

The Relation between Metacognition and Empathy in Nurses¹⁾

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Nurses' empathy is an important dimension of the therapeutic alliance between patients and nurses. The objective of this study was to verify the model that metacognition directly relates to perspective taking, and that rationality and intrapersonal emotional intelligence can mediate between metacognition and perspective taking, and that perspective taking relates to other-oriented emotional reactivity in nurses. Questionnaires obtained from 838 nurses working in five hospitals were analyzed using structural equation modeling. The results showed that metacognition related to rationality and intrapersonal emotional intelligence, and rationality and intrapersonal emotional intelligence related to perspective taking. In addition, monitoring and control within the subfactors of metacognition related to perspective taking. Furthermore, perspective taking and metacognitive knowledge related to other-oriented emotional reactivity. The results of this study suggest these relations may be one source of proof of causation.

key words: empathy, metacognition, nurse

Introduction

The patient-nurse relationship and Empathy

It is important for a nurse to establish a trust relationship with a patient, this relationship makes effective nursing actions (Morse, 1991). In patient-nurse relationships, a nurse's empathy facilitates shared understanding (Williams & Stickley, 2010) and is one of the essential factors to establish a trusting relationship with a patient (Hayashi & Kawai, 2002; Ito, 2002; Sugiyama, Higa, Tanaka, & Yamada, 2015). Empathy is defined as awareness or self-cognition of another's mental state (Tobari,

2005), there are two aspects of empathy: state and trait. "State empathy" is empathy that happens in the actual situation (Tobari, 2005). On the other hand, "trait empathy" is a personality trait that causes "state empathy" (Tobari, 2008). Previous studies have shown that the trait empathy of nurses related skills for encouraging the expressiveness of patients and communication skills (Nagao & Kadohama, 2015, Sugiyama et al., 2015). Therefore, trait empathy is important because it is one of the foundations in patient-nurse relationships (Fukuda, 2009; Ito, 2002).

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Trait empathy

Trait empathy is conceived as a multidimensional concept and is categorized as other and self-orientation in addition to having cognitive and emotional aspects (Suzuki & Kino, 2008). Such orientation is categorized according to whether some cognition or emotion about another's mental state is based on the perspective of self or others (Suzuki & Kino, 2008). For example, regarding the cognitive aspect, the perspective of thinking that says "that person would surely feel like this" about an individual is other-oriented, while the perspective of thinking that says "I would surely feel this way" is self-oriented (Suzuki & Kino, 2015). Regarding the emotional aspect, the feeling of compassion, such as "I am sure that it is hard for him" when looking at a friend who has failed is other-oriented, while the feeling of "it is going to be hard if this happens to me" is self-oriented (Suzuki & Kino, 2015). The other-oriented aspect of empathy is very important for nurses (Hayashi & Kawai, 2002). Within other-oriented empathy, the cognitive aspect is perspective taking and the emotional aspect is other-oriented emotional reactivity (Suzuki & Kino, 2015). However, previous studies have described that perspective taking does not improve with nursing experience, and practicing nurses' other-oriented emotional reactivity was lower than those of nursing students (Hayashi & Kawai, 2002). Therefore, trait empathy seems to be difficult to develop (Reynolds & Presley, 1988), and an intervention study using role lettering with nursing students reported that it did not improve perspective taking (Kaneko, Sekido, & Shimomura, 2014). On the other hand, previous studies showed that cognitive function and social experience related to perspective taking (Apperly, 2011; Bradford & Gomez, 2015; Hoffman, 2000; Watanabe, 2018), and Fukuda (2009) pointed out the potential of perspective taking training. In addition, Davis's (1994) organizational model of the process of state empathy showed that the cognitive aspect of empathy relates to the emotional aspect. Even in trait empathy, perspective taking related to

other-oriented reactivity (Hayama, Uemura, & Hagiwara, 2008). These studies suggest that perspective taking may be related and transformed in some way, and that perspective taking may promote other-oriented emotional reactivity. Therefore, the aim of the current study was to clarify the factors that relate to perspective taking and examine the potential of training of other-oriented emotional trait empathy as an essential skill for nurses.

Metacognition

Higher-order cognitive function is required for perspective taking (Hoffman, 2000), which may be due to the relation of metacognition. Metacognition can be described as thinking about thinking (Flavell, 1987) and is important in learning situations such as sentence comprehension and social adjustment (Sannomiya, 2018). Metacognition has three components: metacognitive knowledge, monitoring, and control (Sannomiya, 2008). Metacognitive knowledge is knowledge about one's own knowledge, such as knowledge about the cognitive trait that "A is easier to understand than B". Monitoring is assessing one's perception of self (Dunlosky, 2010), such as conducting a causal analysis of success or failure. Control is adjusting certain aspects of the perception of the self (Dunlosky, 2010), such as re-setting goals and planning (Sannomiya, 2008, 2018).

For establishing perspective taking, it is necessary to distinguish and infer the difference between self and other's perspective, based on the knowledge formed from the other's past words and behavior, and to aware that the self's perspective is not the same as the other's (Watanabe, 2018). Therefore, it is necessary to have an objective and limited view of one's own perspective based on knowledge of others through metacognition. Furthermore, a brain imaging study of adults also showed common sites in the neural basis of metacognition and perspective taking (Saxe, Moran, Scholz, & Gabrieli, 2006). These studies suggest that metacognition relates to perspective taking.

Rationality

Rationality is defined as logical thinking, it is

characterized by abstract, slow, active, quick change, logical conjunction, and subdivided constructs (Pacini & Epstein, 1999). Perspective taking requires reasoning while connecting observed and past information about others, which requires a deliberate effort to suppress the perspective of the dominant self (Hoffman, 2000). Therefore, rationality, the tendency to view things objectively, may also relate to perspective taking. A previous study of adults also showed a positive correlation between perspective taking and rationality (Strobel, Strobel, Grass, & Pohling, 2017).

Metacognition plays an important role for rationality because rationality requires having knowledge of one's thoughts and assessing and adjusting those thoughts (Sannomiya, 2009). Metacognition allows us to avoid the relation of emotions on our thoughts and behaviors (Strle, 2012). Furthermore, previous studies with university students showed that metacognition and rationality were positively correlated (Matsuda, 2017). It is possible, therefore, that metacognition relates to rationality, which, taken together with the above, suggests that metacognition mediates rationality and thereby relates to perspective taking.

Intrapersonal Emotional Intelligence

It is important to regulate one's emotions appropriately to promote perspective taking (Decety & Moriguchi, 2007). Intrapersonal emotional intelligence is the proper recognition and regulation of one's emotions (Nozaki, 2017). Intrapersonal emotional intelligence involves emotion recognition and emotion regulation (Nozaki, 2015). Emotion recognition is a deep monitoring of one's own emotions (Wong & Law, 2002). Emotion recognition makes it easier to recall emotional memory (Toyoda & Sato, 2009) and enables decision-making that is not bound by incidental emotions (Nozaki, 2014). Furthermore, emotion recognition provides awareness and knowledge of one's own emotions (Nozaki, 2014; Wong & Law, 2002) and allows for the adjustment of emotions to suit the situation (Nozaki, 2014). In addition, emotion regulation positively reduces the stress

that interferes with cognitive function during task performance and inhibits inappropriate behavior associated with emotion in interpersonal situations (Nozaki, 2014). Although perspective taking consists only of cognitive components and can relate to other-oriented emotional reactivity, perspective taking itself is less related by emotions (Eisenberg, 1994; Hoffman, 2000). In addition, previous studies with university students and older adults showed a weak to moderate positive correlation between intrapersonal emotional intelligence and perspective taking (Eisenberg, 1994; Eisenberg & Okun, 1996). Therefore, intrapersonal emotional intelligence may relate to perspective taking. Although it has been noted that the expression of emotions in nursing can be helpful in the relationship with the patient (Miyamoto, 2003), given that excessive negative emotions can lead to negative attitudes, it is sometimes necessary to regulate emotions in interpersonal situations (Salovey, Mayer, Goldman, Turvey, & Palfai, 1995).

Furthermore, intrapersonal emotional intelligence requires the ability to reflect (Nozaki & Koyasu, 2015), and metacognition supports reflection (Kakuta, 1998). Metacognition avoids the relation of emotions on thinking and behaviors (Strle, 2012), and attitudes that distance themselves from emotions lead to intrapersonal emotional intelligence (Sugiura, 2008). In addition, previous studies with university students showed a positive correlation between intrapersonal emotional intelligence and metacognition (Mahasneh, 2014). From the above, it is possible to suggest that metacognition mediates intrapersonal emotional intelligence and relates to perspective taking. Consequently, it was suggested that in addition to metacognition directly influencing perspective taking, metacognition might also relate to perspective taking via rationality and intrapersonal emotional intelligence, and furthermore, perspective taking relates to other-oriented emotional reactivity.

Although previous studies have examined the bivariate relations between empathy and metacogni-

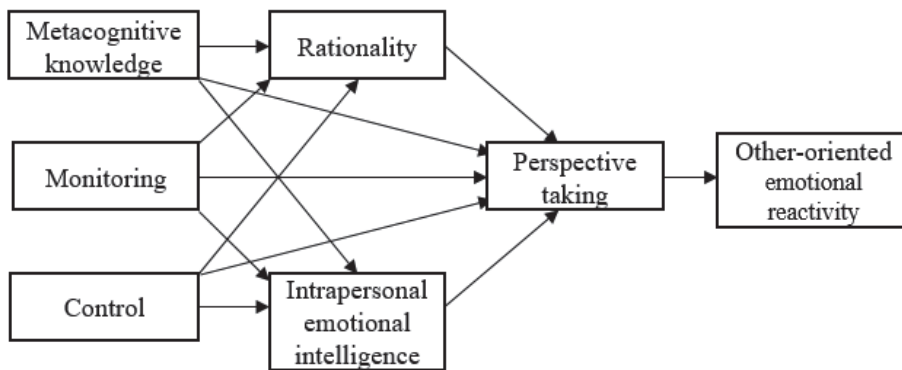


Figure 1 Hypothesized model

tion, rationality, and intrapersonal emotional intelligence, respectively, no studies have been found that have modeled these factors and examined the psychological mechanisms of empathy. By including all of these factors in the model, it is possible to examine the possibility that metacognition is behind the factors that relate to empathy and the factors that have a strong relation. Therefore, this study aimed to test the hypothesized model (Figure 1) that metacognition directly relates to perspective taking, that metacognition relates to perspective taking via rationality and intrapersonal emotional intelligence, and that perspective taking relates to other-oriented emotional reactivity.

Methods

1. Study population and data collection

The participants in this study were 2072 nurses working in an advanced treatment hospital, a community medicine support hospital, a general hospital, and two psychiatric hospitals in Kanto area. Data were collected from July to August 2019, using an anonymous self-report questionnaire.

The experimental protocol was approved by the Ethics Committee of the University of Tsukuba Hospital, (approval number: R1-096), and five hospitals.

2. Questionnaires

Demographics Participants' demographics, including sex, age, level of education, job category,

working experience, and working department were collected.

Empathy The Multidimensional Empathy Scale (MES; Suzuki & Kino, 2008) includes 5 subscales: other-oriented emotional reactivity, self-oriented emotional reactivity, emotional susceptibility, perspective taking, and fantasy. MES has been approved for assessing trait empathy, and its reliability and validity have been established. The other-oriented emotional reactivity and perspective taking subscales were used in our study. The items are rated on a Likert scale of 1 to 5 ("1=very strongly disagree" to "5=very strongly agree"), with higher scores indicating higher trait empathy.

Metacognition The Metacognitive Scale (Muromachi & Ueichi, 2015) includes 3 subscales: metacognitive knowledge, monitoring, and control. The Metacognitive Scale has been approved for assessing metacognition, and its reliability and validity have been established. The items are again rated on a Likert scale of 1 to 5 ("1=very strongly disagree" to "5=very strongly agree"), with higher scores indicating higher metacognition.

Rationality The Rational and Intuitive Information-Processing Style Inventory (IPSI; Naito et al, 2004) includes 2 subscales: rationality and intuition. IPSI has been approved for assessing individual differences in rational and intuitive thinking, and its reliability and validity have been established. The rationality subscale was used in our

Table 1 Descriptive statistics of demographics

	<i>n</i>	%
Sex		
male	141	16.8
female	697	83.2
Job category		
registerd nurse	788	94.0
assistant nurse	50	6.0
Level of education		
high school	25	3.0
college	526	62.8
junior college	44	5.2
university	223	26.6
graduate university	20	2.4
Working department		
adult ward	333	39.8
pediatric/perinatal ward	38	4.5
pschiatric ward	275	32.8
others	192	22.9
	<i>Mean</i>	<i>SD</i>
Age (year)	37.66	10.92
Nursing experiene (year)	13.56	10.45

N = 838

study. The items are rated on a Likert scale of 1 to 5 (“1=very strongly disagree” to “5=very strongly agree”), with higher scores indicating higher rationality.

Intrapersonal Emotional Intelligence The Revised Wong and Law Emotional Intelligence Scale Japanese version (WLEIS-R; Nozaki, 2017) includes 2 subscales: intrapersonal emotional intelligence and interpersonal emotional intelligence. WLEIS-R has been approved for assessing individual differences in emotional intelligence, and its reliability and validity have been established. The intrapersonal emotional intelligence subscale was used in our study. The items are rated on a Likert scale of 1 to 6 (“1=very strongly disagree” to “6=very strongly agree”), with higher scores indicating higher intrapersonal emotional intelligence.

3. Statistical methods

Descriptive statistics were used to summarize data, including means, standard deviations, and percentages. Cronbach’s coefficient α was used to assess the reliability of the scales and subscales. Correlations between each scale were calculated using

Pearson’s coefficient. In addition, structural equation modeling (SEM) was used to test the hypothesis model. For assessing the model fit, the following the criteria were used: goodness of fit index (GFI) $\geq .950$, adjusted goodness of fit index (AGFI) $\geq .950$, comparative fit index (CFI) $\geq .950$, root mean square error of approximation (RMSEA) $\leq .080$ (Brown, 2006). And also, Akaike’s information criterion (AIC) was used for model comparison.

Analyses were performed using Statistical Package for the Social Sciences (SPSS), version 25.0 for Windows, Tokyo, and SEM was performed using SPSS Amos 25.0 for Windows, Tokyo. For all analyses, $p < 0.05$ was considered significant.

Results

1. Participants (Table 1)

A total of 1037 questionnaires were returned from participants of 5 hospitals with a response rate of 50.1%. Participants with missing data were excluded, leaving 838 for analysis (80.8%).

2. Correlation analysis

Cronbach’s coefficient α for each scale, the mean and standard deviation, and the correlation coefficients between each scale were calculated (Table 2); the Cronbach’s coefficient α ranged from .67 to .86. In relations between variables of hypothesized model, statistically significant positive correlations, were observed between other-oriented emotional reactivity and perspective taking ($r = .54$), perspective taking and metacognitive knowledge ($r = .29$), monitoring ($r = .42$), control ($r = .34$), rationality ($r = .29$), intrapersonal emotional intelligence ($r = .35$), rationality and metacognitive knowledge ($r = .35$), monitoring ($r = .46$), control ($r = .42$), intrapersonal emotional intelligence and metacognitive knowledge ($r = .48$), monitoring ($r = .33$), control ($r = .35$). And also, statistically significant positive correlations, were observed between other-oriented emotional reactivity and metacognitive knowledge ($r = .25$), intrapersonal emotional intelligence ($r = .24$), monitoring ($r = .22$).

3. Covariance structure analysis of models

To test the hypothesized model, we computed

Table 2 Descriptive statistics and Cronbach's coefficient α of variables, and correlations between variables

	1	2	3	4	5	6	7	M	SD	α
Trait empathy										
1. Other-oriented emotional reactivity								3.87	0.55	.72
2. Perspective taking	.54**							3.71	0.54	.68
Metacognition										
3. Metacognitive knowledge	.25**	.29**						3.65	0.62	.71
4. Monitoring	.22**	.42**	.40**					3.45	0.63	.82
5. Control	.14**	.34**	.47**	.56**				3.31	0.64	.67
6. Rationality	.11**	.29**	.35**	.46**	.42**			2.91	0.61	.86
7. Intrapersonal EI	.24**	.35**	.48**	.33**	.35**	.29**		3.76	0.67	.84

N = 838

intrapersonal EI = intrapersonal emotional intelligence

Pearson's correlation coefficient, * $p < .05$, ** $p < .01$

Table 3 Goodness of fit for each model

	GFI	AGFI	CFI	RMSEA	90%CI	AIC
Hypothesized model	.990	.951	.984	.072	[.048, .097]	75.75
Revised model 1	.993	.939	.990	.081	[.050, .117]	69.66
Revised model 2	.992	.965	.989	.058	[.034, .084]	66.81

SEM with the maximum-likelihood algorithm. Other models were also tested because the results of the correlation analysis showed statistically significant positive correlations between other-oriented emotional reactivity and metacognitive knowledge, interpersonal emotional intelligence, and monitoring. Specifically, paths from metacognitive knowledge, intrapersonal emotional intelligence, monitoring to other-oriented emotional reactivity were added for the hypothesized model (revised model 1). In addition, using model search (Toyoda, 2016), about paths have small path coefficient were considered, paths that from metacognitive knowledge to perspective taking, from monitoring and intrapersonal emotional intelligence to other-oriented emotional reactivity were deleted from revised model 1 (revised model 2). An evaluation of the considered index showed that revised model 2 the most met the recommended criteria: GFI=.992, AGFI=.965, CFI=.989, RMSEA=.058, 90% CI=[.034, .084], AIC=66.81 (Table 3). In combination, these figures suggest a satisfactory fit to the data. Examination of the path coefficients for the model (Figure 2) indicated the proposed paths were signifi-

cant, with standardized estimates ranging from .08 to .52.

Discussion

This study focused on metacognition, rationality, and intrapersonal emotional intelligence as factors that relate to perspective taking. After considering several models by using SEM, revised model 2 was adopted. The results showed that metacognition related to rationality and intrapersonal emotional intelligence, and rationality and intrapersonal emotional intelligence related to perspective taking. In addition, monitoring and control within the subfactors of metacognition related to perspective taking. Furthermore, perspective taking and metacognitive knowledge related to other-oriented emotional reactivity.

1. Characteristics of the Study Samples

Previous study showed that the rate of male nurses was about 6.3% (Japanese nursing association; JNA, 2018), 12.4% (Sugiyama et al., 2015), 1.9% (Fuzii, 2009), in the level of education, college is 73.2% (JNA, 2018), more than junior college is 26.8% (JNA, 2018). Mean age in nurses was 41.5 years old

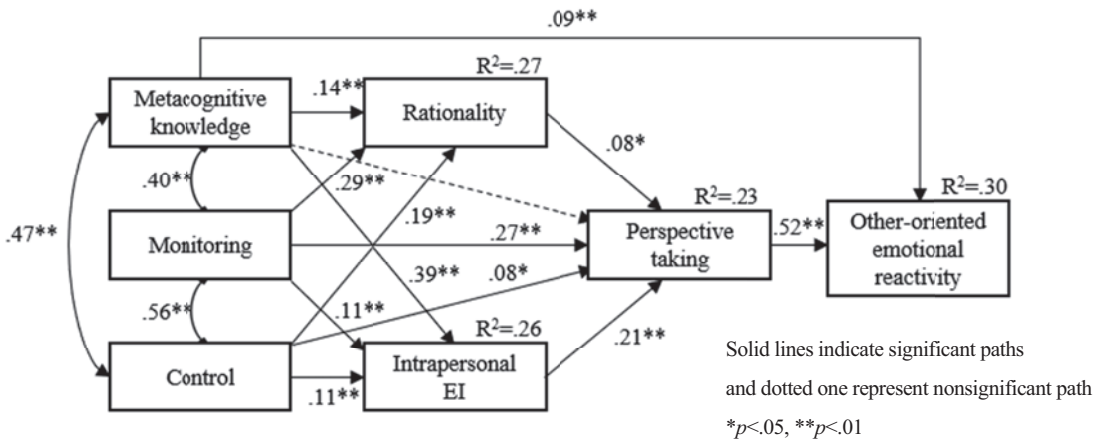


Figure 2 The Relation between Metacognition and Empathy in Nurses

(JNA, 2018), 35.0 years old (Sugiyama et al., 2015), 30.4 years old (Fuzii, 2009), the mean of nursing experience was 18.5 years (JNA, 2018), 11.7 years (Sugiyama et al., 2015). Although there is variation depending on the study in study samples, from the above, characteristics of this study samples are high rate of male nurses and a high rate of more than junior college, therefore generalizations may be made with caution.

2. The Relation between Metacognition and Empathy in Nurses

Monitoring and control directly related to perspective taking, since monitoring had a larger path coefficient, it was possible that monitoring was more strongly related to perspective taking than control. This result suggests that assessing one's own perceptions would allow one to appreciate the perspective of others. By looking at oneself objectively, we can achieve a deeper self-understanding and become more aware of our differences with others and, as a result, one gains a wider range of understanding of others (Kakuta, 1998). Therefore, monitoring enables us to distinguish between self and other by examining both personalities at a profound level this leads to perspective taking (Decety & Moriguchi, 2007). Surprisingly, metacognitive knowledge did not relate to perspective taking but related to other-oriented emotional reactivity

directly. This result suggests that emotions toward others may be generated based on accumulated metacognitive knowledge about interpersonal relationships, without thinking from the other party's standpoint. This may be because of the cognitive load on cognitive processing, such as perspective taking (Hoffman, 2000). For nurses who are busy with their daily tasks, they may not have the time to put their cognitive load on and think from the perspective of others. Therefore, revised model 2 was considered to be most likely to fit the data best. However, the absence of perspective taking suggests that the accuracy of metacognitive knowledge may have a direct relation to the quality of other-oriented emotional reactivity. Metacognitive knowledge includes inappropriate knowledge, for example, incorrect knowledge (Sannomiya, 2016), while inappropriate metacognitive knowledge regarding interpersonal relationships have the potential of leading to other-oriented emotional reactivity that are not congruent with others' states. Although the present study could not qualitatively examine the content of metacognitive knowledge and other-oriented emotional reactivity, it is necessary to examine the relation between metacognitive knowledge and other-oriented emotional reactivity in the future, taking these factors into account.

We found that intrapersonal emotional intelli-

gence directly related to perspective taking. This suggests that intrapersonal emotional intelligence is necessary for perspective taking because perspective taking consists only of cognitive components and perspective taking itself is less influenced by emotions, even though it may relate to other-oriented emotional reactivity (Eisenberg et al., 1994; Hoffman, 2000). Therefore, perspective taking could be achieved by recognizing and regulating one's emotions appropriately. Among the elements of metacognition, the path coefficient from metacognitive knowledge to intrapersonal emotional intelligence was the largest. This suggests that increasing metacognitive knowledge can lead to appropriate emotion recognition and regulation of the self. It is possible that the impact of the metacognitive knowledge on intrapersonal emotional intelligence was greater than that of monitoring and control because metacognitive knowledge included knowledge of the self's emotions (Sannomiya, 2018). Therefore, it is possible that knowledge of self-cognition may promote the recognition and regulation of the self's emotions.

We found that rationality directly related to perspective taking. This suggests that perspective taking requires a deliberate effort to make inferences by associating observed information about others with past information (Hoffman, 2000). However, path coefficient from rationality to perspective taking is small. Although it is possible that high rationality is associated with a higher tendency to think about things logically, and that they may have deliberate and effortful thinking patterns, rationality may not always be effective in interpersonal relationships. Therefore, in the future, it may be valuable to examine how rationality functions in interpersonal situations.

There are multiple pathways in the process of evoking other-oriented emotional reactivity, one of which is perspective taking (Hoffman, 2000). Perspective taking is the basis of other-oriented emotional reactivity (Eisenberg, Spinrad, & Morris, 2013). Therefore, the relation of perspective taking

on other-oriented emotional reactivity was demonstrated in the participants of the present study.

In conclusion, the present study showed that metacognition, rationality, and intrapersonal emotional intelligence related to perspective taking, and perspective taking related to other-oriented emotional reactivity. This means that, as a psychological mechanism, the process of improving other-oriented emotional reactivity through perspective taking from metacognition to perspective taking can be assumed, and this suggests these relations may be one source of proof of causation. And also, the path coefficient from perspective taking to other-oriented emotional reactivity and the R^2 of other-oriented emotional reactivity suggest the importance of perspective taking to other-oriented emotional reactivity. However, although metacognition, rationality, and intrapersonal emotional intelligence related to perspective taking and other-oriented emotional reactivity, they are not highly influential. Therefore, it may be important to have skill training of perspective taking itself, like thinking from the patient's perspective through simulation education from the viewpoint of clinical application, or other variables may need to be used to examine the factors associated with perspective taking.

3. Limitations and future issues

A limitation of this study is that the response rate is 50.1%, which was not sufficient to fully ensure internal validity. The response rate was affected by the burden of answering and returning the responses because the nurses' daily duties are irregular and their workload is high. Therefore, reducing the number of questions by using a shortened version of the scale or lengthening the survey period to give consideration to the burden of responses and returns might increase the response rate.

In addition, this study cannot reveal causal relations in the model. Therefore, further study is needed to directly test that metacognitive training increases rationality, intra-personal emotional intelligence, perspective taking, and other-oriented emo-

tional reactivity more than the group that does not.

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