

# Critical thinking disposition among hospital nurses in Japan: Impact of organizational versus personal factors

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## Abstract

**Aim:** Critical thinking is vital in implementing evidence-based practice. However, little is known about factors related to critical thinking among nurses in Japan. This study aims to comprehensively explore the organizational and personal factors related to critical thinking disposition among hospital nurses in Japan.

**Methods:** We conducted a cross-sectional, self-administered questionnaire survey. Critical thinking was measured using the 33-item Japanese Critical Thinking Disposition Scale. We asked nurse managers about organizational characteristics of hospitals/units and about their critical thinking disposition. We questioned staff nurses regarding personal characteristics, cultural construal of self, self-esteem, perception of their work environment and workload, experiences of nursing research, and critical thinking disposition. We conducted multiple regression analysis to identify factors associated with staff nurses' critical thinking.

**Results:** We analyzed data from 68 nurse managers and 986 staff nurses. The staff nurses' mean age was 37.6 years and 91% of the participants were female. Factors related to higher critical thinking were working in an emergency unit ( $\beta = .07$ ,  $p = .040$ ); having a bachelor's degree or higher qualification ( $\beta = .07$ ,  $p = .030$ ); having higher independent view of self ( $\beta = .22$ ,  $p < .001$ ), self-esteem ( $\beta = .24$ ,  $p < .001$ ), and perceived workload ( $\beta = .10$ ,  $p = .002$ ); and training experience of nursing research in post-licensure education ( $\beta = .15$ ,  $p < .001$ ).

**Conclusions:** The factors influencing critical thinking disposition are mainly related to personal characteristics or experiences. Providing research training for nurses may contribute to fostering critical thinking.

## KEYWORDS

continuing education, critical thinking, evidence-based practice, related factors, staff nurse

## 1 | INTRODUCTION

Evidence-based practice (EBP) is defined as “the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients” (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996).

Previous studies have shown that EBP leads to higher-quality care, improved patient outcomes, reduced costs, and greater nurse satisfaction (Brooks, Titler, Ardery, & Herr, 2009; Feldman, Murtaugh, Pezzin, McDonald, & Peng, 2005; Titler, 2008). Although nurses have recognized the importance of EBP, the practice of many nurses is based not

on research evidence but on personal experience (Makabe et al., 2014; Squires et al., 2011; Yoder et al., 2014).

Critical thinking (CT) positively affects the implementation of EBP (Kim, Song, Sim, Ahn, & Kim, 2015; Wangenstein, Johansson, Bjorkstrom, & Nordstrom, 2011). CT is defined as “reasonable reflective thinking focused on deciding what to believe or do. The emphasis is on reasonableness, reflection, and the process of making decisions” (Ennis, 1996). CT is vital in the first step of EBP implementation (International Council of Nurses, 2012), and also in the whole process (Profetto-McGrath, 2005); therefore, fostering CT among nurses may lead to the implementation of EBP.

There are two main features of CT: disposition and skills (Facione, 1990). CT skills alone are not sufficient to enable a person to think critically, because if a person does not have the disposition to carry them out, there will be no CT (Nieto & Saiz, 2011); CT dispositions influence the consciousness and control of our thinking as metacognition (Kusumi, Koyasu, & Michita, 2011). Therefore, disposition is essential to think critically. Although there is no consistent definition of CT disposition, 19 affective dispositions of CT were reported in the Delphi report by the American Philosophical Association (Facione, 1990). CT dispositions include inquisitiveness with regard to a wide range of issues, self-confidence in one's own ability to reason, open-mindedness regarding divergent world views, and so on.

Some studies have explored factors related to CT dispositions. Organizational factors that seem to affect nurses' CT dispositions were the nursing care provision system and nurses' perceptions of their workload (Cornell, Riordan, Townsend-Gervis, & Mobley, 2011; Takagi, Tamura, & Omori, 1998) and educators' attitudes toward CT (Mangena & Chabeli, 2005). It was also pointed out that positive environments (i.e., nonthreatening, encouraging, and open to discussing and expressing thoughts) facilitated students' CT (Chan, 2013).

Some personal factors have been suggested to relate to CT dispositions: years of nursing experience, highest level of nursing education (Ito & Yamase, 2007; Wangenstein, Johansson, Bjorkstrom, & Nordstrom, 2010), higher self-esteem (Takahashi & Hongo, 2014), and higher independent view of self (Kakai, 2001; Takahashi & Hongo, 2014). Another study reported that the experiences of writing a graduation thesis have an impact on one's thinking process (Michita, 2003) but this study did not specifically assess CT.

Most studies have focused only on a specific aspect of personal or organizational factors and employed only bivariate analyses. Therefore, the factors that have a significant impact on nurses' CT remain unclear. Moreover, while most studies have focused on CT among nursing students, our focus is on registered nurses' CT. Registered nurses can have

a more direct impact on the promotion of EBP than nursing students because they are already in a practice setting and can incorporate EBP firsthand. Therefore, this study aims to comprehensively examine the relationship between organizational/personal factors and CT among hospital staff nurses.

## 2 | METHODS

### 2.1 | Study design and participants

We conducted a cross-sectional nationwide questionnaire survey from June to September 2016. Participants were selected from among registered nurses (nurse managers and staff nurses) who were working in hospitals in Japan. A total of 1,000 hospitals were randomly selected from a hospital database developed by WELLNESS Inc. that included 8,658 hospitals, making up the majority of hospitals throughout Japan.

First, we sent a letter of invitation to the nursing directors of these 1,000 hospitals requesting their participation in this study. We asked them to include one unit in each hospital. If the hospital had general and long-term care units, we asked them to invite one unit from each type. Next, we sent self-administered, anonymous questionnaires to these unit managers and nursing staff of hospitals that agreed to participate. Participants received a letter, a questionnaire, and a return envelope. After completing the questionnaire, the nurses enclosed it in a sealed envelope and placed it in a box in each unit. After 2 weeks, the directors of each unit gathered the questionnaires from the boxes and sent them to the researchers by mail.

### 2.2 | Measures

The managers' questionnaire comprised items about the characteristics of the hospitals/units and their CT. The nurses' questionnaire comprised items on personal characteristics, CT, and some other measures that might affect staff CT. We obtained permissions from the developers of the scales discussed below for using them in this study.

#### 2.2.1 | Outcome

##### *Staff nurses' CT disposition*

In this study, we focused on CT dispositions, and we used the Japanese Critical Thinking Disposition Scale (Hirayama & Kusumi, 2004). The scale includes comprehensive elements of CT dispositions, and its reliability and validity have been confirmed; it has been used in various settings in Japan. This instrument was rated on a five-point Likert scale ranging from 1 (disagree) to 5 (agree), and comprises four subscales: awareness of logical thinking, inquiry-

mindfulness, objectiveness, and evidence-based judgment. In this study, as with previous studies, we used the total score, which is the average of the subscales. A higher score indicates a greater tendency for CT. The Cronbach's alpha coefficient of the total score was .90 in this study.

## 2.2.2 | Organizational factors

### *Characteristics of hospitals/units*

We collected the following characteristics of hospitals/units from the nurse managers' questionnaire: number of beds in the hospital/unit, designation as a special functioning hospital (hospitals that develop and offer education in sophisticated medical care), university hospital or not, clinical department of the unit (i.e., medical, surgical, pediatric), bed classification of the unit (general, long-term care, psychiatric, infectious, or tuberculosis), nursing care provider system, existence of a research committee, research presentations in the hospital, educational programs on nursing research, affiliated library, affiliation of a certified nurse specialist with the unit, research collaborations with certified nurse specialists or certified nurses (accomplished and knowledgeable nurses in a specific field), number of purchased medical journals/magazines in the unit per year, and availability of a database of published research papers and clinical decision support resources (i.e., Up To Date).

### *Work environment*

We assessed staff nurses' work environments using the 31-item Japanese version of the Practice Environment Scale of the Nursing Work Index (PES-NWI). This instrument comprises five subscales: nurse participation in hospital affairs (nine items); nursing foundations for quality of care (10 items); nurse manager ability, leadership, and support of nurses (five items); staffing and resource adequacy (four items); and collegial nurse-physician relations (three items). Each item is rated on a five-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). A higher score indicates that the practice environment is good for nurses and care quality. This scale has been used in various countries and clinical settings. In this study, the Cronbach's alpha coefficient of the subscales ranged from .80 to .87. The average scores of nurses in each unit for each subscale were used for analysis. The reliability and validity of this scale have been confirmed (Lake, 2002; Ogata, Nagano, & Akanuma, 2008; Ogata et al., 2010).

### *Unit managers' CT disposition*

We also collected data on CT from unit managers using the 33-item Japanese Critical Thinking Disposition Scale. The Cronbach's alpha coefficient of the total score of managers was .90 in this study.

## 2.2.3 | Personal factors

### *Characteristics of staff nurses*

The following characteristics of participants were collected from the staff nurses' questionnaire: age, gender, qualifications, highest level of nursing education, years of nursing experience, number of years in the current unit, number of changes in nursing workplaces, and previous work experience before nursing education.

### *Cultural construal of self*

Cultural construal of self was measured using the 10-item short version of the Japanese scale for measuring independent and interdependent views of self on a five-point Likert scale ranging from 1 (disagree) to 5 (agree). The total score is calculated by summing the item scores. The two views differ in beliefs regarding the relationship between the self and others and, especially, the degree to which individuals see themselves as separate from or connected with others. Independent view of self is defined as being separate from social context and is common in Western culture. Interdependent view of self is connected with social context and is more common in non-Western cultures (Markus & Kitayama, 1991). A higher score indicates a greater tendency to have an independent or interdependent view of self.

In this study, Cronbach's alpha coefficients of the independent and interdependent views of self were .69 and .74, respectively. The reliability and validity of this scale have been confirmed in people of various ages and from different countries (Takata, 2000).

### *Self-esteem*

Self-esteem was measured using the eight-item Japanese scale for self-esteem on a four-point Likert scale ranging from 1 (disagree) to 4 (agree). The total score is calculated by summing the item scores. A higher score indicates higher self-esteem. The Cronbach's alpha coefficient of the scale was .83 in this study. The reliability and validity of this scale have been confirmed (Tanaka, 2005).

### *Workload*

Workload was measured using the four-item Japanese version of the quantitative workload scale based on the National Institute for Occupational Safety and Health Generic Job Stress Questionnaire on a five-point Likert scale ranging from 1 (never experienced) to 5 (have always experienced). The total score is calculated by summing the item scores. A higher score indicates higher workload. The Cronbach's alpha coefficient of the scale was .90 in this study. The reliability and validity of this scale have been confirmed (Haratani, 2004; Hurrell & McLaney, 1988; Hurrell, Simmons, 1998).

### Experiences in nursing research

The following personal information about experiences in nursing research was collected from the staff nurses' questionnaire: experiences in training and conducting nursing research during nursing education (pre-licensure) or continuing education (post-licensure), connections with research experts, frequency of participation in academic conferences in the past year, and frequency of participation in journal clubs.

## 2.3 | Statistical analysis

First, descriptive statistics were used. Second, we conducted a bivariate analysis to identify factors related to CT scores using the *t*-test, Pearson's correlation coefficient, and one-way analysis of variance, where appropriate. Finally, after ensuring there was no multicollinearity between the variables, we conducted a multiple regression analysis. Variables with a *p* value of .2 or less were included in a stepwise variable selection.

For all statistical tests, *p* < .05 (two-sided) was regarded as statistically significant. IBM SPSS ver. 24 for Windows was used for all statistical analyses.

## 2.4 | Ethical considerations

Along with the questionnaire, we provided participants with a letter stating the purpose, methods, risks, and benefits of this study; the voluntary nature of participation; and the right to refuse participation. They were also informed that they would not be able to withdraw after submitting their questionnaire in the collection bag. We asked the directors of nursing and managers not to compel nurses to participate in this study. This study was approved by the Graduate School of Medicine, The University of Tokyo Ethics Committee.

## 3 | RESULTS

In total, 73 units from 61 out of 1,000 hospitals agreed to participate (acceptance rate 6.1%). The questionnaires were completed and returned by 1,008 nurses and 68 managers out of the 1,368 nurses and 73 nurse managers who received them (response rate 73.7% and 93.2%, respectively). Among these, the questionnaires of 22 nurses were excluded owing to missing responses ( $\geq 20\%$  missing responses) to items (*n* = 20) or because they were licensed practical nurses (*n* = 2).

### 3.1 | Characteristics of hospitals/units and participants

Table 1 shows the characteristics of the hospitals/units and participants. The staff nurses' mean age  $\pm$  standard deviation (SD) was  $37.6 \pm 10.2$  years; most participants were female

(91%); 8.3% of the participants were university-level graduates or had a higher educational qualification. There were eight certified nurses but no certified nurse specialists. In total, depending on the topic, 26.2–54.1% of hospitals offered educational programs on nursing research, and 60.9% of participants had been trained in nursing research in post-licensure education.

### 3.2 | Factors related to CT of staff nurses

Table 2 shows the results of the bivariate analysis. The following variables were significantly associated with higher CT scores: older age (*p* = .008), longer years of nursing experience (*p* = .025), higher number of changes of hospital workplaces (*p* = .007), having a certified nurse qualification (*p* = .050), higher independent view of self (*p* < .001), lower interdependent view of self (*p* = .001), higher self-esteem (*p* < .001), higher

**TABLE 1** The characteristics of the hospitals and participants

	<i>n</i> (%) or <i>M</i> $\pm$ <i>SD</i>
Characteristics of hospitals <i>N</i> = 61	
Number of beds in the hospital	247.1 $\pm$ 172.6
University hospital	5 (8.2)
Having educational programs about research	
Article search	23 (37.7)
Statistical	16 (26.2)
Way of nursing research	33 (54.1)
Characteristics of participants <i>N</i> = 986	
Classification of unit	
General	782 (79.3)
Psychiatric	89 (9.0)
Long-term care	115 (11.7)
Clinical department of the unit (multiple answers allowed)	
Medical	562 (57.0)
Surgical	539 (54.7)
Rehabilitation	206 (20.9)
Emergency	98 (9.9)
Pediatric	44 (4.5)
Others	436 (44.2)
Gender	
Female	897 (91.0)
Age	37.6 $\pm$ 10.2
Nursing experience	
Total, years	13.2 $\pm$ 9.6
In the current unit, years	4.0 $\pm$ 4.5

(Continues)

**TABLE 1** (Continued)

	<i>n</i> (%) or <i>M</i> ± <i>SD</i>
Qualification	
Certified nurse specialist	0 (0.0)
Certified nurse	8 (0.8)
Highest level of nursing education	
High school	77 (7.8)
Vocational school	655 (66.4)
Junior college	61 (6.2)
University	75 (7.6)
Master's/ doctorate	7 (0.7)
Other	107 (10.9)
Previous work experience before nursing education	194 (19.7)
Nursing research	
In pre-licensure education	
Trained	628 (63.7)
Conducted	555 (56.3)
In post-licensure education	
Trained	600 (60.9)
Number of times conducted	1.5 ± 2.0
Nurses' critical thinking (range: 1–5)	
Awareness for logical thinking	2.9 ± 0.5
Inquiry-mind	3.5 ± 0.6
Objectiveness	3.5 ± 0.5
Evidence-based judgment	3.4 ± 0.6
Total	3.3 ± 0.4

Note: mean (*M*); standard deviation (*SD*).

workload ( $p = .021$ ), taking seminars on nursing research in post-licensure education ( $p < .001$ ), more experience in conducting nursing research at the hospital ( $p = .004$ ), having connections with research experts ( $p = .001$ ), more participation in academic conferences ( $p = .035$ ), and more participation in journal clubs ( $p = .003$ ). In the bivariate analysis, organizational factors were not significantly associated with staff nurses' CT scores.

Table 3 shows the results of the multiple regression analysis. The only organizational factor that had a statistically significant association with higher CT scores was working in an emergency unit ( $\beta = .07$ ,  $p = .040$ ). Some other variables that showed significant association with higher CT scores were all personal factors: highest level of nursing education—bachelor's degree or a higher qualification ( $\beta = .07$ ,  $p = .030$ ), higher independent view of self ( $\beta = .22$ ,  $p < .001$ ), higher self-esteem ( $\beta = .24$ ,  $p < .001$ ), higher workload ( $\beta = .10$ ,  $p = .002$ ), and taking seminars on nursing research in post-licensure education ( $\beta = .15$ ,  $p < .001$ ) (adjusted  $R^2 = .17$ ).

**TABLE 2** Factors related to CT according to bivariate analysis ( $p < .2$ )  $N = 986$ 

	<i>M</i> ± <i>SD</i> or <i>n</i>	CT total score	
		<i>M</i> ± <i>SD</i>	Pearson's <i>r</i>
Organizational factors			
Characteristics of hospitals/units			
Number of beds in the unit	45.15 ± 12.79		.05
Number of purchased medical magazines (1 year)	7.01 ± 8.33		.06
Clinical department of the unit			
Rehabilitation	Yes 188	3.28 ± 0.42	
	No 664	3.33 ± 0.42	
Emergency	Yes 91	3.39 ± 0.38	
	No 761	3.31 ± 0.42	
Work environment			
Collegial nurse-physician relations	2.46 ± 0.38		.04
Unit managers' CT			
Awareness for logical thinking	3.36 ± 0.47		−.05
Inquiry-mind	3.66 ± 0.53		−.06
Evidence-based judgment	3.65 ± 0.55		−.05
Personal factors			
Characteristics of participants			
Age	37.60 ± 10.28		.09
Years of nursing experience	13.20 ± 9.58		.08
Number of changes of hospitals	1.57 ± 1.84		.09
Qualification of certified nurse	Yes 7	3.63 ± 0.52*	
	No 890	3.32 ± 0.42	
Highest level of nursing education: bachelor's or higher	Yes 81	3.39 ± 0.40	
	No 841	3.32 ± 0.42	
Work experience before nursing education	Yes 184	3.36 ± 0.41	
	No 735	3.31 ± 0.42	
Independent view of self	3.68 ± 0.98		.29

(Continues)



**TABLE 2** (Continued)

	M ± SD or n	CT total score	
		M ± SD	Pearson's <i>r</i>
Interdependent view of self	4.72 ± 0.96		-.11
Self-esteem	23.06 ± 4.36		.30
Workload	14.26 ± 4.03		.08
Nursing research			
Trained in pre-licensure education	Yes 590	3.34 ± 0.41	
	No 325	3.29 ± 0.44	
Conducted in pre-licensure education	Yes 524	3.34 ± 0.41	
	No 392	3.30 ± 0.43	
Trained in post-licensure education	Yes 562	3.38 ± 0.41**	
	No 349	3.23 ± 0.43	
Number of nursing research conducted in hospitals	1.54 ± 1.97		.10
Having connections with research experts	Yes 202	3.41 ± 0.43**	
	No 701	3.30 ± 0.42	
Number of academic conferences participated in (1 year)	0.38 ± 0.72		.07
Participation in a journal club (1 year)	Yes 62	3.47 ± 0.44**	
	No 860	3.31 ± 0.42	

Note: mean (M); standard deviation (SD); critical thinking (CT).

\**p* < .05.

\*\**p* < .01.

## 4 | DISCUSSION

This study comprehensively explored the factors related to CT among staff nurses in Japan. This is the first Japanese study to comprehensively explore the relationship between organizational/personal factors and CT among hospital staff nurses. Participants' characteristics regarding age and female proportion were similar to statistics on general nurses in Japan (Ministry of Health, 2016). Overall, our results indicated that mostly personal characteristics and experiences were related to CT. Thus, to foster nurses' CT, it seems to be effective to focus on personal factors.

In this study, the only organizational factor that was associated with nurses' CT was working in an emergency unit. A previous study reported no differences in CT among clinical departments (Ito & Yamase, 2007). However, the emergency unit is different from other units because it involves dealing

**TABLE 3** Factors of CT total score: multiple regression analysis *n* = 774

	CT total score	
	sβ	<i>p</i>
Organizational factors		
Emergency unit	.07	.040
Personal factors		
Highest level of nursing education: bachelor's or higher	.07	.030
Independent view of self	.22	<.001
Self-esteem	.24	<.001
Workload	.10	.002
Trained nursing research in post-licensure education	.15	<.001
Adjusted <i>R</i> <sup>2</sup>	.17	

Note: Determination coefficient (*R*<sup>2</sup>); critical thinking (CT); standardized beta coefficient (sβ).

with various diseases and urgent situations, and nurses are faced with unpredictable circumstances (Kim & Choi, 2016). We would expect that urgent and unpredictable situations cause nurses to think more critically.

The highest level of nursing education, a bachelor's degree or a higher qualification, was related to higher CT scores. However, a previous study reported that CT of university graduates was not significantly higher than that of other graduates (Ito & Yamase, 2007). This previous study only conducted bivariate analysis, and participants included nurse managers and chief nurses. CT of managers and chief nurses were significantly higher than that of staff nurses in the previous study. Nursing education in university was previously not common in Japan (Ministry of Education, Sports, Science and Technology Japan, 2006), thus many managers and chief nurses of the participants were not university graduates because most of them obtained pre-licensure education several decades ago. That may be the reason why the results from previous studies differ from our study. Now, CT is being taught at the university level in Japan (Ministry of Education, Sports, Science and Technology, 2011), therefore our result may indicate the effectiveness of university education on fostering CT. However, the contents of CT education may vary among universities, and it is unclear which aspect of education in universities has impact on nursing students. Exploring which aspects of education have impact on nursing students' CT may give suggestions for CT teaching.

Independent view of self has been already suggested as a factor related to CT (Kakai, 2001; Takahashi & Hongo, 2014). Eastern cultures, including Japanese, tend to value harmony rather than independence. This was reflected in the

low average score for independent view of self in this study (3.68) as compared to the average scores of a study conducted in Canada (4.97) (Takata, 2000). Owing to the emphasis on harmony, autonomous thinking such as CT tends to be viewed as a negative characteristic in Japan (Johnson & Marsella, 1978). However, in reality, the concept of CT embraces open-mindedness and respecting the opinions of others (Facione, 1990). Although altering the cultural view of the self may be difficult because it is developed through daily experience from childhood (Hitokoto & Tanaka-matsumi, 2004; Markus & Kitayama, 1994), nurses in Japan need a more real understanding of the concept of CT (Kakai, 2004). Widespread dissemination of the correct understanding of CT may contribute to fostering CT in Japan.

Self-esteem was a factor related to CT in this study. This study has provided more concrete evidence of the association between self-esteem and CT than previous qualitative studies (Chan, 2013; Kawashima, 2003). As thinking critically is difficult for people who lack confidence (Kawashima, 2003), increasing self-esteem may be one of the important components of fostering CT among nurses.

Higher workload perception was associated with higher CT. One possible reason could be that nurses who spend more time engaging in thinking critically feel greater pressure, thus making their entire workload seem more burdensome. CT is fundamental to the daily work of nurses and must be included in measures of workload (Pickett, 2009). However, since there is limited research on the relationship between CT and workload, particularly in terms of quantitative studies, further studies are needed.

Taking seminars on nursing research in post-licensure education was related to higher CT scores. A previous study suggested that education on writing and analysis improved students' CT (Hayashi & Yamada, 2012). We assumed that taking seminars on nursing research can enhance the dispositions that affect CT, such as clarity in stating questions or concerns (Facione, 1990). However, in this survey, only half of the hospitals conducted educational programs on nursing research. Similar results have been reported in previous studies (Sakashita et al., 2013). Especially for small-sized hospitals with limited resources, it may be difficult to offer such training; therefore, it may be helpful for big hospitals to open these seminars to nurses working elsewhere.

We considered that organizational factors such as work environments and unit managers' CT could be associated with nurses' CT. However, these factors were not significantly associated with nurses' CT, which indicates that simply focusing on organizational environment may not be enough to foster nurses' CT.

Contrary to our expectation, the work environment as measured by the PES-NWI was not associated with staff

CT. A good relationship with colleagues has been suggested to affect CT (Takagi et al., 1998). Many items of the PES-NWI evaluated the entire hospital environment, and a few items included unit-level work environment. Thus, focusing more on unit-level work environment may have yielded a different result.

The unit managers' CT did not have a direct impact on staff nurses' CT. It is reported that preceptorship fosters nursing students' CT (Myrick, 2002); people who are close to staff nurses might have an influence on their CT. Managers have few opportunities to care for patients with staff nurses. Therefore, education about CT would be effective for team leaders or preceptors who directly educate staff nurses.

This study has several implications for clinical settings. First, offering seminars on research may be effective not only for conducting research but also for fostering nurses' CT. However, it seems that many hospitals do not offer this education; therefore, supplying this kind of education may be helpful. Second, enhancing nurses' self-esteem is one way to foster nurses' CT. Third, although it is difficult to enhance independent view of self, disseminating the correct understanding of CT among nurses may contribute to fostering their CT.

This study has several limitations. First, because it was cross-sectional, the observed associations among variables might not have been causal. It is necessary to examine the causal relations through a longitudinal investigation. Second, because we used a Japanese CT scale, we cannot easily compare these results with similar studies in other countries. The California Critical Thinking Dispositions Inventory (CCTDI) is often used for measuring CT. However, although a Japanese version of the CCTDI was created, its reliability could not be confirmed (Makimoto et al., 1999). The Japanese CT scale was created by integrating the CCTDI with other CT scales; therefore, the concept of CT was similar to that measured by the CCTDI. Third, the low response rate and the manner of unit selection may reflect selection bias, which may have affected the internal validity of this study. As the nursing directors of these hospitals may have been interested in CT, the CT of their staff nurses could have been higher than of those in other hospitals, and the variations of CT might be smaller than can be found in other hospitals. Thus, we might have missed some potential factors related to CT disposition in this study. However, the average score of CT in this study was similar to that found in a previous study (Takahashi & Hongo, 2014). In future, we should examine whether nurses' CT can be improved through interventions aimed at the factors highlighted by this study.

## 5 | CONCLUSIONS

This study comprehensively explored the factors influencing CT among staff nurses in Japan. Factors related to higher CT were working in an emergency unit, having a bachelor's degree or a higher qualification, higher independent view of self, higher self-esteem, higher perceived workload, and training experience of nursing research in post-licensure education. Other organizational factors such as the work environment and unit managers' CT were not associated with staff nurses' CT. These findings suggest that personal factors have more of an impact on nurses' CT than do organizational factors. Offering educational opportunities regarding research is one of the ways to foster nurses' CT. Exploring which educational contents promote nurses' CT would be the next step.

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## DISCLOSURE

The authors declare no conflicts of interest.

## AUTHOR CONTRIBUTIONS

A.F. contributed to the conception, design, acquisition of data, statistical analysis, and interpretation, and also drafted the manuscript; M.N. contributed to revise the manuscript; N.M. contributed to the design and interpretation of data and revised the manuscript; and N.Y. supervised the entire study process.

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