire, research purpose, significance and notes to the teachers of each school who would assist in the survey and entrusted the teacher to inform above contents to the postgraduate nursing students of their schools. Postgraduate nursing students who agreed to assist in the study were asked to complete the questionnaire anonymously, and the questionnaire can be submitted directly to the system only after all the questions in the questionnaire were answered. The questionnaire took 20–25 minutes to complete without giving students any compensation. Whether students fill in the questionnaire or not had no effect on their course score. The survey period ended one month later after the questionnaire was distributed. The tools included the following:

3.3.1 | Social-demographics

The demographic variable questionnaire was used to collect the data of age, gender, grade, clinical work experience, teaching experience, marital status, acceptance of nursing and type of postgraduates.

3.3.2 | Research ability variable Nursing research ability of self-evaluation questionnaire (NRASQ)

The NRASQ was developed by Pan in 2011 to assess the level of knowledge, skills and experience mastered by nursing staff in research exploration (Pan & Cheng, 2011). This questionnaire has 30 items with six dimensions of problem finding (3 items: 1–3), literature review (5 items: 4–8), research design (5 items: 9–13), research practice (6 items: 14–19), data processing (5 items: 20–24) and paper writing (6 items: 25–30). Each item is graded from 0 to 4. Therefore, the total scores of NRASQ range from 0 to 120 with higher scores reflecting stronger the research ability. The content validity and construct validity of the scale have been reported to be acceptable. In Pan's study (2011), the reliability was 0.861 using Cronbach's alpha. Moreover, the goodness-of-fit indexes in a confirmatory factor analysis showed acceptable values, which were $\chi^2/df = 3.63$, root mean square error of approximation (RMSEA) = 0.08 and comparative fit index (CFI) = 0.97. In the present study, the overall Cronbach's alpha for NRASQ was 0.966, with that of the six dimensions ranging from 0.761–0.947.

3.3.3 | Research motivation variable The Chinese version research motivation scale (RMS-C)

The RMS (Deemer et al., 2010) has been widely used for assessing the type of research motivation. Ji (2013) translated the RMS into Chinese, and the validity and reliability were proved among 249 postgraduate nursing students. This questionnaire has 20 items with three dimensions of intrinsic motivation (9 items: 1, 4, 7, 9, 11, 13, 15, 17, 19), failure avoidance motivation (6 items: 2, 5, 8, 14, 16, 18) and extrinsic motivation (5 items: 3, 6, 10, 12, 20). RMS-C used a 5-point Likert Scale from 1 (strongly disagree) to 5 (strongly agree). The item average score for each dimension ranged from 1 to 5. The higher item average score in a particular dimension, the stronger the respondents' tendency to perform in that dimension. The content validity and construct validity of the scale have been reported to be acceptable. In Ji's study (2013), the validity scores of the overall questionnaire and each dimension ranged from 0.71 to 0.91 using a correlation coefficient, and the reliability was 0.88

using Cronbach's alpha. In the present study, the overall Cronbach's alpha for RMS-C was 0.853, with that of the three dimensions ranging from 0.714–0.905.

3.4 | Data analysis

Data were analysed using IBM SPSS22.0, and statistical significance level was defined as $p < .05$. Descriptive statistics including frequencies and percentages were used to describe postgraduate nursing students' social demographic characteristics. Descriptive statistics including means and standard deviations were used to describe postgraduate nursing students' research ability and research motivation. According to Kolmogorov–Smirnov test, the NRASQ and RMS-C scores were normally distributed. One-way ANOVA or independent t test was conducted to examine differences in research ability via social demographic characteristics. Relationship of postgraduate nursing students' research ability and research motivation was calculated using Pearson's correlation analysis. Multiple stepwise regression analysis was used to determine the relationship between significant variables and research ability.

3.5 | Ethical considerations

This study was approved by the institutional review board of the investigator's affiliated university (NO: 2020001). Respondents of the study were assured of the anonymity of their responses and that completion of the e-survey would indicate their consent to participate.

4 | RESULTS

4.1 | Characteristics of the respondents

The sample in this study consisted of 191 postgraduate nursing students from seven TCM colleges. Most respondents were female (172, 90.1%), unmarried (121, 63.4%) and with clinical work experience (104, 54.5%). There are 85 postgraduate nursing students in the first grade, 71 in the second grade and 35 in the third grade. Detailed data of the characteristics were presented as frequency and percentage in Table 1.

4.2 | Research ability and research motivation scores of respondents

The average NRASQ total score of all respondents was (66.74 ± 17.20) (with the average score/item = 2.22 ± 0.57). Regarding the six dimensions of the NRASQ, the average score was (12.02 ± 3.02) (with the average score/item = 2.40 ± 0.60) in

literature review dimension, (14.23 ± 4.33) (with the average score/item = 2.37 ± 0.72) in paper writing dimension, (13.08 ± 3.74) (with the average score/item = 2.18 ± 0.62) in the research practice dimension, (10.75 ± 3.49) (with the average score/item = 2.15 ± 0.70) in the research design, (6.43 ± 1.84) (with the average score/item = 2.14 ± 0.61) in the problem finding and (10.23 ± 3.51) (with the average score/item = 2.05 ± 0.70) in the data processing dimension. It could be seen that respondents in this study had strong literature review ability, but weak data analysis ability.

The average RMS-C total score of all respondents was (68.47 ± 8.01). Regarding the three dimensions of the RMS-C, the average score was (21.62 ± 2.86) (with the average score/item = 3.60 ± 0.48) in failure avoidance motivation, (16.77 ± 2.49) (with the average score/item = 3.36 ± 0.50) in extrinsic motivation and (30.12 ± 3.68) (with the average score/item = 3.35 ± 0.41) in intrinsic motivation. Among the respondents, 55.5% of the postgraduate nursing students had the highest item average score in failure avoidance motivation, indicating that they were dominated by failure avoidance motivation, while 27.7% and 21.2% of the postgraduate nursing students were respectively, dominated by extrinsic motivation and intrinsic motivation.

4.3 | Influence of general characteristics on the scores of research ability of respondents

There were statistically significant relationships between the research ability and some general characteristics, such as age, grade, clinical work experience, marital status, type of postgraduates, participation in extracurricular activities every week, active participation in class discussions during undergraduate study and active participation in class discussions during postgraduate study ($p < .05$), as shown in Table 1.

4.4 | Correlation coefficients between respondents' research ability and research motivation

The research ability of postgraduate nursing students in TCM colleges was positively correlated with research motivation. Moreover, a positive correlation existed between each dimension of research ability and research motivation ($p < .05$), as shown in Table 2.

4.5 | Multiple stepwise regression analysis of the research ability of respondents

All of the statistically significant variables found in the univariate analysis were selected as independent variables to determine the predictors of research ability. For the regression analysis, the factors of grade level, research motivation, age, clinical work experience, marital status, type of postgraduates, active participation in

TABLE 1 Association between the respondents' characteristics and the research ability ($N = 191$)

Variable	n	%	Mean $\pm$ SD	t/F	P-value
Gender				0.74[b]	.458
Male	19	10.0	69.53 $\pm$ 17.15		
Female	172	90.1	66.43 $\pm$ 17.23		
Age (years)				9.91[a]	.000
≤25	94	49.2	72.12 $\pm$ 16.59		
26 ~ 30	46	24.1	61.26 $\pm$ 17.30[①]		
≥31	51	26.7	61.76 $\pm$ 15.34[①]		
Marital status				−2.85[b]	.005
Married	70	36.6	62.16 $\pm$ 17.05		
Unmarried	121	63.4	69.39 $\pm$ 16.79		
Grade				34.71[a]	.000
First grade	85	44.5	58.60 $\pm$ 14.28		
Second grade	71	37.2	68.44 $\pm$ 14.43[②]		
Third grade	35	18.3	83.06 $\pm$ 16.59[②③]		
Family Residence				0.614[b]	.540
Rural	71	37.2	67.73 $\pm$ 16.40		
Urban	120	62.8	66.15 $\pm$ 17.69		
Clinical work experience				−3.05[b]	.003
Yes	104	54.5	63.34 $\pm$ 16.35		
No	87	45.5	70.80 $\pm$ 17.39		
Teaching experience				−0.76[b]	.451
Yes	45	23.6	65.04 $\pm$ 15.46		
No	146	76.4	67.26 $\pm$ 17.72		
Type of postgraduates				6.84[a]	.001
Academic postgraduate	83	43.5	69.71 $\pm$ 15.31[④]		
Professional postgraduate	66	34.6	68.30 $\pm$ 18.88[④]		
On-the-job postgraduate	42	22.0	58.40 $\pm$ 15.61		
Participation in extracurricular activities every week				2.65[b]	.009
Yes	126	66.0	69.07 $\pm$ 16.71		
No	65	34.0	62.22 $\pm$ 17.36		
Active participation in class discussions during undergraduate study				2.36[b]	.019
Yes	109	57.1	69.26 $\pm$ 16.77		
No	82	42.9	63.39 $\pm$ 17.30		
Active participation in class discussions during postgraduate study				2.19[b]	.030
Yes	145	75.9	68.26 $\pm$ 17.24		
No	46	24.1	61.96 $\pm$ 16.34		
The degree of love for nursing major				1.24[a]	.290
High	24	12.6	69.29 $\pm$ 16.62		
Medium	134	70.2	67.28 $\pm$ 18.03		
Low	33	17.3	62.70 $\pm$ 13.53		

Note: The bolded values indicate the level of statistical significance (with $p < .05$) between the independent and dependent variables.

According to the homogeneity-of-variance test results, LSD method was used for pair comparison, and the results showed that: [①]Compared with the research ability of postgraduate nursing students aged less than 25 years old, $p < .05$; [②]Compared with the research ability of first grader postgraduate nursing students, $p < .05$; [③]Compared with the research ability of second grade postgraduate nursing students, $p < .05$; [④]Compared with on-the-job postgraduate nursing students, $p < .05$.

Abbreviation: *SD*, standard deviation.

[a]Results of the analysis of variance.

[b]Results of the t test.

TABLE 2 Correlation coefficients between respondents' research ability and research motivation

Variables	Total score of research ability	Problem finding	Literature review	Research design	Research practice	Data processing	Paper writing
Total score of research motivation	0.353*	0.265*	0.386*	0.342*	0.337*	0.209*	0.282*
Intrinsic motivation	0.336*	0.280*	0.353*	0.321*	0.312*	0.222*	0.260*
Failure avoidance motivation	0.281*	0.217*	0.325*	0.261*	0.274*	0.151*	0.228*
Extrinsic motivation	0.297*	0.176*	0.336*	0.313*	0.291*	0.155*	0.241*

Note: * indicates the level of statistical significance (with P < .05) between the independent and dependent variables.

TABLE 3 Multiple stepwise regression analysis of factors influencing the research ability of respondents (N = 191)

Variables	b	Beta	t	p-value	R square	F-value	p-value
Constant	36.41		3.55	**<.001**	0.39	29.80	**<.001**
Grade level	10.35	0.45	7.69	**<.001**			
Research motivation	0.42	0.20	3.25	**.001**			
Age	−4.75	−0.23	−3.93	**<.001**			
Active participation in class discussions during postgraduate study	−6.39	−0.16	−2.73	**.007**			

Note: The bolded values indicate the level of statistical significance (with p < .01) between the independent and dependent variables.

extracurricular activities, active participation in class discussions during undergraduate study and active participation in class discussions during postgraduate study were selected as the standard factors. The results of the stepwise multiple regression analysis showed that there were four predictors of research ability, which were grade level (ß = 0.45, p < .001), research motivation (ß = 0.20, p = .001), age (ß = −0.23, p < .001) and active participation in class discussions during postgraduate study (ß = −0.16, p = .007), and they accounted for 39% of the total variance (F = 29.80, p < .001), as shown in Table 3.

5 | DISCUSSION

To our knowledge, this was the first study to explore the research ability and research motivation of postgraduate nursing students in TCM colleges. We found a positive correlation between research ability and research motivation and identified several social-demographics affecting research ability. We found that the stronger the intrinsic motivation, the higher the grade, the more active the participation in class and the stronger the research ability of postgraduate nursing students, which further confirmed the previous studies (Areepattamannil, 2014; Fischer et al., 2019; Ryan, 2014; Smith et al., 2014; Wang et al., 2019). However, this study also showed a positive correlation between extrinsic motivation, failure avoidance motivation and research ability, and the phenomenon that the younger the postgraduate nursing students, the stronger the research ability, which was inconsistent with previous studies. These broke down the stereotype and provided suggestions for the reform of graduate nursing education.

5.1 | The research ability of postgraduate nursing students in TCM colleges

This study showed that the score of research ability of postgraduate nursing students in TCM colleges was (66.74 ± 17.20), which was equivalent to the average level of ones in 22 medical schools in 2013 (Liao et al., 2015). However, the average score of data processing ability was only (2.05 ± 0.70), which was lower than the results of Tian (2016), indicating that the research ability of postgraduate nursing students in TCM colleges need to be improved. Enlighten educators to improve postgraduate nursing students' practical ability of data analysis and processing, strengthen operational training and enrich teaching content.

5.2 | Correlation analysis between research ability and research motivation

Consistent with previous studies, the stronger the intrinsic motivation, the more conducive to the improvement of research ability (Fischer et al., 2019; Ryan, 2014). Intrinsic motivation means that researchers are interested in the research itself and the satisfaction brought by research activities can motivate them to continue exploring (Liu & Shi, 2015). Intrinsic motivation can stimulate researchers' innovative thinking and improve their ability to find problems and solve practical difficulties (Fischer et al., 2019).

Extrinsic motivation refers to the fundamental reason that motivates researchers to continue their exploration, not the enthusiasm for the research itself, but the influence of external factors, such as the recognition and respect of others, research tasks and material

rewards (Smith et al., 2014). This study showed that the stronger the extrinsic motivation, the higher the research ability of postgraduate nursing students, which was inconsistent with the previous studies (Horodnic & Zait, 2015; Peng & Gao, 2019). The consideration was related to the kind of extrinsic motivators. Amabile (1997) pointed out that the influence of extrinsic motivators on research creativity varied with its characteristics of control and information. Controlling extrinsic motivators have a destructive effect on creativity. While informational extrinsic motivators can promote creativity. In this study, extrinsic motivation was mainly to obtain external recognition and rewards. Postgraduate nursing students were told that they would be rewarded when they successfully completed a particular task. This reward was an informational extrinsic motivator that promoted creativity and positively predicted research ability.

In this study, avoidance motivation was positively correlated with research ability. This was not consistent with previous study (Mueller and Kamdar, 2011). It may be related to the cultural background and work experience. As students of TCM colleges, postgraduate nursing students have been trained in TCM dialectical thinking for a long time. They have a deep understanding of the twists and turns of knowledge learning. As a result, they focus on long-term success rather than the small mistakes in the current learning process that plague them. Instead, they spend more time and energy seeking breakthroughs, reducing procrastination and taking the time to enrich themselves (Schodl et al., 2018). In addition, previous studies only included full-time postgraduate students in ordinary universities (Fan & Wu, 2019; Ji, 2013), whereas this study included full-time postgraduate nursing students and on-the-job postgraduate nursing students. Generally speaking, on-the-job postgraduate nursing students have several years of clinical work or teaching experiences and have a deeper understanding of what it means to be a nurse. Nurses belong to a clinical practice group that attend to critically ill patients facing crisis (De Simone et al., 2018). A small mistake in the workplace may have a big impact. Therefore, on-the-job postgraduate nursing students pay more attention to the learning process, summarize their experience and avoid mistakes and failures in their future work. Educators should enhance students' understanding of their profession, guide students to correctly deal with the process and pressure of scientific research and increase investment to promote research ability.

5.3 | Social-demographics factors affecting research ability

The research ability of postgraduate nursing students in TCM colleges in a low age group was strong. This finding was inconsistent with the results of Yang (2017). The consideration was related to the weak research foundation in the early stage and the insufficient research investment in the later stage. Most of postgraduate nursing students in a low age group were fresh graduates, who had received systematic research courses and had a relatively good research foundation. Literature showed that in the course of study,

students can participate in the process of research topic selection, research design and paper report in the form of group, and better master the scientific knowledge (Luo et al., 2020; Zhang et al., 2016). At the same time, by writing papers, the theoretical knowledge was reasonably applied to research practice, which improved the students' scientific literacy such as team cooperation ability and information acquisition ability (Guo, 2019; Ma et al., 2016). For postgraduate nursing students in the high age group, the imperfect early training mechanism for postgraduates in China and the forgetting of knowledge caused by long graduation time would affect their early research foundation (Yan et al., 2019 ; Liao et al., 2015). What's more, in the process of study or research practice, postgraduate nursing students of high age group need to give consideration to family and work, which would undoubtedly reduce their input for scientific research and lead to a decline in research ability. Educators should give more attention and guidance to students in the high age group.

After a long period of training, senior postgraduate students' ability of literature review and data analysis has been improved, and the opportunities to participate in academic exchanges have also been increased. Effective academic exchange is an important skill, which can cultivate the interest of students, widen their knowledge and foster research thinking (Piao & Cui, 2018; Stevens et al., 2019). Influenced by traditional education, in China, the teaching form in schools is still dominated by teacher's explanation. The interaction between teachers and students strengthens the ideological collision, gives full play to postgraduate nursing students' subjective initiative, stimulates their enthusiasm for learning and improves their independent thinking ability (Hew & Lo, 2018; Presti, 2016; Smith et al., 2014). These findings were consistent with previous studies. Educators should teach postgraduate nursing students in accordance with their aptitude. For lower grade students, educators should cultivate their basic ability, increase their interest in scientific research. For senior students, it is important to improve their comprehensive ability and divergent thinking. What's more, educators should focus on teaching methods, encourage students to express their ideas and help them translate theory into practice.

6 | LIMITATIONS

This study had several limitations. The convenience sampling method used in this study may lead to a selection bias because the postgraduate nursing students who choose to respond to the survey invitation may be more interested in the scientific research. Furthermore, this cross-sectional study suggested a correlation between the two variables but cannot lead to a conclusive causal relationship. In addition, although this study tried to select samples from different regions, schools and grades to ensure the scientific nature of the research results. However, the samples cannot be generalized because they may not be a true representation of the population. Thus, replication studies with larger and more diverse samples are needed to confirm these findings.

7 | CONCLUSION

The self-rated research ability of postgraduate nursing students in TCM colleges is positively correlated with research motivation. It is affected by grade, age and whether students actively participate in class discussions during their postgraduate study. It is suggested that in the training process of postgraduate nursing students in TCM colleges, targeted or individualized training methods should be adopted according to their research motivation to guide them to deal with research pressure rationally and have correct professional understanding. Future researches include exploring which factors mediate the influence of research motivation on research ability. The improvement scheme based on the results is helpful to adjust the research motivation of postgraduate nursing students and improve their research ability.

CONFLICT OF INTEREST
The authors declare that they have no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

AUTHOR CONTRIBUTIONS
JHZ and SQP conceived the idea. JHZ, ZTL, XPH and XYL collected data. JHZ, SQP, LG and GMW analysed and interpreted data. JHZ and SQP wrote the first draft. JHZ, SQP, LG and GMW conducted key revisions to important contents of the manuscript. JHZ and SQP conducted study supervision. All authors have approved the final article to be published.

DATA AVAILABILITY STATEMENT
The data that support the findings of this study are available from the corresponding author upon reasonable request.

ORCID
Jia-Hui Zhang https://orcid.org/0000-0003-2985-3894

REFERENCES
Abuhammad, S., Hatamleh, R., Howard, K., & Ahmad, M. M. (2019). Correlates and Predictors of Stigmatization of Patients With Mental Illness Among Nursing Students. *Journal of Psychosocial Nursing and Mental Health Services*, *57*, 43–51. https://doi.org/10.3928/02793695-20180907-01

Akerjordet, K., Lode, K., & Severinsson, E. (2012). Clinical nurses' attitudes towards research, management and organisational resources in a university hospital: Part 1. *Journal of Nursing Management*, *20*, 814–823. https://doi.org/10.1111/j.1365-2834.2012.01477.x

Amabile, T. M. (1997). Motivating creativity in organizations: On doing what you love and loving what you do. *California Management Review*, *40*, 39–58, https://doi.org/10.2307/41165921

Areepattamannil, S. (2014). Relationship Between Academic Motivation and Mathematics Achievement Among Indian Adolescents in Canada and India. *The Journal of General Psychology*, *141*(3), 247–262. http://dx.doi.org/10.1080/00221309.2014.897929

Ballesteros-Rodríguez, J. L., De Saá-Pérez, P., García-Carbonell, N., Martín-Alcázar, F., & Sánchez-Gardey, G. (2020). Exploring the determinants of scientific productivity: a proposed typology of researchers. *Journal of Intellectual Capital*, Online ahead-of-print. http://dx.doi.org/10.1108/jic-07-2019-0178

Bruce, J. C., Baumann, J., & Schmollgruber, S. (2019). Does improved postgraduate capacity shift the balance of power for nurse specialists in a low-income country: A mixed methods study. *Journal of Advanced Nursing*, *75*, 2969–2979. https://doi.org/10.1111/jan.14109

Caldwell, B., Coltart, K., Hutchison, C., McJury, M., Morrison, A., Paterson, C., & Thomson, M. (2017). Research awareness, attitudes and barriers among clinical staff in a regional cancer centre. Part 1: A quantitative analysis. *European Journal of Cancer Care*, *26*, https://doi.org/10.1111/ecc.12434

Chang, X. Y., Ma, Y. M., Mao, X., & Chu, Y. (2018). Study on the correlation between positive psychological capital and scientific research ability of postgraduate nursing postgraduates. *China Continuing Medical Education*, *10*, 28–30. https://doi.org/10.3969/j.issn.1674-9308.2018.02.014

Chang, Y., & Ramnanan, C. J. (2015). A Review of Literature on Medical Students and Scholarly Research. *Academic Medicine*, *90*(8), 1162–1173. http://dx.doi.org/10.1097/acm.0000000000000702

Chen, Q., Liu, D., Zhou, C., & Tang, S. (2020). Relationship between critical thinking disposition and research competence among clinical nurses: A cross-sectional study. *Journal of Clinical Nursing*, *29*, 1332–1340. https://doi.org/10.1111/jocn.15201

Chen, Q.R., Sun, M., Tang, S. Y., & Castro, A. R. (2019). Research capacity in nursing: a concept analysis based on a scoping review. *BMJ Open*, *9*(11), e032356. http://dx.doi.org/10.1136/bmjopen-2019-032356

Chen, Y., Gao, Q., Yuan, Q., & Tang, Y. L. (2020). Discovering MOOC learner motivation and its moderating role. *Behaviour & Information Thchnology*, *39*, 1257–1275. https://doi.org/10.1080/0144929X.2019.1661520

Comiskey, C. M., Matthews, A., Williamson, C., Bruce, J., Mulaudzi, M., & Klopper, H. (2015). Scaling up nurse education: An evaluation of a national PhD capacity development programme in South Africa, in the context of the global shortage of nursing graduates. *Nurse Education Today*, *35*, 647–652. https://doi.org/10.1016/j.nedt.2015.01.003

Corchon, S., Portillo, M. C., Watson, R., & Saracíbar, M. (2011). Nursing research capacity building in a Spanish hospital: an intervention study. *Journal of Clinical Nursing*, *20*(17-18), 2479–2489. http://dx.doi.org/10.1111/j.1365-2702.2011.03744.x

De Simone, S., Planta, A., & Cicotto, G. (2018). The role of job satisfaction, work engagement, self-efficacy and agentic capacities on nurses' turnover intention and patient satisfaction. *Applied Nursing Research*, *39*, 130–140. https://doi.org/10.1016/j.apnr.2017.11.004

Deemer, E. D., Martens, M. P., & Buboltz, W. C. (2010). Toward a Tripartite Model of Research Motivation: Development and Initial Validation of the Research Motivation Scale. *Journal of Career Assessment*, *18*(3), 292–309. http://dx.doi.org/10.1177/1069072710364794

Edwards, N., Webber, J., Mill, J., Kahwa, E., & Roelofs, S. (2009). Building capacity for nurse-led research. *International Nursing Review*, *56*, 88–94. https://doi.org/10.1111/j.1466-7657.2008.00683.x

Fan, L. H., & Wu, L. Q. (2019). Correlation between achievement motivation and research ability of clinical nurses. *Chinese Medical Innovations*, *16*, 106–111. https://doi.org/10.3969/j.issn.1674-4985.2019.25.027

Fischer, C., Malycha, C. P., & Schafmann, E. (2019). The Influence of Intrinsic Motivation and Synergistic Extrinsic Motivators on Creativity and Innovation. *Frontiers in Psychology*, *10*, http://dx.doi.org/10.3389/fpsyg.2019.00137

Guo, J. P. (2019). Flipped classroom teaching model: Variation and integration. *China Higher Education Research*, 6, 8–14. https://doi.org/10.16298/j.cnki.1004-3667.2019.06.02

Hew, K. F., & Lo, C. K. (2018). Flipped classroom improves student learning in health professions education: a meta-analysis. *BMC Medical Education*, 18(1), http://dx.doi.org/10.1186/s12909-018-1144-z

Higgins, I., Parker, V., Keatinge, D., Giles, M., Winskill, R., Guest, E., Kepreotes, E., & Phelan, C. (2010). Doing clinical research: The challenges and benefits. *Contemporary Nurse*, 35, 171–181. https://doi.org/10.5172/conu.2010.35.2.171

Horodnic, I. A., & Zaiţ, A. (2015). Motivation and research productivity in a university system undergoing transition. *Research Evaluation*, 24, https://doi.org/10.1093/reseva/rvv010

Hu, H. G., Yu, X., Tang, Z. X., & Lin, L. (2019). Research Capacity and Research Training Needs of Clinical Nurses in Suzhou, China. *The Journal of Continuing Education in Nursing*, 50(9), 423–432. http://dx.doi.org/10.3928/00220124-20190814-09

Ji, L. L. (2013). *Nonintellectual factors of research capacity in master nursing students.* Master's thesis, Chinese University, .

Li, X. D., Chen, H. J., Wang, L., Kong, X. Y., & Ying, J. (2019). Scientific Research Capability and Continuing Education Needs for Nurses With Master's Degrees in China. *The Journal of Continuing Education in Nursing*, 50(2), 61–68. http://dx.doi.org/10.3928/00220124-20190115-05

Liao, X. L., Wang, D., Wang, X. H., & Luo, J. F. (2015). The current situation and trend of development for nursing graduate education in China. *Journal of Nursing Science*, 30, 9–12. https://doi.org/10.3870/hlxzz.2015.16.009

Liu, Q. Y., & Shi, J. (2015). Study on influence of scientific research ability and non intelligence factors of different grades of nursing under graduates. *Chinese Nursing Research*, 29, 3908–3910. https://doi.org/10.3969/j.issn.1009-6493.2015.31.022

Luo, Z. T., Hu, H., Pang, S. Q., Ge, L., Liu, Y. H., Hong, X. P., & Zhang, J. H. (2020). Research on the correlation between research capacity and self-efficacy of nursing research among nursing graduate students in Traditional Chinese Medicine universities. *Journal 0f Nursing Administration*, 20, 476–480. https://doi.org/10.3969/j.issn.1671-315x.2020.07.005

Ma, C. H., Zhou, Y., Luo, Y. H., Li, T., & Zhou, W. (2016). Strategies for improving the scientific research ability of nursing postgraduate students. *Chinese General Nursing*, 14, 3646–3648. https://doi.org/10.3969/j.issn.1674-4748.2016.34.037

McKee, G., Codd, M., Dempsey, O., Gallagher, P., & Comiskey, C. (2017). Describing the implementation of an innovative intervention and evaluating its effectiveness in increasing research capacity of advanced clinical nurses: using the consolidated framework for implementation research. *BMC Nursing*, 16(1), http://dx.doi.org/10.1186/s12912-017-0214-6

Mueller, J. S., & Kamdar, D. (2011). Why seeking help from teammates is a blessing and a curse: A theory of help seeking and individual creativity in team contexts.. *Journal of Applied Psychology*, 96, 263–276. http://dx.doi.org/10.1037/a0021574

O'Byrne, L., & Smith, S. (2011). Models to enhance research capacity and capability in clinical nurses: a narrative review. *Journal of Clinical Nursing*, 20(9-10), 1365–1371. http://dx.doi.org/10.1111/j.1365-2702.2010.03282.x

Ommering, B. W. C., van Blankenstein, F. M., Waaijer, C. J. F., & Dekker, F. W. (2018). Future physician-scientists: could we catch them young? Factors influencing intrinsic and extrinsic motivation for research among first-year medical students. *Perspectives on Medical Education*, 7(4), 248–255. http://dx.doi.org/10.1007/s40037-018-0440-y

Ommering, B. W. C., Wijnen-Meijer, M., Dolmans, D. H. J. M., Dekker, F. W., & van Blankenstein, F. M. (2020). Promoting positive perceptions of and motivation for research among undergraduate medical students to stimulate future research involvement: a grounded theory study. *BMC Medical Education*, 20(1), http://dx.doi.org/10.1186/s12909-020-02112-6

Pan, Y. H., & Cheng, J. L. (2011). Revise of scientific research ability self-evaluation rating scales of nursing staff. *Chinese Nursing Research*, 25, 1205–1208.

Peng, J. E., & Gao, X. (2019). Understanding TEFL academics' research motivation and its relations with research productivity. *Sage Open*, 9, https://doi.org/10.1177/2158244019866295

Phillips, R. M. (2014). Creative classroom strategies for teaching nursing research. *Nurse Educator*, 39, 199–201. https://doi.org/10.1097/NNE.0000000000000052

Piao, Y. C., & Cui, X. M. (2018). A discussion on the training of literature retrieval and integrated utilization ability of graduate students in local universities. *Advances in Social Science Education and Humanities Research*, 182, 226–229.

Powers, J. (2020). Increasing capacity for nursing research in magnet-designated organizations to promote nursing research. *Applied Nursing Research*, 55, 151286, https://doi.org/10.1016/j.apnr.2020.151286

Presti, C. R. (2016). The flipped learning approach in nursing education: A literature review. *Journal of Nursing Education*, 55, 252–257. https://doi.org/10.3928/01484834-20160414-03

Qiu, C., Feng, X., Reinhardt, J. D., & Li, J. (2019). Development and psychometric testing of the research competency scale for nursing students: An instrument design study. *Nurse Education Today*, 79, 198–203. https://doi.org/10.1016/j.nedt.2019.05.039

Ryan, J. C. (2014). The work motivation of research scientists and its effect on research performance. *R&D Management*, 44(4), 355–369. https://doi.org/10.1111/radm.12063

Schodl, M. M., Raz, A., & Kluger, A. N. (2018). On the positive side of avoidance motivation: An increase in avoidance motivation reduces procrastination among students. *Applied Psychology*, 67, https://doi.org/10.1111/apps.12147

Segrott, J., McIvor, M., & Green, B. (2006). Challenges and strategies in developing nursing research capacity: A review of the literature. *International Journal of Nursing Studies*, 43(5), 637–651. http://dx.doi.org/10.1016/j.ijnurstu.2005.07.011

Smith, J. L., Deemer, E. D., Thoman, D. B., & Zazworsky, L. (2014). Motivation under the microscope: Understanding undergraduate science students' multiple motivations for research. *Motivation and Emotion*, 38(4), 496–512. http://dx.doi.org/10.1007/s11031-013-9388-8

Spoelstra, S., Wierenga, K., Buckwalter, K. C., & Hoffman, A. J. (2018). Midwest Nursing Research Society News. *Western Journal of Nursing Research*, 40(12), 1919–1926. http://dx.doi.org/10.1177/0193945918807979

Stevens, S., Mills, R., & Kuchel, L. (2019). Teaching communication in general science degrees: Highly valued but missing the mark. *Assessment & Evaluation in Higher Education*, 44, https://doi.org/10.1080/02602938.2019.1578861

Stupnisky, R. H., BrckaLorenz, A., & Laird, T. F. N. (2019). How does faculty research motivation type relate to success? A test of self-determination theory. *International Journal of Educational Research*, 98, 25–35. https://doi.org/10.1016/j.ijer.2019.08.007

Tian, Y. X. (2016). A survey on the research ability of clinical nursing graduate students. *Tianjin Journal of Nursing*, 24, 329–331. https://doi.org/10.3969/j.issn.1006-9143.2016.08.026

Timmins, F., McCabe, C., & McSherry, R. (2012). Research awareness: managerial challenges for nurses in the Republic of Ireland. *Journal of Nursing Management*, 20(2), 224–235. http://dx.doi.org/10.1111/j.1365-2834.2012.01333.x

Turjanica, M. A., Turner, B., & Rodgers, K. (2013). The Nursing Research Idea Fair. *Journal for Nurses in Professional Development*, 29(5), 238–243. http://dx.doi.org/10.1097/01.nnd.0000434585.00380.3d

Wang, X. F., Zhao, L., Hu, H. J., Ou, G. W., & Liao, L. (2017). Competence of clinical teachers: A survey on perception of masters of nursing specialist postgraduates, their clinical teachers, and head nurses. *International Journal of Nursing Sciences*, *4*(2), 158–163. http://dx.doi.org/10.1016/j.ijnss.2017.03.005

Wang, Y. X., Huang, L., & Lü, H. Q. (2019). Nursing research capacity and influencing factors among nursing graduate students. *China Health Industry*, *16*, 4–6. https://doi.org/10.16659/j.cnki.1672-5654.2019.15.004

Wu, X., Wu, X. J., Gao, Y. H., Wang, L. M., Jin, J. F., Li, Y. L., Cheng, S.Z., Wen, X. X., Wang, A.P., Li, Q. Y., & Shang, S. M. (2019). Research-training needs of clinical nurses: A nationwide study among tertiary hospitals in China. *International Journal of Nursing Sciences*, *6*(3), 300–308. http://dx.doi.org/10.1016/j.ijnss.2019.05.007

Yan, J., Zhang, J. E., Li, Q., & Wan, L. H. (2019). Cultivation of nursing master students: An innovation model. *Chinese Journal of Nursing Education*, *16*, 126–129. https://doi.org/10.3761/j.issn.1672-9234.2019.02.011

Yang, S. M. (2017). *The investigation and analysis of scientific Research capacity and influencing factors of nurses in a top three hospital of Changchun City*. Master thesis, Chinese University, .

Zhang, J., Yan, Q. Y., & Yue, S. (2020). Nursing research capacity and its management in China: A systematic review. *Journal of Nursing Management*, *28*, 199–208. https://doi.org/10.1111/jonm.12924

Zhang, W., Li, K., Zhang, X. M., & Chen, L. (2016). Coping self-efficacy of Chinese nursing undergraduates with their research projects. *Nurse Education Today*, *45*, 126–131. http://dx.doi.org/10.1016/j.nedt.2016.07.003