ORIGINAL ARTICLE

Decision-making styles, anxiety levels, and critical thinking levels of nurses

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Abstract

Aim: This research was carried out so as to reveal the relationships between the anxiety state of nurses, their critical thinking disposition, and decision-making strategies.

Methods: Survey forms and scales that were related to demographic attributes, anxiety, critical thinking and decision-making were used in this research. The sampling was formed with 326 nurses who were selected by using the random sampling method. The data were collected between November, 2014 and January, 2015 via a Descriptive Information Form, the California Critical Thinking Disposition Inventory, State–Trait Anxiety Inventory, and Decision-Making Strategies Scale.

Results: Of the nurses, 91.4% were discovered to have low critical thinking disposition levels. The nurses' scores in analytics, open-mindedness, and curiosity were higher, compared to the other categories. As for decision-making, independent decision-making was the most commonly used strategy. There was a poor positive relationship between the age of the nurses and their points of independent decision-making and intuitive decision-making. It was detected that age and open-mindedness affected the total points of independent decision-making, intuitive decision-making, and rational decision-making.

Conclusion: The critical thinking training of nurses affects their rational decision-making levels and their age affects independent, intuitive, and rational decision-making. Systematicity affects only indecision in a negative way, whereas open-mindedness negatively affects intuitive decision-making, rational decision-making, and indecision. Anxiety negatively affects independent decision-making, whereas it affects indecision strategy positively. The working style of nurses does not affect their decision-making strategies. Indecision strategy is negatively predicted by open-mindedness, systematicity, and self-confidence and it is positively predicted by anxiety.

Key words: anxiety decision-making, descriptive quantitative, nurses, nursing practice.

INTRODUCTION

Today's health system has some issues, such as increasing health expenditure, an aging population, inequality in health, and integrating evidence-based practices into the system. Nurses making the right decisions are of undeniable importance in coping with these issues and the maintenance of high-quality patient care. The decision-making ability is an indispensable part of the nursing profession and is a dynamic, conceptual, and complicated process that can affect the outcomes of patients (Johansen & O'Brien, 2016; Thompson, Aitken, Doran, & Dowding, 2013).

Decision-making is the process of creating preferences among options, choosing an action and conducting it, experiencing the result, and evaluating it (Ernst & Paulus, 2005). Studies that have been conducted on

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decision-making strategies have focused on understanding how preferences are created and how personal styles can hinder attaining one's objectives. However, a certain style gives the best result when an appropriate match-up or harmony is secured between the action and the individual (Hunsaker & Hunsaker, 1981).

Critical thinking disposition, anxiety, and decision-making strategies

In the literature, although some studies regard decision-making strategies as a learned habit, others consider it as a cognitive process. In these studies, it is suggested that the main difference among the styles is related to the knowledge level and the number of alternatives (Driver, Brousseau, & Hunsaker, 1998; Hunsaker & Hunsaker, 1981; Thunholm, 2008). According to Driver *et al.*, factors such as time pressure during the decision-making period and the decision being of vital importance and requiring sophisticated knowledge affect the use of the proper style.

In relation to decision-making strategies, the consideration of what results might be yielded in the event of choosing an option among a number constitutes the basis of this process. At this point, critical thinking is of great importance. Critical thinking facilitates making clinical decisions by influencing the diagnosis, therapeutic judgment, and ethical decision-making (Müller-Staub & Stuker-Studer, 2006). Critical thinking is also closely associated with a nurse's intuition ability, analysis and synthesis, and expected patient results (Bjørk & Hamilton, 2011; Fesler-Birch, 2005; Lamond & Thompson, 2000).

Anxiety is a crucial factor that affects decision-making (Miu, Heilman, & Houser, 2008). Making healthy decisions also necessitates making calm decisions that are free from anxiety. Anxiety is an indistinct type of fear that persons feel without knowing the actual problem.

According to Bachkirov (2015) different feelings can affect decision-making in different ways. High levels of continuous anxiety negatively affect decision-making. Some explanations are available in the literature on how anxiety can influence the processes of decision-making. These are as follows (Chapman, 2006; Hartley & Phelps, 2012; Maner *et al.*, 2007; Maner & Schmidt, 2018; Miu *et al.*; Ramírez, Ortega, & Del Paso, 2015):

1 Anxiety, by affecting the ways of processing knowledge, can lead to a tendency of heading towards the information that is related to the threat, negative interpretation of ambiguous stimuli, and the emergence of the behavior of harm avoidance.

2 Anxiety impairs the effective operation of the attention system towards the target and distracts attention away from the subject by drawing it to another place. Decision-makers, rather than finding the best solution to the current problem, focus on reducing the feeling of anxiety and the stimuli related to the threat.

3 Anxiety, in some cases, might cause the tendency of taking excessive risks or avoiding risks.

This study was conducted in order to reveal the relationships between nurses' state of anxiety and disposition towards critical thinking and decision-making strategies because nurses' decision-making processes, critical thinking, and anxiety are considered to be connected. This study also was designed to make contributions, even if only by a small amount, to the literature.

METHOD

Design, setting, and sample

This research is of a descriptive, cross-sectional design. The population of the research comprised 1000 nurses who were working in Istanbul University's Istanbul Medical Faculty Hospital, Turkey. Istanbul Medical Faculty Hospital is one of the most prominent hospitals in Turkey. Advanced healthcare practices are offered in the hospital. There were 1000 nurses and 1353 hospital beds in the hospital during the time that the research was conducted. The period when the research was conducted was when the hospital had the highest number of nurses. The sample in this research constituted nurse practitioners and nurse managers who were working in internal medical units (internal diseases, neurology, physical medicine and rehabilitation, dermatology, pediatrics, infectious diseases, undersea and hyperbaric medicine clinic, coronary intensive care unit, arrhythmia intensive care unit, and anesthesiology) and surgical units (general surgery, gynecology, pediatric surgery, transplantation unit, otorhinolaryngology, brain and nerve surgery, surgical intensive care units, orthopedics, traumatology, and surgery room). The required sample size was determined as 278 persons when the type 1 error was regarded as 5%, $P = 0.50$, confidence level as 95%, and the margin of error as 5%. Considering a potential loss rate of 25% during the study process, it was calculated that the minimum sample size should be 348 persons.

Data collection

The data were collected between November, 2014 and January, 2015. The nurses were informed about the aim of the research, its duration, and how to complete the documents. The survey form was distributed to the nurses who accepted to participate in the research voluntarily. After 1 week, the completed survey forms were collected. Out of the 350 survey forms, 326 were returned, all of which were included in the sampling.

Instruments

Descriptive information form

This form was composed by the researchers to capture the nurses' sociodemographic characteristics.

California Critical Thinking Disposition Inventory

The California Critical Thinking Disposition Inventory (CCTDI) was the first tool to be designed to measure the seven aspects of the critical thinking disposition (CTD) (Facione, Facione, & Sanchez, 1994). The CCTDI was adapted into Turkish by Kökdemir (2003) who studied its validity and reliability. When adapted into Turkish, the inventory was organized into six dimensions as "systematicity," "open-mindedness," "analytics," "seeking truth," "self–confidence," and "inquisitiveness." The "maturity" subdimension that existed in the original inventory was distributed to the other dimensions (Kökdemir). The Turkish CCTDI consists of 51 items and the inventory's internal coefficient of consistence is 0.88. The items are assessed in a Likert style between 1 and 6. The total variance that was revealed by the inventory was 36.13%. In the Turkish adaptation of the inventory, scores of <240 are defined as "low" and scores that are >300 are defined as "high" CTD. To indicate the total score of the CTD, a point-scoring system consisting of the totality of these inventories is used.

State–Trait Anxiety Inventory

The State–Trait Anxiety Inventory (STAI) was developed by Spielberger *et al.* (1970) and was adapted to Turkish by Öner and Le (1983). The STAI includes two different Likert-type scales, comprising 40 items in total. The answers in the Anxiety Scale are between 1 and 4 (1, "not at all"; 4, "very much so"). The points that are obtained through each scale range from 20 to 80. High scores refer to high anxiety levels and low scores refer to low anxiety levels.

Decision-Making Strategies Scale

The Decision-Making Strategies (DMS) Scale was developed by Kuzgun (1992) to specify the decision-making styles of individuals. The scale is composed of four subscales, with 40 items in total. They are of the Likert type and the values of the answers vary between 1 and 5 (1, "absolutely inappropriate"; 5, "absolutely appropriate").

Data analyses

In this research, normality tests were carried out by using one-sample Kolmogorov–Smirnov and Shapiro–Wilk tests and through histogram graphs. The data are presented as the mean ± standard deviation, median, minimum–maximum, frequency, and percentage. The internal consistency of the scales was analyzed by using Cronbach's alpha coefficient. The consistency of the subscales was assessed by an exploratory and confirmatory factor analysis. The normally distributed variables were analyzed by using the *t*-test in independent groups and the Mann–Whitney U test in others. Abnormally distributed three and more groups were evaluated by using the Kruskal–Wallis one-way ANOVA. Multiple or post hoc group comparisons were completed with the Bonferroni-corrected Mann–Whitney U test. The relationship between the variables was evaluated by using Pearson's correlation test. The data of the descriptive information forms, CTD, and anxiety scores were included in the analyses as independent variables, while the DMS scores were included in the analyses as the dependent variables. A linear regression was conducted with the purpose of examining the effects of the independent variables over the dependent variables. $P < 0.05$ (two-sided) was considered to be the limit of significance. The analyses were conducted with IBM SPSS v. 21.0 (IBM Corporation, Armonk, NY, USA) software.

Ethical considerations

Permissions and approval were granted by the ethics committee of the university where the research was conducted and the administration of the hospital (No: 2011/1782-782). A use permit was obtained from the relevant researchers for the scales that were used. The nurses who could participate in the research were selected through the random sampling method. Among the nurses who were selected for sampling, those who were willing to participate in the research were asked to sign the approval form, after which the research was initiated.

RESULTS

Based on the explanatory factor analysis of the STAI, critical thinking, and decision-making subscales, 63%, 39%, and 41% of the variance were explicable, respectively. The result of Bartlett's test of sphericity was $P < 0.05$ in all three scales and the Kaiser–Meyer–Olkin values were 0.75, 0.43, and 0.45, respectively. The factor load value in the STAI scale was between 0.43 and 0.65, between 0.33 and 0.59 in the critical thinking scale, and between 0.35 and 0.60 in the decision-making scale. The findings of the confirmatory factor analysis showed 4.5, 5.5, and 5.3 Chi-squared/degrees of freedom, respectively. Additionally, the adjusted goodness-of-fit index values were found as 0.86, 0.71, and 0.73, respectively. The standardized root mean square residual values were 0.069, 0.113, and 0.119, respectively. It can be deduced that the consistency of the STAI scale in this study was very good in general, whereas the consistency of the DMS Scale and CCTDI was usually lower.

All the nurses were female and their average age was 33.36 ± 9.02 years. The average duration in the occupation was 11.72 ± 9.20 years, whereas the average duration in the organization was 9.73 ± 8.59 years. According to Table 1, 91.4% of the nurses had low CTD levels and 8.6% had medium levels of CTD. None of the nurses had a high level of CTD. The descriptive information regarding the state-trait anxiety, CTD, and decision-making strategies that was gathered in this study can be found in Table 2. The nurses were struggling with T-Anxiety more than S-Anxiety. Their scores in analytics, open-mindedness, and curiosity were higher, compared with the other categories. As for decision-making, independent DMS were the most commonly used.

It was examined whether there were variations in DMS based on the sociodemographic attributes of the nurses (Table 3). Intuitive DMS levels of the executive nurses were lower than the levels of the non-executive nurses. Those whose CTD was low had higher scores of intuitive DMS and indecision strategies, yet lower points in independent DMS and rational DMS than those whose CTD was sufficient. The average rational DMS of the nurses who were working in the surgical departments was lower than in the nurses who were working in the internal diseases departments. Intuitive DMS scores of the nurses with associate degrees were higher than those of the nurses with Bachelor degrees and Master's degrees. According to the correlation analysis, a very poor positive relationship was detected

Table 1 Sociodemographic features of the nurses (*n* = 326)

Characteristic	N (%)
Education	
High school	34 (10.4)
Associate degree	75 (23.0)
Bachelor degree	175 (53.7)
Master's degree	42 (12.9)
Marital status	
Married	170 (52.1)
Single	156 (47.9)
Department	
Surgery	144 (44.2)
Internal medicine	182 (55.8)
Manner of working	
Day shift	138 (42.3)
Shifts in turns	188 (57.7)
Level of income	
Low	64 (19.6)
Average	219 (67.2)
High	43 (13.2)
Executive nurse	
Yes	35 (10.7)
No	291 (89.3)
Education on critical thinking	
Those who received it	33 (10.1)
Those who did not	293 (89.9
Critical thinking disposition	
Low	298 (91.4)
Medium	28 (8.6)

between the nurses' professional time and their intuitive DMS. There was a poor positive relationship between the age of the nurses and their scores for independent DMS and intuitive DMS (Table 3). When the relationships between the variables in this study were analyzed, poor relationships were discovered between the variables in general (Table 4).

The linear regression analysis was carried out with the purpose of examining the relationships between the age, professional time, CTD subdimension, and STAI total scores, which were observed in the univariate analyses to be statistically significant or close to statistical significance with DMS (Table 5). As a result of the backward method evaluation, it was detected that independent DMS were predicted by the nurses' age, open-mindedness, systematicity, self-confidence, and STAI total points. Intuitive DMS were predicted by age, seeking for rights, and open-mindedness. Rational DMS were predicted by age, open-mindedness, being analytical, and systematicity. The indecision strategy was predicted by open-mindedness, systematicity, self-confidence, and the STAI total scores. The professional

Table 2 Defining characteristics regarding anxiety, critical thinking disposition, and decision-making strategies (*n* = 326)

Variable	Number of statements	Cronbach's α	Mean ± SD	Range[†]
State–trait anxiety				
Trait anxiety	20	0.80	40.62 ± 7.520	23–62
State anxiety	20	0.89	37.19 ± 8.950	20–68
STAI	40	90.00	77.80 ± 14.640	43–121
Critical thinking disposition				
Seeking truth	7	0.57	22.92 ± 5.100	7–39
Open-mindedness	12	0.74	42.93 ± 7.900	16–64
Analytics	11	0.78	50.72 ± 6.680	25–66
Systematicity	6	0.54	22.84 ± 3.950	13–33
Self-confidence	7	0.81	27.66 ± 5.210	10–14
Curiosity	8	0.81	34.67 ± 6.000	16.0–48
Critical thinking disposition	51	0.89	201.74 ± 23.890	144–262
Decision-making strategy				
Independent DMS	10	0.63	33.07 ± 4.149	22–46
Intuitive DMS	10	0.66	22.55 ± 4.093	11–36
Rational DMS	10	0.64	31.32 ± 3.762	17–40
Indecision strategy	10	0.80	18.69 ± 4.627	9–36

[†] Range expressed from minimum to maximum. DMS, Decision-Making Strategies Scale; SD, standard deviation; STAI, State–Trait Anxiety Inventory.

time period of the nurses did not predict their decision-making strategies (Table 5).

DISCUSSION

In the present study, it was seen that both anxiety and the CTD were related to DMS. It was found that the CTD was low for almost all the nurses in this study. Other studies that have been conducted in Turkey with nurses on the CTD have found similar results. Studies on critical thinking in nurses and student nurses include studies that have reported low CTD scores (Erkus & Bahçecik, 2015; Noohi, Karimi-Noghondar, & Haghdoost, 2012), studies with average CTD scores (Chang, Chang, Kuo, Yang, & Chou, 2011; Hicks, Merritt, & Elstein, 2003; Kawashima & Petrini, 2004), and studies with high CTD scores (Raymond & Profetto-McGrath, 2005; Zori & Morrison, 2009). Studies on nurses in Turkey show that nurses have medium or low levels of a CTD.

In a study on nurses by Özen Kutaniş and Tunç (2013), the average scores of state and trait anxiety were low, whereas the nurses in this study had average scores of trait anxiety, state anxiety, and STAI. In a study by Kaya, Bolol, Turan, Kaya, and Işci (2011), the nurses were reported to prefer rational decisions, intuitive decisions, and independent decisions the most, respectively. However, in this study, the nurses preferred independent DMS the most, followed by rational DMS and intuitive DMS, respectively. The hospital where this research was

undertaken is a university hospital at which patients with severe complications are treated. As a result of the fact that nurses are supposed to make many vital decisions, it is considered that they use independent DMS and rational DMS more frequently.

When the validity and reliability analyses of the scales that were used in this research were carried out, it was seen that although the Cronbach's α-values of the scales were high, the consistency of the DMS and CCTDI scales was usually lower. The DMS and CCTDI (Turkish Form) scales that were used in this research are scales that are used frequently in Turkey. Many studies (Kanbay, Işik, Aslan, & Özdemir, 2012; Kaya *et al.*, 2011; Kaya, Şenyuva, & Bodur, 2017; Yildirim, Özkahraman, & Ersoy, 2012) that were carried out by using the aforementioned scales with student nurses, nurses, and academic nurses in Turkey did not include the results of a factor analysis and confirmatory factor analysis; therefore, it is not possible to make comparisons. The reason why these figures are lower might result from the fact that the scales were answered through subjective perspectives and because the validity and reliability practices were carried out in samples outside of the nurse samples. Although the results that were obtained were low, they have been reported with the principle of honesty and with regard to guidance for successive researchers.

It was detected in the current research that those who did not receive critical thinking training used rational DMS more frequently than those who were trained.

Table 3 Anxiety, critical thinking disposition, and decision-making strategies based on the nurses' sociodemographic features (*n* = 326)

Characteristic	Decision-making strategies (N [range]) or mean ± SD			
	Independent DMS	Intuitive DMS	Rational DMS	Indecision strategies
Critical thinking disposition level[†]				
A: Low (*n* = 298)	33 (22–46)	23.0 (12–36)	31.0 (17–40)	19 (9–36)
B: Adequate (*n* = 28)	36 (25–42)	21.0 (11–31)	34.0 (24–38)	14 (9–38)
Difference (*P*)	B > A ($P < 0.010$**)	B > A (0.019*)	B > A (0.024*)	B > A ($P < 0.010$**)
Executive nurse[†]				
A: Yes (*n* = 35)	32 (26–41)	22.0 (11–29)	32.0 (26–39)	17 (9–27)
B: No (*n* = 291)	33 (22–46)	23.0 (12–36)	31.0 (17–40)	19 (9–36)
Difference (*P*)	None (0.798)	A > B (0.021*)	None (0.290)	None (0.093)
Received critical thinking training[†]				
A: Yes (*n* = 35)	33 (26–46)	21.0 (13–36)	29.0 (17–40)	19 (9–36)
B: No (*n* = 291)	33 (22–46)	23.0 (11–32)	32.0 (21–40)	19 (9–30)
Difference (*P*)	None (0.744)	None (0.137)	B > A (0.006*)	None (0.206)
Perception of level of income[‡]				
A: Very low (*n* = 64)	33 (27–43)	22.5 (14–31)	32.0 (21–39)	18 (9–28)
B: Low (*n* = 219)	33 (22–46)	23.0 (12–36)	31.0 (40–43)	19 (9–36)
C: Average (*n* = 43)	32 (26–42)	23.0 (11–32)	31.0 (17–40)	17 (9–27)
Difference (*P*)	None (0.888)	None (0.876)	None (0.937)	None (0.391)
Educational background[‡]				
A: High school (*n* = 34)	33 (26–42)	23.0 (14–30)	31.5 (21–40)	19 (29–75)
B: Associate degree (*n* = 75)	33 (23–43)	24.0 (18–32)	31.0 (22–39)	19 (10–29)
C: Bachelor degree (*n* = 42)	33 (22–46)	22.0 (12–31)	32.0 (24–38)	18 (9–30)
D: Master's degree (*n* = 42)	33 (27–43)	23.0 (11–36)	32.0 (17–40)	19 (9–36)
Difference (*P*)	None (0.686)	B > A, C, D (0.016*)	None (0.294)	None (0.316)
Manner of working[§]				
A- Day shift (n = 138)	33.33 ± 3.90	22.70 ± 4.12	31.74 ± 3.42	18.57 ± 4.66
B- Shifts in turns (n = 188)	32.88 ± 4.32	22.44 ± 4.07	31.02 ± 3.9	18.78 ± 4.61
Difference (p)	None (0.336)	None (0.572)	None (0.079)	None (0.677)
Marital status[§]				
A: Married (*n* = 170)	33.12 ± 4.08	22.68 ± 3.91	31.38 ± 3.540	18.72 ± 4.54
B: Single (*n* = 156)	33.01 ± 4.23	22.40 ± 4.29	31.26 ± 4.000	18.66 ± 4.72
Difference	None (0.820)	None (0.549)	None (0.763)	None (0.911)
Department[§]				
A: Surgery (*n* = 144)	32.84 ± 4.20	22.08 ± 4.17	30.64 ± 3.911	18.34 ± 4.29
B: Internal (*n* = 258)	33.25 ± 4.10	22.91 ± 4.00	31.86 ± 3.558	18.97 ± 4.87
Difference (*P*)	None (0.380)	None (0.069)	B > A (0.003*)	None (0.225)
Age[¶] *r*(*P*)	0.132 (0.017*)	0.129 (0.020*)	0.105 (0.057)	0.063 (0.259)
Time in occupation[¶] *r*(*P*)	0.103 (0.063)	0.116 (0.036*)	0.108 (0.052)	0.019 (0.727)
Time in institution[¶] *r*(*P*)	0.050 (0.370)	0.101 (0.068)	0.034 (0.543)	0.051 (0.357)

* $P < 0.05$.
** $P < 0.01$.
[†] Mann–Whitney U test.
[‡] Kruskall–Wallis test.
[§] *t*-test.
[¶] Pearson's correlation test. SD, standard deviation.

Helsdingen, Van den Bosch, Van Gog, and van Merriënboer (2010), stating that critical thinking training enhanced decision-making strategies, suggested that learning critical thinking within educational programs might be useful for professional decision makers who have to work in sophisticated and extremely interactive, dynamic environments. In the literature, it was stated that problem- and inquiry-based learning, critical incident analysis, and case scenario studies were useful techniques to promote the development of critical

Table 4 Relationship between the nurses' decision-making strategies, levels of anxiety, and critical thinking disposition†(*n* = 326)

Variable	r (P)	2	3	4	5	6	7	8	9	10	11	12	13	14
Trait anxiety (1)	r	0.576**	0.866**	-0.161**	-0.166**	-0.140*	-0.362**	-0.273**	-0.254**	-0.312*	-0.336**	0.218**	-0.095	0.155**
	P	0.000	0.000	0.003	0.003	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.086	0.000
State-anxiety (2)	r	1	0.907**	-0.145**	-0.113*	-0.200**	-0.248**	-0.237**	-0.220**	-0.273**	-0.216**	0.060	-0.069	0.254**
	P	—	0.000	0.000	0.041	0.000	0.000	0.000	0.000	0.000	0.000	0.279	0.217	0.000
STAI (3)	r		1	-0.172**	-0.154**	-0.194**	-0.338**	-0.285**	-0.265**	-0.327**	-0.305**	0.149**	-0.091	0.413**
	P		—	0.002	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.101	0.000
Seeking truth (4)	r			1	0.591**	0.186**	0.486**	0.105	0.258**	0.629**	0.180**	-0.301**	0.033	-0.267**
	P			—	0.000	0.001	0.000	0.059	0.000	0.000	0.000	0.000	0.556	0.000
Open-mindedness (5)	r				1	0.274**	0.491**	0.053	0.249**	0.689**	0.246**	-0.353**	0.004	-0.401**
	P				—	0.000	0.000	0.344	0.000	0.000	0.000	0.000	0.948	0.000
Analytics (6)	r					1	0.343**	0.559**	0.625**	0.746**	0.251**	-0.056	0.413**	-0.234**
	P					—	0.000	0.000	0.000	0.000	0.000	0.309	0.000	0.000
Systematicity (7)	r						1	0.264**	0.293**	0.659**	0.367**	-0.193**	0.178**	-0.447**
	P						—	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Self-confidence (8)	r							1	0.606**	0.610**	0.230**	-0.050	0.306**	-0.241**
	P							—	0.000	0.000	0.000	0.367	0.000	0.000
Curiosity (9)	r								1	0.744**	0.243**	-0.053	0.226**	-0.209**
	P								—	0.000	0.000	0.342	0.000	0.000
Critical thinking disposition – total scale (10)	r									1	0.362**	-0.253**	0.277**	-0.434**
	P									—	0.000	0.000	0.000	0.000
Independent DMS (11)	r										1	-0.032	0.217**	-0.411**
	P										—	0.000	0.000	0.000
Intuitive DMS (12)	r											1	0.172**	0.603**
	P											—	0.002	0.000
Rational DMS (13)	r												1	0.047
	P												—	0.393
Indecision strategy (14)	r													1
	P													—

* *P* < 0.050.
** *P* < 0.01.
† Pearson's correlation
DMS, Decision-Making Strategies Scale; STAI, State–Trait Anxiety Inventory.

Table 5 Results of the model that were obtained in the regression analysis (*n* = 326)

Model	Unstandardized coefficients			95% confidence interval for B	
	B	SE	*P*	Lower bound	Upper bound
Independent DMS					
Open-mindedness	0.053	0.030	0.076	−0.006	0.112
Systematicity	0.231	0.064	0.000**	0.105	0.357
Self-confidence	0.098	0.042	0.020*	0.015	0.181
STAI	−0.057	0.015	0.000**	−0.087	−0.026
Age	0.079	0.023	0.001**	0.033	0.124
Intuitive DMS					
Seeking truth	−0.101	0.051	0.041*	−0.202	0.001
Open-mindedness	−0.144	0.033	0.000**	−0.209	−0.079
Age	0.052	0.023	0.027*	0.006	0.098
Rational DMS					
Open-mindedness	−0.081	0.027	0.003**	−0.135	−0.027
Analytics	0.237	0.030	0.000**	0.178	0.296
Systematicity	0.114	0.056	0.044*	0.003	0.224
Age	0.049	0.021	0.019*	0.008	0.090
Indecision strategy					
Open-mindedness	−0.148	0.031	0.000**	−0.208	−0.087
Systematicity	−0.239	0.066	0.000**	−0.368	−0.109
Self-confidence	−0.084	0.043	0.043*	−0.169	0.001
STAI	0.088	0.016	0.000**	0.057	0.119

* $P < 0.05$.
** $P < 0.01$. DMS, Decision-Making Strategies Scale; STAI, State–Trait Anxiety Inventory.

thinking skills (Raymond & Profetto-McGrath, 2005; Thorpe & Loo, 2003; Zori & Morrison, 2009). Based on this research, the intuitive DMS scores of the graduates of associate degree programs were higher than those of the nurses with higher educational levels. In the studies of Lauri *et al.* (2001), it was stated that the nurses with higher levels of professional education used intuitive decision-making more frequently. Similar to the study of Tekin and Ehtiyar (2010), it was found that the use of DMS did not differ according to income status. Verma, Rangnekar, and Barua (2016) stated that administrators with a high annual revenue were less dependent on DMS and avoided them. The DMS did not vary based on marital status in this research.

In the current study, it was found out that those nurses who were working in the surgical departments preferred rational DMS less than those who worked in the internal diseases departments. There are research findings in the literature that indicate that the working field affects DMS (Bjørk & Hamilton, 2011; Kaya *et al.*, 2011; Lauri *et al.*, 2001; Tekin & Ehtiyar, 2010). Rational DMS is the tendency of examining the options attentively while making decisions and evaluating the positive and negative aspects of each. This result could be influenced by patients' circulation being faster in

surgical units, compared with internal diseases clinics, and an insufficiency of time to think properly related to the high frequency of sudden changes. Additionally, as stated by Bjørk and Hamilton (2011), nurses in surgical departments might encounter ambiguity and tasks that are characterized by many factors at a time. For this reason, those who work in surgical units might use less rational DMS.

These findings were in agreement with those of Kaya *et al.* (2011): DMS did not differ based on the working styles of the nurses. In one study, intensive care nurses stated that decision-making was not related to experience (Hicks *et al.*, 2003). Bakalis and Watson (2005) reported that the more experience the nurses had, the more clinical decisions they made, whereas Verma *et al.* (2016) stated that decision-making experience ensured administrators to be less dependent and less avoidant. In the current study, according to the correlation analysis, the amount of professional time in the occupation had a poor, but positive, relationship with intuitive DMS. Yet, this relationship was not confirmed in the regression analysis. In contrast, some relationships were encountered in the literature regarding a relationship between the duration of professional experience and decision-making styles. It also was stated in the study of

Lauri *et al*. (2001) that nurses with sufficient occupational experience (5–10 years) used intuitive DMS more frequently. In the study of Pretz and Folse (2011), nurses with greater experience preferred their intuition more in their field, compared with those with less or no clinical experience. If experience provides valuable information on the relationships between the symptoms of patients and the results, then the use of intuition in clinical practice should be promoted.

According to the regression analysis in this research, the age of the nurses was found to be positively related with independent, intuitive, and rational DMS. It was reported that there was a positively significant correlation in the literature between decision-making frequency and age (Bakalis & Watson, 2005; Ludin, 2018). There are studies in the literature that indicate that age does not affect DMS or there is a negative relationship between them (Sladek, Bond, & Phillips, 2010; Thunholm, 2008; Verma *et al*., 2016). These research findings indicate that, as their age increases, nurses who solve many problems and have the experience of decision-making under critical circumstances are more eager to make their own decisions independently and to ask for advice or support from others less frequently.

In this study, a relationship was found between the CTD scores and anxiety scores, as well as the mean subscale scores of DMS. It was seen in this research that the nurses who had high scores in systematicity and self-confidence, the subdimensions of the CTD, and who were older used independent DMS more frequently and those with higher anxiety used it less. Open-mindedness, despite not indicating a significant relationship, was seen in the model. It was determined that the nurses with a low seeking of the truth and open-mindedness scores used intuitive DMS more frequently and that the older nurses used intuitive DMS more. The nurses with low open-mindedness scores used rational DMS more and the nurses with high analytics, systematicity, and age used rational DMS more. The indecision strategy was negatively predicted by open-mindedness, systematicity, and self-confidence, whereas it was positively predicted by anxiety. Some research indicated a positive correlation between clinical decision-making and critical thinking ability (Ludin, 2018). However, despite being limited in numbers, there are also studies that reported the contrary (Girot, 2000; Hicks *et al*., 2003; Hoffman & Elwin, 2004; Salehi, Bahrami, Hosseini, & Akhondzadeh, 2007) or that there was no relationship between the two (Noohi *et al*., 2012). No study could be found in the literature that included all the

relationships between the CTD, DMS, and the level of anxiety, as does this study.

While making decisions, considering the outcomes in the event of preferring an option among many others is the most crucial aspect of the decision-making process (Erözkan, 2011). The CTD is of great importance at this stage. Emotions affect a series of critical cognitive tasks and outputs, including data processing, judgment, and decision-making (Bachkirov, 2015; Brosch, Scherer, Grandjean, & Sander, 2013; Thiel, Connelly, & Griffith, 2012; Zhang, Wang, Zhu, Yu, & Chen, 2015). In the literature, there are studies indicating that anxiety affects decision-making (Miu *et al*., 2008). Decision-making, which depends on the control and proper processing of emotional stimuli, is a fundamental constituent of cognitive function.

Interestingly, anxiety and decision-making share major neural substrata, including the amygdala, striatum, and the medial and dorsolateral prefrontal cortex, which involve cortical–limbic pathways (De Visser *et al*., 2010). Hartley and Phelps (2012) reported that the amygdala, which mediates fear, anxiety, and their cognitive effects, was a significant constituent of brain systems and anxiety levels of this shared structure might produce predictable effects on decision-making.

According to the results of this research, systematicity predicts independent DMS and rational DMS positively, whereas it negatively predicts the indecision strategy. Systematicity measures the tendency of organized, focused, and vigoros inquiry. Systematic persons attach importance to knowledge and handle problems with a solution-oriented method by structuring them. Deficiencies in systematicity might lead nurses to be prone to the possibility of negligence in their applications (Facione *et al*., 1994; Kökdemir, 2003). A systematic approach is essential in decisions in the field of health care (Lamond & Thompson, 2000). Given that systematicity ensures nurses research attentively and collect information so that they can properly evaluate their knowledge towards options and the potential for positive and negative outcomes, it might positively predict them in using rational DMS and independent DMS. Nurses with a high tendency of systematicity can display less indecision strategy because they might be satisfied with the decisions they make owing to their structured data collection.

In this study, open-mindedness negatively predicted intuitive DMS, rational DMS, and the indecision strategy. Open-minded people tend to question the current opinion and practice; acknowledge the revealed possibilities; share ideas and are willing to consider different

alternatives; take the opinions of others into consideration, rather than their own views; and are tolerant and respectful of different approaches; are aware of their own mistakes and tolerate their faults. Individuals with a high level of open-mindedness endeavor to acquire knowledge and this increases the effects of predictions (Facione *et al.*, 1994; Haran *et al.*, 2013; Kökdemir, 2003; Von & Giuliano, 2017). On account of the fact that nurses with a tendency for open-mindedness are able to gather different knowledge and opinions while approaching issues that require decisions from different perspectives, rather than through intuition, they experience less indecision and use intuitive DMS and rational DMS less frequently.

In this research, analytics positively predicted rational DMS. While making decisions with rational DMS, alternatives are examined attentively and decisions are made by assessing the positive and negative sides of each alternative (Kuzgun, 1992). Analytics is the tendency to make predictions by considering potential problems and obstacles and to use objective evidence by reasoning (Facione *et al.*, 1994; Kökdemir, 2003). According to Lamond and Thompson (2000), the data that are used in decision-making become known when an analytical approach is adopted. Analytics can predict rational DMS positively because the positive and negative sides of each option and necessary information are objectively and rationally evaluated while making decisions with this approach. According to Facione *et al.*, analytical nurses are able to attach clinical observations to their own theoretical database and foresee incidents that could jeopardize the security of the patients that are assigned to them that could lead to potential health restrictions.

Based on the findings of this research, seeking truth negatively predicted intuitive DMS. Intuition is based on the ability to recognize relationships and patterns before defining the components of the situation in advance. Intuition in the area of nursing is an ability that develops through the experience that nurses acquire by the management of patients. According to Lamond and Thompson (2000), if the decisions of healthcare professionals are based on their intuitional knowledge and way of thinking, neither the patients nor other related parties can understand the basis of the decisions. In the study of Soane, Schubert, Lunn, and Pollard (2015), it was reported that intuitional data processing and direct data inquiry were negatively associated. A high tendency for seeking truth indicates that the ability of questioning and the possibility of acting reasonably, even when the data contradict one's

personal opinion, are highly probable (Facione *et al.*, 1994; Kökdemir, 2003). Nurses with high intuitive DMS, rather than taking different approaches and benefiting from the views and opinions of others, place more importance on their own intuition. Therefore, the tendency of seeking truth might have predicted intuitive DMS negatively. Nurses who are interrogative in their practices, in search of the truth, and reflect on new data in their practice, will promote safe practice (Facione *et al.*; Hoffman & Elwin, 2004).

Based on the results of this study, self-confidence predicted independent DMS positively and indecision negatively. The self-confidence subdimension measures the individual's confidence in their own reasoning processes. As a subdimension of the CCTDI, self-confidence enables the individual to trust the accuracy of their decisions and to lead others so as to solve the problems (Facione *et al.*, 1994). A lack of confidence leads individuals to postpone their decisions and give the responsibility to others (Deniz, 2006). Nurses who do not trust in themselves and the accuracy of their decisions probably use the indecision strategy more frequently. As a result, a high tendency of self-confidence in nurses will increase the confidence in their decisions. This will cause nurses to not ask for advice or support from others while making decisions. It should not be forgotten that overconfidence in clinical decisions could result in negative clinical results by increasing faults in decision-making and it could hamper evaluative functions (Hoffman & Elwin, 2004).

Inquisitiveness is the individual's tendency for knowledge acquisition and learning, regardless of any anticipation of benefit, and the individual's intellectual curiosity and learning (Facione *et al.*, 1994; Kökdemir, 2003). In the present study, it was detected that inquisitiveness did not predict DMS. This was an unexpected result because it was considered that an individual acquiring a great deal of information with the tendency for learning new information might create indecision; or the individual might make rational or independent decisions when they obtain sufficient information on the issue that requires a decision.

Based on the current findings, anxiety negatively affected independent DMS and positively affected the indecision strategy. This study supported Schwarz's (2000) finding that differences in anxiety might result in differences in the tendency of decision-making. Bavol'ár and Orosová (2015) reported that those who used intuitive DMS generally had lower stress levels. It was reported in the study of Remmers and Zander (2018) that a disruption was encountered in the intuitional

performance of the participants with anxiety (state anxiety), compared with the participants with positive and neutral emotion states and that the holistic and associative processes were disrupted by anxiety. In the current research, on the contrary, it was found that anxiety did not affect intuitive DMS. In the literature, some studies reported that T-anxiety was associated with decision-making (Miu *et al.*, 2008) and risk-avoidant decision-making (Maner *et al.*, 2007) and that anxiety might increase avoidant decision-making (Maner *et al.*, 2007; Maner & Schmidt, 2006). In the study of Soane *et al.* (2015), it was stated that increased anxiety decreased the tendency to seek additional data, whereas low-level anxiety resulted in inquiry for data and there was a positive relationship between the preference of using data and delaying decision-making.

Limitations of the study

Using self-answers and conducting the research in a mono-centred way, even though the study was conducted in a hospital with a large number of nurses, are among the limitations of the research. The effects of culture were not examined in the study's results, which also is regarded as a limitation. Despite having some limitations, this research is considered to contribute to the literature.

CONCLUSIONS AND RECOMMENDATIONS

The CTD and anxiety levels affect the decision-making styles of nurses. Practices that decrease the anxiety levels of nurses and strengthen their CCTDI dimensions, such as systematicity, self-confidence, seeking the truth, and analytics, should be implemented. It can be concluded that it would be beneficial to conduct further research on the relationships between the CTD, decision-making, and levels of anxiety in nurses who are working in large and different types of organizations.

It is of vital importance to specify the factors that affect each decision-making style. Determining how the decision-making styles of nurses are affected and recognizing the strengths and weaknesses of each style will ensure efficiency in decision-making. When individuals know which dominant DMS they use, they can strive to fortify their weaknesses. Assigning appropriate persons to carry out tasks with high levels of anxiety or in areas that require high levels of CTD can increase their professional performance. Additionally, providing educational programs towards enhancing the CTD and ensuring a working environment that promotes reduced

anxiety can increase efficiency and productivity in decision-making.

Nurse managers' awareness of the different emotions and influences of nurses might enable them to be more successful in directing personnel towards the desired objectives. Furthermore, recognizing the factors that affect the decision-making of nurses could secure more effective decisions.

FUNDING

DISCLOSURE

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Ş. P. designed the study and carried out the data collection, manuscript writing, and editing of the manuscript; L. K. also designed the study and conducted the data collection; F. A. helped to write and edit the manuscript; S. P. carried out the data analysis; H. A. E. conducted the data collection.

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