



Analysis of structural equations in the relationship between family communication patterns with tendency to critical thinking and students' happiness with the mediating role of cognitive flexibility in students

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ABSTRACT

Background and Aim: Critical thinking skills in itself are a type of cognitive skills that emphasize on cognitive strategies and the aspect of tendency to critical thinking, on the attitudinal components of thinking and the internal motivation to solve problems. The present study was conducted with the aim of determining the fit of the model based on the relationship between family communication patterns with tendency to critical thinking and happiness with the mediating role of cognitive flexibility in students. **Methods:** The current research method was descriptive-correlation type. The statistical population of this study was the female students of the second grade of public schools in Chalus city. Using random cluster sampling, a sample of 319 people was selected. The data collection tools were Ricketts (2003) critical thinking tendency questionnaire, Dennis and Vanderwaal (2010) cognitive flexibility questionnaire, Koerner and Fitzpatrick (2002) communication patterns questionnaire and Oxford happiness inventory (Argyle et al., 1989). Data analysis was done by Pearson correlation method. **Results:** It showed that there is a positive and significant relationship between family communication patterns with tendency to critical thinking ($r=0.34$; $P<0.05$) and happiness ($r=0.35$; $P<0.05$). There is a positive and significant relationship between cognitive flexibility with tendency to critical thinking ($r=0.73$; $P<0.01$) and happiness ($r=0.69$; $P<0.01$). **Conclusion:** Based on the results of structural equation modeling, the model based on the relationship between family communication patterns with tendency to critical thinking and happiness with the mediating role of cognitive flexibility in students has sufficient fit. It is expected that the effect of factors such as family communication patterns and cognitive flexibility on increasing happiness and tendency to critical thinking in students will be noticed by researchers and educational planners and consultants.



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Introduction

One of the valuable intellectual abilities that students should acquire in schools is to evaluate the various things they hear, read, think and believe in life and make rational decisions about them. This valuable ability is called critical thinking (Firouzfard, Faqih, and Erfani, 2020). Tendency to critical thinking is one of the important challenges of schools of the third millennium, which provides the basis for the growth and promotion of students in academic and career success (Maleki Avarsin et al., 2016). Critical thinking skills in itself are a type of cognitive skills. In fact, without a positive attitude towards critical thinking, the emotional dimension of this type of thinking does not occur or appears below the standard level, and therefore, the tendency towards critical thinking is a vital part of critical thinking. Critical thinking includes two aspects of critical thinking skill and critical thinking tendency. The skill aspect of critical thinking emphasizes on cognitive strategies, and the aspect of tendency to critical thinking emphasizes on the attitudinal components of thinking and internal sustainable motivation to solve problems (Bagheri et al., 2019).

Also, vitality and happiness have always been considered as one of the most important needs of students in schools. Happiness is one of the factors that have recently been raised in the field of health psychology and it is one of the most important psychological needs of humans, which has a major impact on the formation of personality and mental health (Yazdi & Abolmaali, 2014). Happiness is a necessity and need of today's world and it is the driving force that causes motivation and activity and empowerment and hope in a person and is the central element of a good life (Luman et al., 2016). According to Argyle (2005), happiness has emotional, cognitive and emotional dimensions.

Family communication patterns are among the variables related to happiness (Ruzbehi, 2012) and critical thinking (Ghodoumizadeh & Fouladchang, 2014). Based on Koerner and Fitzpatrick's theory of communication patterns (2002), the concept of family communication patterns refers to how family members communicate with each other and how family members interpret family communication, which has two underlying dimensions: conformity orientation and dialogue orientation (Marzifard,

2020). Communication patterns, personality, learning, self-confidence, power of choice and rational decision-making affect family members (Hanson & Olson, 2018). High communication is a positive and significant predictor for the physical and mental health of family members (Bahrami & Khoshbat, 2015). Koreshnia and Latifian (2011) have shown that the different situations that families have during these two dimensions can effectively form children's critical thinking. The result of the study by Ghodomizadeh and Fouladchang (2015) indicated that the orientation of family dialogue positively and the orientation of conformity negatively predicts the tendency to think critically. In their study, Koroshnia and Latifian (2011) showed that the communication patterns of family and professors mediate the relationship between society's cultural values and students' critical thinking tendencies. Studies have also shown the relationship between family communication patterns and happiness. In his study, Roozbehi (2012) showed that the dimensions of family compatibility and communication patterns (dialogue and harmony) are predictors of happiness. In Kim and Kang's (2008) study, extroverted female children with close relationships with their parents felt the highest level of happiness.

Another variable related to happiness (Hosseini et al., 2015) and critical thinking (Guner & Gokchi, 2021) is cognitive flexibility. Cognitive flexibility is usually described as one of the executive functions (Haghighati et al., 2019). According to Dennis and Vanderwaal (2010), cognitive flexibility includes the two constructs of perception of different options and perception of controllability, which refer to fundamental changes in mental re-presentation in facing new and unpredictable situations in order to adapt to changing environmental stimuli. Research evidence shows that cognitive flexibility is related to psychological well-being and is related to the reduction of depression, anxiety and psychological disturbance (Demirtash, 2020; Malkash & Kissenmatlo, 2019; Kato, 2012). Also, the result of Ozkan and Esen's study (2016) showed that high cognitive flexibility is a sign of high academic, social and emotional self-efficacy. The study of Goner and Gokchi (2021) showed that critical thinking and cognitive flexibility have a positive and significant effect on each other. Hosseini et al. (2015) showed that cognitive flexibility helps to maintain people's

mental happiness. In this regard, the study of Demirtash (2020) showed that cognitive flexibility positively correlates with happiness. The result of Kisten et al.'s (2009) study also indicated that family expression positively predicts young adults' cognitive flexibility, while conflict avoidance emerged as a negative predictor. As the studies conducted and the theoretical literature of the upcoming study show, family communication patterns and interpersonal communication atmosphere in the family can foster cognitive flexibility in children and bring two important consequences by increasing their psychological well-being. An emotional consequence that is creating happiness in children, which also arouses academic vitality, and a cognitive consequence of the tendency to critical thinking. Both of these results will lead to growth and excellence in education and breadth of thinking and mental health in children and, as a result the future builders of society. Therefore, the following study raises the question of whether there is a relationship between family communication patterns with the tendency to think critically and happiness with the mediating role of cognitive flexibility in students.

Method

The present research method was the descriptive-correlation type. The statistical population of this study was the female students of the second grade of public schools in Chalus city. Inclusion criteria included studying in public schools of Chalus city, calendar age of 15 to 19 years, female gender and working to study in the second secondary school level. The random sampling method was cluster. Seven schools were randomly selected out of nine government girls' schools in Chalus city at secondary level. One class from each grade was randomly selected from each school, and a total of 3 classes were selected from each school. In this way, a total of 21 classes were selected from seven schools. Then, each class was randomly selected based on the list of students' names. These students received and completed research questionnaires, including Ricketts' (2003) critical thinking tendency, Dennis and Vanderwaal (2010), Koerner and Fitzpatrick (2002) communication patterns, and the Oxford Happiness Inventory (Argyle et al., 1989). After collecting the questionnaires and removing the distorted questionnaires, the data of 319 samples were analyzed statistically ($n = 319$). Among the ethical considerations in the present study were the following: 1) The research objectives were explained to the students. 2) The students entered the study with personal consent and the consent of one of the parents. 3) Students and their parents had the right to be informed about the results of the administered

questionnaires and 4) Students had the right to refuse to continue answering the questionnaires and the research test if they did not want to. Data analysis was done using Pearson's correlation method and structural equation modeling with SPSS and Lisrel software.

Tools

1. Critical thinking tendency questionnaire.

To measure critical thinking tendency, the critical thinking tendency list (Ricketts, 2003) was used, which includes 33 items. This scale was designed after Moore, Rudd, and Penfield (2002) obtained different and important results about the California Critical Thinking Tendency Questionnaire, which was previously developed by Fashion (1990). Ricketts tried to develop a shorter, more effective and more reliable scale (cited in Ghadomizadeh & Fouladchang, 2015). This questionnaire is a self-report tool that measures the tendency or desire for critical thinking and has three subscales: creativity, cognitive maturity, and involvement or commitment. In a five-point Likert scale, from 1 (completely disagree) to 5 (completely agree), the subject specifies the level of disagreement or agreement with each of the statements. This questionnaire has a total score. Ricketts (2005) reported a reliability coefficient of 0.76 for creativity subscale, 0.85 for engagement and 0.59 for cognitive maturity. Since this scale was prepared based on the original work of Fashion (1990), its construct validity has been confirmed and the reliability of this scale in Iran has been reported favorably in several studies (cited by Ghadomizadeh & Fouladchang, 2015). Ghanbari Hashemabadi et al. (2013) reported the reliability coefficient of this tool for the total score, creativity, cognitive maturity and involvement as 0.79, 0.71, 0.80 and 0.57 respectively. In Ghadomizadeh & Fouladchang (2015) research, Cronbach's alpha method was used to evaluate reliability. Cronbach's alpha coefficient for the total score of the test was 0.73 and for the subscales of creativity, cognitive maturity and involvement were 0.74, 0.56 and 0.75 respectively. Also, to determine the construct validity and confirm the factor structure of the mentioned scale for use in Iran, factor analysis using the principal component method with vertical rotation was used.

2. Happiness questionnaire. The Oxford Happiness Inventory was developed in 1989 by Argyle et al. This questionnaire consists of 29 four-choice questions, in each question, the person judges his feeling of unhappiness to

extreme happiness. This questionnaire was revised by Argyle and Lowe (1990) and psychological constructs related to social interests, extroversion, kindness, agreeableness, humor, sense of purpose, self-sufficiency, self-respect, self-acceptance, physical health, autonomy, locus of control and aesthetic sense. evaluates (Adibi & Gorji, 2017). This questionnaire is directly scored on the Likert scale; Thus, answer A gets 0 marks, answer B gets 1 mark, answer C gets 2 marks and answer D gets 3 marks. The range of scores is between 0 and 87, and scores below 43 indicate lower than average happiness; Therefore, this questionnaire has a total score. In terms of construct validity, happiness has three parts: positive emotion, satisfaction, and the absence of negative emotion, and the correlation of this questionnaire with Bradburn's positive emotion scale (1963) was 0.32 and Beck's depression questionnaire (1961) was calculated as 0.52 (Adibi & Gorji, 2017). The reliability of this scale in the research of Argyle et al. (1989) on 347 subjects was 0.90 with Cronbach's alpha method and 0.78 with retest method. The reliability of this questionnaire was calculated in Adibi & Gorji (2017) using Cronbach's alpha method of 0.92.

3. Questionnaire of communication patterns.

The communication patterns questionnaire was created by Koerner and Fitzpatrick (2002). In this questionnaire, subjects specify 26 items related to the way of communication in the family, and to what extent each sentence applies to them. This questionnaire measures the two dimensions of dialogue and conformity. A 5-point Likert scale (strongly disagree=1 to strongly agree=5) was used to respond to the items of this questionnaire. According to the scores of the respondents, an average score is calculated for each subscale. This questionnaire does not have a total score. Fitzpatrick (2004) has reported the validity of this questionnaire using Cronbach's alpha coefficient for the two dimensions of dialogue and conformity as 0.89 and 0.79, respectively (cited by Fatehi et al., 2019). The validity of content, criterion and structure of this questionnaire has been reported as favorable in many researches. In the research of Farahmand and Fooladchang (2017), Cronbach's alpha coefficient was reported as 0.91 and 0.87 for conversation orientation and conformity, respectively. The construct validity of the instrument was obtained by the internal consistency method by calculating the

correlation coefficient between each of the dimensions with the items of the questionnaire, for conversation orientation in the range of 0.62 to 0.77 and for conformity orientation in the range of 0.63 to 0.76. In the research of Fatehi et al. (2020), the alpha coefficient for conversation orientation was 0.89 and for conformity orientation was 0.88, which indicates the good validity of this tool. To determine the validity of the questionnaire, the confirmatory factor analysis method was used, and the factor loading range of the items was 0.49 to 0.62 for dialogue and 0.60 to 0.70 for conformity. The fit indices of the confirmatory factor analysis model also indicated the good fit of this model.

4. Cognitive flexibility questionnaire. The Cognitive Flexibility Questionnaire was developed by Dennis and Vanderwaal (2010) and is a short self-report tool with 20 questions that is used to measure a type of cognitive flexibility that is necessary for a person's success in challenging and replacing ineffective thoughts with more effective ones. This questionnaire is used to evaluate a person's progress in clinical and non-clinical work and to evaluate a person's progress in developing flexible thinking in the treatment of illness and tries to measure three aspects of cognitive flexibility: 1) the desire to understand difficult situations as situations controllable (control), 2) the ability to perceive several alternative justifications for life events and human behavior (alternatives for human behavior) and 3) the ability to create several alternative solutions to difficult situations (alternatives). The questions are set on a seven-point Likert scale (from completely disagree with a score of 1 to completely agree with a score of 7). The higher the person's score in this questionnaire, the higher the cognitive flexibility. Dennis and Vanderwal (2010) showed that this questionnaire has a good factorial structure, convergent validity and concurrent validity. The concurrent validity of this questionnaire with Beck's depression was equal to -0.39 and its convergent validity with Martin and Robin's cognitive flexibility scale was 0.75 (Dennis and Vanderwaal, 2010). Dennis and Vanderwaal (2010) also found the reliability of this questionnaire with Cronbach's alpha method for the whole scale, control and alternatives as 0.91, 0.84 and 0.91 respectively and with the retest method as 0.81, 0.75 and 0.77 respectively. they got In Iran, unlike the main scale that only two subscales were obtained, the

cognitive flexibility questionnaire has three subscales of control, alternatives, and alternatives for human behavior. Dennis and Vanderwaal (2010) showed that the two subscales of alternatives have the same meaning for human behavior and alternatives, and the control factor was considered as the second subscale. Share, Farmani and Soltani (2014) reported the retest coefficient and Cronbach's alpha coefficients of the whole scale as 0.71 and 0.90, respectively. They also report the test-retest reliability coefficients of the subscales of control, substitutes, and substitutes for human behavior as 0.55, 0.72, and 0.57, respectively, and Cronbach's alpha coefficients for the above subscales as 0.87, 0.89, and 0.55, respectively. did (cited by Soltani et al., 2013). In the study of Kohandani and Abulmaali al-Husseini (2016), the internal consistency of the total score of this questionnaire and the two factors of alternatives and control were obtained as 0.89, 0.78 and 0.81, respectively. Also, the total score of this questionnaire and its two subscales had a significant relationship with the total score of

Beck's depression, which was -0.67, -0.58, and -0.60, respectively. In the study of Khoshsorour and Mikaili (2021), the total reliability of this test was calculated using Cronbach's alpha method of 0.88.

Results

Descriptive findings related to 319 female students of the second secondary level of public schools in Chalus city in the academic year of 1401-1400 indicated that: 17-year-old students with 80 people (25.08%) had the largest sample size and 19-year-old students with 48 people (15.05%) had the smallest sample size. First-born students numbered 140 (43.89%) included the largest sample size and third-born students numbered 54 (16.93%) included the smallest sample size. The twelfth grade students numbered 113 people (35.42%) included the largest sample size and the tenth grade students numbered 105 people (32.91%) included the smallest sample size. Table 1 shows the descriptive characteristics of the research variables.

Table 1. Descriptive characteristics of research variables

variable	Mean	Standard deviation	Max	Min	Skewness	Kurtosis
Critical Thinking	129/68	1/92	165	69	-0/546	0/664
Happiness	112/79	1/20	145	67	-0/419	0/331
Dialogue	58/58	3/32	75	35	-0/321	-0/522
Consistency	43/16	2/94	55	21	-0/484	-0/154
Communication patterns	101/74	1/003	130	62	-0/397	-0/436
Cognitive flexibility	77/82	1/82	100	39	-0/423	-0/329

The data in Table 1 shows that the highest average is related to critical thinking with a value of 129.68 and the lowest average is related to consistency (communication patterns), with a value of 43.16. Also, considering that the

skewness and kurtosis statistics of the research variables are all between -2 and +2, the data has a normal distribution. In the following, the correlation coefficients of the research variables are given in Table 2.

Table 2. Correlation matrix of research variables

variables	1	2	3	4	5	6
1- Conversation	1					
2- Consistency	0/567**	1				
3- Communication patterns	0/938**	0/914**	1			
4- Cognitive flexibility	0/935**	0/610**	0/847**	1		
5- Critical thinking	0/765**	0/680**	0/783**	0/73**	1	
6- Happiness	0/685**	0/756**	0/775**	0/69**	0/938**	1

The results of Pearson's correlation coefficient showed that there is a positive and significant relationship between the conversational communication pattern and tendency towards critical thinking ($r=0.765$; $P<0.01$); There is a positive and significant relationship between the conformity communication pattern and the tendency to think critically ($r=0.680$; $P<0.01$); There is a positive and significant relationship between the conversational communication pattern and happiness ($r=0.685$; $P<0.01$); There is a positive and significant relationship between the relationship pattern of conformity with happiness ($r=0.756$; $P<0.01$); There is a positive and significant relationship between the conversational communication pattern and cognitive flexibility ($r=0.935$; $P<0.01$); There is a positive and significant relationship between the conformity communication pattern and cognitive flexibility ($r=0.610$; $P<0.01$); There is a positive and significant relationship between cognitive flexibility and critical thinking ($r=0.73$; $P<0.01$); There is a positive and significant relationship between cognitive flexibility and happiness ($r=0.69$; $P<0.01$); There is a positive and significant relationship between critical thinking and happiness ($r=0.938$; $P<0.01$).

Before analyzing the data, the assumptions of multivariate normality, linearity, multiple collinearity and independence of the test errors

were confirmed using the path analysis method. To check the normality of the data, skewness and kurtosis tests were used (Table 1). Considering that the skewness and elongation statistics of the research variables were all between -2 and +2, the assumption of normality of the data was confirmed. To check multiple collinearity, the tolerance statistic and the variance inflation factor were used, and for all variables, the variance inflation statistic was less than 10 and the tolerance statistic was greater than 0.1; Therefore, the assumption of multiple non-collinearity was met. Also, Durbin-Watson's test was used to test the assumption of independence of errors. The value obtained in this research was equal to 2.66, which is in the range of 1.5 to 2.5, indicating compliance with the assumption of independence of errors. According to the assumptions, the suitability of the proposed model can be evaluated based on the suitability criteria. The path analysis method was used to evaluate the proposed model of this research.

The proposed model for developing a structural model has been obtained to explain the structural model for family communication patterns with a tendency to critical thinking and happiness with the mediating role of cognitive flexibility in students, which can be seen in diagram 1. Also, Table 3 shows the fit indices of the model along with the desired values

Table 3. Fit indices of the modified model

	Index	Value	Criteria	Result
Absolute	chi-square (χ^2)	79/13	-	-
	degrees of freedom (df)	43	-	-
	Significance level	0/001	Less than 0.05	
	Chi-square ratio to degrees of freedom (χ^2/df)	1.84	Less than 3	Approved
	goodness of fit index (GFI)	0/909	More than 0.90	Approved
	Modified goodness of fit index (AGFI)	0/859	More than 0.85	Approved
Adjustive	Relative Fit Index (RFI)	0/931	More than 0.90	Approved
	Incremental Fit Index (IFI)	0/919	More than 0.90	Approved
	Comparative Fit Index (CFI)	0/921	More than 0.90	Approved

	Tukler-Lewis Index (TLI)	0/927	More than 0.90	Approved
	Normalized Fit Index (NFI)	0/918	More than 0.90	Approved
Others	root mean square error of estimate (RMSEA)	0/034	Less than 0.1	Approved
	Normalized parsimonious fit index (PNFI)	0/659	More than 0.50	Approved
	Parsimonious Goodness of Fit Index (PGFI)	0/652	More than 0.50	Approved

The data in Table 3 shows that the value of the χ^2 statistic is equal to 13.79 with a degree of freedom of 43. The result of dividing the chi-square by the degree of freedom is 1.84 and less than 3, which indicates the excellent fit of the model. The value of the goodness of fit index is GFI = 0.909 and indicates the optimal fit of the model. The modified goodness of fit index value is AGFI = 0.859, which is greater than 0.85, so the model has a good fit. The value of the mean root square of the estimation error is RMSEA = 0.034 and considering that it is less than 0.1, it is favorable and indicates the confirmation of the research model. The values of the norm fit index are NFI = 0.918, Tockler-Lewis index = 0.919, TLI = 0.919, comparative fit index CFI = 0.921, and relative fit index = RFI = 0.931, all of which

indicate a good fit and confirmation of the research model. According to the quantitative indicators of fit, it can be concluded that the theoretical model of the research is acceptable. To test the research hypothesis, the partial p-value index was used, and the condition for a relationship to be significant is that the value of this index for the desired relationship is less than 0.05. Therefore, the main hypothesis of the research that the model based on the relationship between family communication patterns with tendency to critical thinking and happiness with the mediating role of cognitive flexibility in students is confirmed. Table 4 shows the results of the bootstrap method in the macro program, Preacher and Hayes (2008) test for mediation relationships.

Table 4. Estimation of indirect paths in the model using bootstrap

	Path		Estimate	Upper bound	Lower bound	Sig.	confidence interval
Exogenous variable	Mediator	Endogenous variable					
Communication patterns	Cognitive flexibility	Tendency to critical thinking	0/459	0/141	0/285	0/006	0/95
Communication patterns	Cognitive flexibility	happiness	0/469	0/383	0/09	0/001	0/95

Based on figure 1 and table 4, to investigate the variable effect of communication patterns on the tendency to think critically with the mediation of cognitive flexibility, the indirect effect coefficient has been estimated at 0.459, and this path coefficient is significant at the confidence level of 0.99; Because the results of the bootstrap test for the indirect effect showed that the lower limit and upper limit of this path coefficient do not include zero (95% CI: 0.09 ~ 0.383).

Therefore, the mediating role of cognitive flexibility in the present hypothesis is confirmed. Based on figure 1 and table 4, the indirect effect coefficient of 0.469 has been estimated for the variable effect of communication patterns on happiness with the mediation of cognitive flexibility, which is significant at the confidence level of 0.99; Because the results of the bootstrap test for the indirect effect showed that the lower limit and upper limit of this path coefficient do

not include zero (95% CI: 0.141 ~ 0.285). Therefore, the role of the mediating variable of cognitive flexibility in the research hypothesis is

confirmed. Table 5 shows the coefficients of the direct effect and the significance level between the research variables.

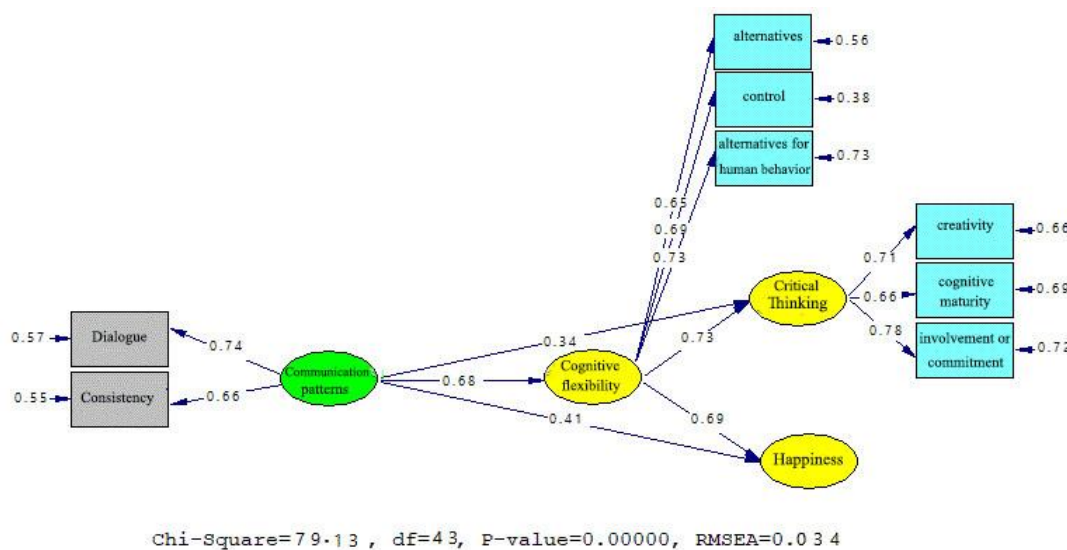


Figure 1. Final Model

Table 5. Estimates of the direct effects of model variables				
Path	Standard coefficient	Std. error	Critical ratio	Sig.
Communication patterns ----> Tendency to critical thinking	0/34	0/267	4/32	0/0005
Communication patterns ----> happiness	0/35	0/341	4/33	0/0005
Cognitive flexibility ----> Tendency to critical thinking	0/73	0/231	8/71	0/0005
Cognitive flexibility ----> happiness	0/69	0/245	7/67	0/0005
Communication patterns ----> cognitive flexibility	0/68	0/129	7/66	0/0005

Based on figure 1 and table 5, the strength of the direct effect of family communication patterns on cognitive flexibility has been calculated as 0.63, which shows that the correlation is favorable. The t-test statistic of 7.61 is also greater than the critical value of t at the error level of 0.05, i.e. 1.96, and it shows that the observed correlation is significant. Therefore, it can be said that family communication patterns directly affect students' cognitive flexibility and is statistically significant. The strength of the direct effect of cognitive flexibility on the tendency to think critically has been calculated as 0.73, which shows that the correlation is

favorable. The t-statistic of the test is 8.71 and is greater than the critical value of t at the error level of 0.05, i.e. 1.96, and it shows that the observed correlation is significant. Therefore, it can be said that cognitive flexibility directly affects students' critical thinking tendency and is statistically significant. The strength of the direct effect of cognitive flexibility on happiness has been calculated as 0.69, which shows that the correlation is favorable. The t test statistic of 7.67 is also greater than the critical value of t at the error level of 0.05, i.e. 1.96, showing that the observed correlation is significant. Therefore, it can be said that cognitive flexibility directly

affects students' happiness and is statistically significant.

Conclusion

The present study was conducted to determine the fit of the model based on the relationship between family communication patterns with tendency to critical thinking and happiness with the mediating role of cognitive flexibility in students. This study's findings showed a positive and significant relationship between family communication patterns and critical thinking tendencies. This finding is consistent with the study of Ghadoumizadeh and Fouladchang (2015) and Koroshnia and Latifian (2011). The result of the study of Ghadoumizadeh and Fouladchang (2015) indicated that family dialogue orientation positively predicts and conformity orientation negatively predicts critical thinking tendency. Koroshnia and Latifian (2011) also showed that the different situations that families have during the two dimensions of conformity orientation and dialogue orientation could be effective in forming children's critical thinking.

In explaining this finding, it is necessary to mention that in flexible families, family leadership and management is democratic and less autocratic, and younger family members also participate in decision-making. In flexible families, people's roles, rules, and hierarchies are flexible, so when facing different issues, a wide range of issues are discussed among family members, and family members solve problems together. Suppose children feel accepted by their parents, rules, discipline and dry and unchangeable hierarchy do not dominate the family atmosphere. Moreover, they should feel that in facing various issues, their opinion is considered one of the family's decision-making pillars and orders are rarely dictated to them. Then, they enthusiastically participate in solving the problem. Since it is necessary to solve the problem of thinking in different ways, it can be said that it is also necessary to solve the problem of creativity and cognitive maturity, which is one of the dimensions of critical thinking. Also, Ennis (2001) defines critical thinking as a type of logical and reasoned thinking that is involved in making decisions, accepting beliefs, or doing things. According to this definition, it is natural that the tendency to critical thinking is more in the children of families with high communication because in such families healthy interaction and

communication between family members is essential for a productive and enjoyable life. Furthermore, all members are encouraged to freely and comfortably engage in interaction and discussion on a wide range of topics, exchange opinions on a wide range of issues, and make family-related decisions together. As a result, the field of logical thinking, reasoning power, truth-seeking, analysis and independent behavior will be provided for children.

This study's findings showed a positive and significant relationship between family communication patterns and happiness. This finding is in line with Rozbehi's (2012) study, which showed that the dimensions of family compatibility and communication patterns (dialogue and harmony) are predictors of happiness. This finding is also in line with Kim and Kang's (2008) study that extroverted female children who had a close relationship with their parents felt the highest level of happiness. According to Fitzpatrick and Ritchie (1994), in families that have high listening and conformity, on the one hand, there is an interest in open communication and discovering new beliefs, and on the other hand, maintaining the existing hierarchy is important in these families. While parents are very interested in their children and express their opinions, they are the final decision makers of the family. The children of these families learn to value family conversations and apply the values and opinions of their parents. When family members can meet each other's needs in the direction of their individual and collective goals, family cohesion increases, which, like a motivating force, causes emotional connection and increases vitality and happiness. When an emotional bond is formed in the family as a result of dialogue, taking into account the components of listening and empathy, its effect will mutually improve the atmosphere of dialogue and cohesion, and this cycle continues to evolve. Therefore, dialogue, emotional connection and family cohesion are presented as variables that have a positive and high correlation with each other, facilitate each other, cause family health, and increase happiness and vitality in children.

This study's findings showed a positive and significant relationship between cognitive flexibility and critical thinking. This finding is in line with the study of Goner and Gokchi (2021), who showed that critical thinking and cognitive flexibility have a positive and significant effect

on each other. Ennis (1987) believes that there are several characteristics or skills for successful critical thinking, including looking for different perspectives, being flexible and unbiased, deducing or generalizing from several observations or thoughts to others, and the value of judging reasonably. As it is known, these characteristics of critical thinking can also be identified in the components of cognitive flexibility. For example, the alternatives component refers to the ability to generate multiple alternative solutions to difficult situations. Also, by internalizing the skills of critical thinking, the critical thinker becomes capable in the following cases: Asking basic questions and issues, collecting and evaluating related information, expressing the results and reasoned solutions and evaluating them, thinking intellectually in alternative thought systems and identifying their assumptions, implications and consequences, communicating effectively with others in order to discover solutions to complex issues

From the point of view of Paul and Elder (2000), critical thinking is a way of thinking about any issue or problem, during which a thinking person improves the quality and way of thinking through the skillful use of cognitive structures and bases rational criteria and indicators on it. The requirement to engage in this thought process is to have the characteristic of cognitive flexibility, resulting in a person becoming a fully developed thinker.

This study's findings showed a positive and significant relationship between cognitive flexibility and happiness. This finding was in line with the study of Hosseini et al. (2015), who showed that cognitive flexibility helps to maintain people's mental happiness. The result of Demirtaş's study (2020) was also in line with this finding, which showed that cognitive flexibility positively correlates with happiness. In fact, flexible people, having a flexible and easy-going nature, cause positive responses from others. Not only do these people have good interpersonal skills, but they also show signs of coping skills early on. With the development of cognitive flexibility, people can use cognitive approaches such as reappraisal and regulate their emotions. As a result, they experience less discomfort and more happiness. People with self-flexibility constantly adapt to the environment and optimally regulate their impulses, emotions and desires. These people are not only skilled,

but also find a way to solve their problems. Also, people with high flexibility, when they are caught in a negative mood, they can get help from others, and in the same way, when they are in a positive mood, the people around them understand this and are affected by their positive emotions.

The findings of this study showed that cognitive flexibility plays a mediating role in the relationship between family communication patterns with tendency to critical thinking and students' happiness. According to the fit of the proposed model, it is expected that researchers and educational planners and consultants will notice the effect of factors such as family communication patterns and cognitive flexibility during experimental studies on increasing happiness and tendency to critical thinking in students.

Conflict of Interest

According to the authors, this article has no financial sponsor or conflict of interest.

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