

Emotional Intelligence: The Key for Nursing Students' Critical Thinking Disposition

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Abstract: Emotional intelligence skills and critical thinking are the main factors for success in life, education and nursing. The unique feature which distinguishes humans from other creatures is the ability to think. Aim of the study: to assess nursing students' emotional intelligence, nursing students' critical thinking disposition and investigate the relationship between emotional intelligence and critical thinking dispositions. Design: A descriptive correctional design was used to achieve the aim of the study. Setting: This study was conducted at Faculty of Nursing, Benha University. Subjects: All fourth year nursing students who were enrolled in the fourth academic year in 2016 – 2017 at Benha Faculty of Nursing (n = 360 students). Tools for data collection: Three tools: Demographic data Questionnaire, Emotional Intelligence Assessment Scale, The California Critical Thinking Disposition Inventory Scale (CCTDI).The result showed that the nursing students had moderate level of emotional intelligence, ambivalence and positive disposition to critical thinking. There was a positive highly significant correlation between total score of emotional intelligence and total score of critical thinking disposition among nursing students .The study recommended that, The Conduction of intervention program for nursing students about emotional intelligence and critical thinking to enhance the development of their skills.

Keywords: Emotional Intelligence, Nursing Students, Critical Thinking Disposition.

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I. Introduction

Literature on Emotional Intelligence (EI) as a conception spans only since the 20th century⁽¹⁾. EI is prerequisite in health care practices, mainly the nursing learning and practice, so assessing levels of EI and ascertain its development among nursing students is essential for ensuring effective nursing learning and competent qualified nursing skills before graduation⁽²⁻⁴⁾. EI is a concept that identifies attributes that help people more adequately cope with the demands of life through their ability to recognize, use and manage their emotions and the emotions of others⁽⁵⁾. All human activity is influenced by and influences emotion⁽⁶⁾. To handle emotion well, we need emotional intelligence which concerns our sensitivity to and artful handling of our own and others' emotions.

In many ways, emotional intelligence may be considered as among the most promising of the “new constructs” emerging in psychological science that are directed towards improving social adaptation⁽⁷⁾. Researchers stated five most important competencies that are linked with emotional intelligence can have a huge impact on individual's perception and reactions to proceedings: *self-awareness*, *self-regulation (Managing emotions)*, *self-motivation*, *Social awareness (empathy)*, and *social skills (relationship management)*⁽⁸⁻⁹⁾. These five emotional elements or competencies are further defined as each level builds upon the previous one which gives the construct of EI.

Self-awareness means knowing when feelings are present in the self and others, and being able to label feelings with specific feeling words. At its highest level, it means being able to expect feelings in advance⁽¹⁰⁻¹²⁾. *Self-regulation* is concerned with understanding interpersonal feelings as an essential tool for successful and fulfilling life, and for supportive and collaborative relationships⁽¹³⁾. The third core competency of EI is *self-motivation*. Self-motivation involves the using one's deepest performance to move toward achieving goals and to strive to improve and grow⁽¹⁴⁻¹⁵⁾. *Social awareness or empathy*, the fourth element of EI, refers to the ability to understand the emotional make-up of other people and the skills in treating people according to their emotional reactions^(14, 16). Lastly, *social skills or relationship management* is a key social competence that is the last element and a fundamental part of emotional intelligence. It includes the abilities to handle emotions in relationships well and accurately manage social interactions, works with others toward shared goals, and built positive interpersonal relationships⁽¹⁷⁻¹⁸⁾.

Therefore, in order to produce a balanced education with students of high aspirations, the focus should not be too narrowly set on the development of thinking skills alone. Attention must also be paid to developing

the dispositions, attitudes, and habits that constitute the intellectual character of students. Likewise, emotions should not be ignored. Given that not many studies focus on the relationship between emotional intelligence and critical thinking⁽¹⁹⁻²⁰⁾.

Critical thinking is one aspect of thinking⁽²¹⁾. Critical thinking is necessary to understand knowledge in any field⁽²²⁾. Naturally humans communicate critically with the world⁽²³⁻²⁴⁾. Critical thinking is not only related to learning in higher education, but also involves all life activities such as interpersonal and working relationships⁽²⁵⁻²⁶⁾. Critical thinking is considered important in the academic fields because it enables one to analyze, explain, evaluate, and restructure their thinking, thereby decreasing the risk of adopting, thinking with, or acting on, a false belief. However, even with knowledge of the methods of logical reasoning, and inquiry, mistakes can happen due to a thinker's inability to apply the methods or because of character traits such as egocentrism⁽²⁷⁻²⁸⁾.

The disposition toward critical thinking was considered to be crucial to a good critical thinker, as the requisite of core cognitive skill. The critical thinker dispositional characteristics were described as "a set of attitudes that define a personal disposition or tendency to use critical thinking in one's personal, professional and social life. Accordingly, the seven dispositional characteristics, which are constituents of an overall disposition toward critical thinking, were identified namely: truth seeking, open-mindedness, analyticity, systematicity, self-confidence, inquisitiveness and cognitive maturity.

Truth seeking is a tendency to seek the best knowledge in a situation even when one's personal belief system may be challenged. It also includes the ability to continually evaluate new knowledge and information"⁽²⁹⁾. *Open-mindedness* is the tolerance of divergent views and willingness to seriously entertain alternatives. Open-mindedness is a virtue for professional practice; the open-minded nurse "is an educational aspiration and a practical imperative"⁽³⁰⁾. *Analyticity* is demonstrated by the ability to anticipate both the positive and negative potential consequences of actions and includes the use of evidence to resolve problems⁽²⁹⁾.

Systematicity is the tendency or habit of striving to approach problems in a disciplined, orderly, and systematic way. The habit of being disorganized is the opposite characteristic to systematic⁽³¹⁾. *Self-confidence* is the tendency to trust the use of reason and reflective thinking to solve problems. This habit can apply to individuals or to groups; as can the other dispositional characteristics measured by CCTDI⁽³²⁾.

Inquisitiveness is intellectual curiosity. It is the tendency to want to know things, even if they are not immediately or obviously useful at the moment. It is being curious and eager to acquire new knowledge and to learn the explanations for things even when the applications of that new learning are not immediately apparent. The opposite of inquisitiveness is indifference⁽³³⁾.

1.1 Significance of the study:

Emotional intelligence and critical thinking are both the pillars of success, especially when they are raised in the area of education. Since the body and mind are closely associated with each other, what a man thinks about and even how we think is under the influence of emotions and the surrounding. The more powerful the human in understanding his thoughts, the more control he will have on them and the more changes he can make on them if necessary. In other words, the result of perceptive and rational thinking is success in different aspects of life⁽³⁴⁾.

1.2 Aim of the study:

The present study was aimed to assess nursing students' emotional intelligence, nursing students' critical thinking disposition and investigate the relationship between emotional intelligence and critical thinking dispositions.

1.3 Research question:

1. What is the level of nursing students' emotional intelligence?
2. What is the level of nursing students' critical thinking disposition?
3. Is there is a relationship between nursing students' emotional intelligence and critical thinking disposition?

II. Material and Methods

2.1 Design:

A descriptive correlational design was used to achieve the aim of the study.

2 Setting:

The study was conducted at Faculty of Nursing, Benha University, affiliated to ministry of higher education, Egypt. There are six scientific departments in the faculty namely: Medical and surgical nursing department, Psychiatric and mental health nursing department, Community health nursing department, Pediatric nursing department, Maternal and newborn health nursing department, and Nursing administration department.

2.3 Subjects:

The subjects of this study were all fourth year nursing students who were enrolled in the academic year 2016 – 2017 at Benha Faculty of Nursing 366 and six students withdraw so total subjects were 360 students.

2.4 Tools:

Three main tools were used for data collection:

2.4.1 Demographic Data Questionnaire.

tool was developed by the researcher. It included demographic data related to nursing students (code number, Gender, Residence, Marital status, Mothers' job).

2.4.2 Emotional Intelligence Assessment Scale.

It was designed to assess nursing students' emotional intelligence level. It was developed by (Hall, 1999) ⁽³⁵⁾, and was modified by the researcher based on reviewing the related literature, and translated into Arabic by the researcher. The scale was consisted of 81 items under five sub dimensions of self-awareness (11) items, self regulation (17) items, self-motivation (15) items, social skills (28) items, and social awareness (10) items.

Scoring system: The nursing students response using five-point Likert scale that were ranges from 1 (never) to 5 (always). The total score ranged from 81 to 405. The subject is considered to have Low EI (81 to 189), Moderate EI (190 to 279) and High EI (280-405) ⁽³⁶⁾. The total of Cronbach's alpha of the scale was detected = 0.89.

2.4.3 The California Critical Thinking Disposition Inventory Scale (CCTDI).

The scale developed by *Facione and Facione, (1992)* ⁽³⁷⁾ and it was modified by *Hasanin, (2012)* ⁽³⁸⁾, it was aimed to assess dispositional characteristics of nursing students. It consists of 74 items grouped into seven subscales: Truth seeking (12) items, Open-mindedness (12) items, Analyticity (11) items, Systematicity (10) items, Self-confidence (9) items, Inquisitiveness (10) items and cognitive maturity (10) items.

Scoring system: The nursing students response using six-point Likert scale that were ranges from 1 (strongly disagree) to 6 (strongly agree). The total score ranged from 74 to 444. The subject is considered to have negative disposition to critical thinking (74 to 204), ambivalence disposition to critical thinking (205 - 270) and positive disposition to critical thinking (271 to 444) ⁽³⁸⁾. The total of Cronbach's alpha of the scale was detected = 0.84.

2.5 Data collection procedure

2.5.1 Administrative Approval:

official approval was obtained from the Dean of the Benha Faculty of Nursing. After explanation of the purpose of the study to collect the data.

2.5.2 Field of work

The preparatory phase started from the beginning of October 2016 to end of December 2016, covering three months and including the following: Reviewing the national and international related literature using journals, periodicals, textbooks, internet and theoretical knowledge of the various aspects concerning the topic of the study.

2.6 Statistical analysis

Data entry and analysis were done using the statistical package for social sciences (SPSS) version 18. Data were presented using: Descriptive statistics in the form of frequencies, percentage, mean and the standard deviation. Correlation coefficient (r) was used to investigate correlation between items. For all statistical tests done, the threshold of significance was fixed at the 5% level, P-value ≤ 0.05 Significant

2.7 Ethical Considerations:

At the interview with students to collect data they informed about the purpose and benefits of the study, and they were informed that their participation is voluntary and they have the right to refuse to participate in the study without giving any reason. In addition, confidentiality and anonymity of the subjects were assured through coding of all data.

III. Results

Table (1): Illustrated that the majority of nursing students (82.8%, 81.4%) were females and were living in urban areas, and 91.1% of them were single, while only 8.9% were married, more than half of them (52.5%) their Mothers were house wife.

Table (2): Showed that the mean of total emotional intelligence of nursing students was 293.19 (± 33.56) against a full score of 405, and 68.9 % of them had a moderate level of emotional intelligence while 27.5 % had high level of emotional intelligence and only 3.6 % of them had low emotional intelligence level. Self regulation is the highest dimension followed by Self awareness, then Asocial skills, Social awareness and finally Self motivation.

Table (3): Displayed that the mean of total critical thinking disposition of nursing students was 279.75 (± 22.11) against a full score of 444, and 52.4% of them had positive disposition to critical thinking while 38.6% had Ambivalence disposition to critical thinking and only 3.6 % of them had Negative disposition to critical thinking. Analyticity the highest component and other components are in the order of Truth seeking, Self-confidence, Open-mindedness, Systematicity, Inquisitiveness, and Cognitive Maturity is the lowest component.

Table (4): Indicated that there was a positive highly significant correlation coefficient between total score of emotional intelligence and total score of critical thinking disposition among nursing students ($r = 0.181$, $p = 0.001$). And among dimensions of emotional intelligence, there was a significant relationship between self-motivation, social skills and critical thinking disposition ($r = 0.176$, $p = 0.001$) and ($r = 0.143$, $p = 0.001$) respectively.

Table (5): Illustrated that there was no significant correlation coefficient between students' gender, marital status, and residence and total EI ($r = 0.028$, $p > 0.05$), ($r = 0.005$, $p > 0.05$) and ($r = 0.101$, $p > 0.05$) respectively. And there was highly significant correlation coefficient between students' gender and total critical thinking disposition ($r = 0.300$, $p = 0.000$), that there was no significant correlation coefficient between students' marital status, and residence and total critical thinking disposition ($r = 0.016$, $p > 0.05$) and ($r = 0.091$, $p > 0.05$) respectively

Table (1): Demographic characteristics of studied nursing students (n= 360)

Variables	No	%
Gender		
Male	62	17.2
Female	298	82.8
Residence		
Urban	293	81.4
Rural	67	18.6
Marital status		
Single	328	91.1
Married	32	8.9
Mothers' job		
House wife	189	52.5
Employee	171	47.5

Table (2): Levels of emotional intelligence dimensions as reported by nursing students. (n= 360)

Emotional Intelligence Dimensions	Low		Moderate		High		Mean \pm SD
	No	%	No	%	No	%	
Self-awareness	4	1.1	262	72.8	94	26.1	41.86 \pm 7.01
Self regulation	0	0.0	298	82.8	62	17.2	66.54 \pm 8.14
Self-motivation	36	10.0	180	50.5	144	40.0	50.94 \pm 14.26
Social skills	0	0.0	212	58.9	148	41.1	98.81 \pm 13.02
Social- awareness	17	4.7	185	51.4	158	43.9	35.02 \pm 6.60
Total emotional intelligence	13	3.6	248	68.9	99	27.5	293.19 \pm 33.56

Table (3): level of critical thinking disposition as reported by nursing students. (n=360)

Critical Thinking Dispositional Characteristics	Negative		Ambivalence		Positive		Mean \pm SD
	No	%	No	%	No	%	
Truth seeking	11	3.1	109	30.3	240	66.6	47.42 \pm 7.98
Open-mindedness	1	0.3	154	42.8	205	56.9	44.32 \pm 4.78
Analyticity	2	0.6	21	5.8	337	93.6	50.27 \pm 6.12
Systematicity	54	15.0	166	46.1	140	38.9	34.74 \pm 7.29

Cognitive Maturity	97	26.9	210	58.3	53	14.7	30.25±6.31
Inquisitiveness	19	5.3	218	60.6	123	34.2	38.29±5.36
Self-confidence	43	11.9	99	27.5	218	60.6	34.42±7.55
Total critical thinking disposition	32	9	139	38.6	189	52.4	279.75±22.1

Table (4): Correlation coefficient between nursing students' emotional intelligence and their critical thinking disposition (n= 360).

Emotional intelligence	Critical thinking disposition	
	r	p
Self-awareness	0.056	0.292
Self regulation	0.081	0.127
Self-motivation	0.176	0.001**
Social skills	0.143	0.001**
Social- awareness	0.032	0.549
Total Emotional intelligence	0.181	0.001**

** Correlation is significant at the 0.01 level (2-tailed).

Table (5): Correlation coefficients between total scores of critical thinking disposition and emotional intelligence among nursing students` by their demographic characteristics. (n= 360).

Personal characteristics	Total Score Of Critical Thinking Dispositions		Total Score Of Emotional Intelligence	
	r	p	r	p
Gender	0.300	0.000**	0.028	0.592
Residence	0.016	0.757	0.005	0.927
Marital status	0.091	0.086	0.101	0.057

** Correlation is significant at the 0.01 level (2-tailed).

IV. Discussion

Nursing students, experience a great deal of emotion and stress specially related to their educational and clinical competence. Emotional intelligence and critical thinking is known to be one of the required skills to effectively cope with such feelings⁽³⁹⁻⁴⁰⁾. Generally, in nursing as a practical profession and over the previous 10 years there have been constant demands for physically powerful, emotionally intelligent and effective nurses to meet and get together the continuous challenges in today's health care system, to buffer the stresses, develop resiliency among staff, and prevent burnout and staff loss⁽⁴¹⁻⁴²⁾.

The aim of present study was to assess nursing students' emotional intelligence, nursing students' critical thinking disposition and investigate the relationship between emotional intelligence and critical thinking dispositions. This aim was achieved through the present study findings. The current study findings were demonstrated that, the nursing students' average score for emotional intelligence in this study was 293.19 with a standard deviation of 33.56. And 68.9 % of nursing students had a moderate level of emotional intelligence. Hence, the nursing students have shown moderate level of emotional intelligence.

These findings are in the same line with the studies conducted by **Beauvais et al and Benson et al**⁽⁴³⁻⁴⁴⁾ who reported the scores of nursing students' emotional intelligence as moderate. This finding is in agreement with **Ibrahim et al., Rice, Codier and Odell, Beauvais et al., Mahmoud et al., and Luan**⁽⁴⁵⁻⁵⁰⁾. Where the first, had studied "Relationship between nursing students' emotional intelligence and their clinical performance during obstetrics and gynecologic nursing practical training". The second had studied "predictors of successful clinical performance in associate degree nursing students". The third, measured" EI ability and grade point average in nursing students". The fourth had studied "the factors related to academic success among nursing students". The fifth, studied had studied "EI among baccalaureate students at the faculty of nursing, Alexandria University". The sixth, studied, "Graduate Students' Critical Thinking Disposition and Emotional Intelligence ". They stated that, the mean score for EI among their study participants was within moderate level. This agreement between the present study result and these studies may be due to the fact that, all of them were carried out on students with limited clinical and theoretical experience and young age. It is strongly acknowledged that EI as human attribute improves through experience and age⁽⁵¹⁾.

Self regulation is the highest dimension followed by Self awareness, then Asocial skills, Social awareness and finally Self motivation. Self regulation is the capability to handle stressful, powerful and difficult emotions and readdress them in a positive way. Persons who had self regulate can work in a stressful setting and confront inappropriate work behaviors by being calm and professional. Subjects of the study were fourth-year nursing students, so it is logic that they are moderately sufficient for them to control, regulate, organize, and use their own emotion. Which is supported by the study of **Sim and Bang, Shin and Park**⁽⁵²⁻⁵³⁾. Where the first, had studied "Emotional Intelligence, Stress Coping, and Adjustment to college life in nursing students". The second, had studied "Emotional intelligence, ego resilience, stress in clinical practice of nursing students".

Critical thinking is an active and systematic cognitive strategy to examine, evaluate, and understand events, solve problems, and make decisions on the basis of sound reasoning and valid evidence **Jackson et al.**⁽⁵⁴⁾. It is a purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference as well as explanation of the evidential conceptual methodological, criteriological, or contextual considerations upon which that judgment was based. Study findings revealed that the nursing students' average score for critical thinking in this study was 279.75 with a standard deviation of 22.11. And more than half of them had positive disposition to critical thinking. This might be due to these students have analyticity, seeking truth, self-confidence, can think accurately, have inquisitiveness and intellectual curiosity, seek and prefer to study new things, deal with problems seriously, have the ability to anticipate both the negative and positive potential consequences of actions and use evidence to resolve problems, like the challenge and are open-minded.

This result supported by study of **Wangensteen, et al.**⁽⁵⁵⁾ who studied critical thinking dispositions among newly graduated nurses. It showed that more than two third of the respondents reported a positive disposition towards critical thinking and **Shin et al.**⁽⁵⁶⁾ "assess critical thinking during the 4th year of university found that students' critical thinking disposition was positive". Also study of **Suliman and Halabi**⁽⁵⁷⁾ "on 165 nursing students showed that critical thinking disposition of students was positive". Moreover, studies conducted with nurses in practice have reported a positive disposition towards critical thinking disposition (**Profetto-McGrath et al., Smith-Blair & Neighbors, Foluso, Cesarina, Lederer**)^(58-60, 29) This is may be due to the repeated evaluation of the students

In the opposite of the present study the findings of **Mohamed and Mohamed**⁽⁶¹⁾ "indicating that fifty percent of the nursing students were having ambivalent dispositions towards critical thinking", **Tafazzoli et al.**⁽⁶²⁾ "who studied the relationship between critical thinking dispositions and academic achievement in Iranian midwifery students". Their finding indicated that critical thinking disposition was unstable in the majority of the students. Also **Barkhordary et al., Ip et al., Profetto-McGrath, El-Hessewi et al.**⁽⁶³⁻⁶⁶⁾ showed the same result.

Nursing students in the majority of the dispositional characteristics showed positive disposition towards critical thinking. Analyticity the highest component and other components are in the order of Truth seeking, Self-confidence, Open-mindedness, Systematicity, Inquisitiveness, and Cognitive Maturity is the lowest component.

The Analyticity scale targets prizing the application of analysis, interpretation, reasoning and the use of facts and evidence to resolve problems, anticipating prospective theoretical or practical difficulties, and consistently being alert to the need to interfere. Analyticity is a core dispositional characteristic for the curious mind. Persons with this characteristic are inclined to predict the consequences of dealings and ideas, and to use reason in solving problems.

The findings is consistent with **Nagib**⁽⁶⁷⁾ who assessed critical thinking dispositions of undergraduate nursing students at Faculty of Nursing, Minia University and arranged these subscales as following: the first one is analyticity which followed by inquisitiveness, self-confidence, cognitive maturity, systematicity, open-mindedness, and the last one is truth seeking. **Shin et al.**⁽⁵⁶⁾ "reported that Korean students tended to had high score in analyticity", also **Suliman and Halabi**⁽⁶⁸⁾ "reported analyticity, and systematicity, were predominant critical thinking dispositions". Similar results have been found by **Smith-Blair and Neighbor, El-Hessewi et al., Li et al., Mc Carthy**^(59, 66, 69, 70). This may indicate that the majority of nursing students have the disposition of being on the alert to potential challenging situations, look forward to possible results and prize the application of reason and the use of evidence.

As regards to cognitive maturity the results of this study showed that the cognitive maturity subscale of critical thinking dispositions is the lowest. This may be due to these students are still undergraduate student and cognitive maturity grow with age and attaining experiences throughout the human life and exposure to different situations. This was supported with **Bartlett & Cox**⁽²⁷⁾ who point out that "people become mature and confident as they age and better equipped to think critically as they gain more experience under various circumstances. In addition, older students tend to have higher motivation to study hard and they also have more experience".

The findings of the current study displayed that there was a positive highly significant correlation coefficient between total score of emotional intelligence and total score of critical thinking disposition among nursing students. The findings are in line with those of **Ghanizadeh & Moafian, Afshar & Rahimi**⁽⁷¹⁻⁷²⁾, who found a significant relationship between students' emotional intelligence and their critical thinking disposition. And **Stedman & Andenoro**⁽⁷³⁾ also "found a substantially positive relationship between EI and CT disposition in undergraduate leadership students".

The findings of the study revealed that there was no significant correlation coefficient between students' gender, marital status, and residence and total emotional intelligence as regardless of the gender, marital status, and residence, the difference in nursing students' emotional intelligence has remained non-significant. **Codier & MacNaughton, Kabeel & Eisa**⁽⁷⁴⁻⁷⁵⁾ came to similar conclusions about the lack of gender differences in their study. Also, **Esin & Nalan**⁽⁷⁶⁾ found that emotional intelligence was not associated

with any demographic variables like gender and marital status". And Ibrahim et al., Saeid et al.,^(45,77) shows that; "there was no a statistically significant relation between students EI and their residence, marital status".

The findings of the current study showed that there was highly significant correlation coefficient between students' gender and total critical thinking disposition. In the opposite of the present study the findings of Kabeel & Eisa⁽⁷⁵⁾, who concluded that gender has no differences in their study.

Critical thinking and emotional intelligence ensures the following skills for nurses: making rational evaluations about their experiences and training and thereby reflecting them on healthcare services, diagnosing personal needs of healthy individuals/patients and provide systematic care, making rapid and correct decisions and evaluating complicated information about the patients through different viewpoints, communicating and trying to be aware of individuals' emotions and thoughts and understanding⁽⁷⁸⁻⁸⁰⁾.

V. Conclusion

Based on the results of the present study, it can be concluded that:

The study concluded that the nursing students had moderate level of emotional intelligence, ambivalence and positive disposition to critical thinking. There was a positive highly significant correlation coefficient between total score of emotional intelligence and total score of critical thinking disposition among nursing students.

Recommendation

1. The admission interview conducted at the faculty of Nursing, Benha University to new applicants should includes an assessment tool to assess critical thinking disposition and emotional intelligence for the new applicants
2. University curriculum should take into consideration the need to promote emotional intelligence and critical thinking skills in nursing education
3. Teaching Faculty staff should continuously evaluate and enhance teaching strategies by introduce the new strategies that foster critical thinking and emotional intelligence as (concept mapping and role play).
4. The Conduction of intervention program for nursing students about emotional intelligence and critical thinking to enhance the development of their skills.
5. Furthermore, it is proposed to conduct a study on the other groups of age, sex, occupation, and education, and then compare its results
6. Future research about how emotional intelligence and critical thinking could reflect on the developmental, neuropsychological, and information processing approach.

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