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Testing a Model of Causal Relationships of Family Communication Patterns, Metacognition, and Personality Traits with Critical Thinking Disposition, Mediated by Epistemic Beliefs of Female High School Students in Ahvaz

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The purpose of this study was to test a model of causal relationships of family communication patterns (conversation and conformity), metacognition and personality traits (openness to experience and conscientiousness) with critical thinking disposition mediated by epistemic beliefs of female high school students in Ahvaz in 2016. The sample consisted of 402 high school students, who were selected by a multi-stage random sampling method. In this study, five questionnaires were used for collecting data, Family Communication Patterns of Koerner and Fitzpatrick, Metacognitive Awareness of Schraw and Dennison, NEO Five-Factor Questionnaire, Epistemic Beliefs of Bayless, and Critical Thinking Disposition of Ricketts. The structural equation modeling (SEM) method was used for analyzing the data. The results showed that all the path coefficients were statistically significant. The relationships of conversation, metacognition, conscientiousness, openness to

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experience, and epistemic beliefs with critical thinking disposition were positive and significant, and the relationship of conformity with critical thinking disposition was significant but negative. The model fit indices showed that the model fitted the data properly (CMIN = 273.649, df = 50, CMIN / df = 5.473 (P <.001), GFI = .90, AGFI = .83, NFI =.91, IFI = .92, TLI = .89, CFI = .92, NFI = .91, and RMSEA = .09). The indirect paths were also tested using the bootstrap procedure of Preacher and Hayes. The results indicated that all the indirect hypotheses had been confirmed.

Keywords: critical thinking disposition, family communication patterns, metacognition, conscientiousness, openness to experience, epistemic beliefs.

Critical thinking, as a life skill, is usually understood as the ability of thinking individuals to challenge their thoughts (Perry, 2014). In addition, Butler et al. (2012) argue that the role of critical thinking in the field of education and training has attracted the attention of education and training philosophers today. Undoubtedly, one of the most popular contemporary research topics in education includes the investigation of the various aspects of critical thinking. The scope of this topic is so broad that researchers around the world have attempted to explain and examine this valuable topic in various disciplines and with different methods. Critical thinking means thoughtful and logical thinking that is concentrated on the decision to do something or believing in it (Ennise, 2010).

As reported by the American Diploma Project (people with diploma certificate), high school graduates should be able to assess the judgment and reasoning behind the information and recognize personal opinions; in addition, they should be capable of diagnosing problems and solving daily problems. In order to be able to interpret ideas and opinions, and incorporate the information, students need to recognize the importance of critical thinking skills at a high level based on their capabilities, and they should strive to master these skills (Marin & Halpern,

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2011). In addition, most research activities in the past 25 years have focused on the measurement of the learners' critical thinking, but research on the processes and the factors needed to facilitate critical thinking has been downplayed (Banning, 2006).

In addition, critical thinking experts argue that in this type of thinking, there are characterological components called disposition. Critical thinking disposition includes a person's urge that pushes the person towards a practical use of his/her skills in critical thinking; without it, the person is unwilling to use critical thinking skills (Giancarlo & Facione, 2001; Facione, 2011). A person with critical thinking disposition has a critical spirit (Facione, 2011). In this regard, Ricketts (2003) admits that critical thinking disposition is based on an inner motivation and components of critical thinking disposition include innovativeness, cognitive maturity, and mental engagement. Family communication patterns reflect how parents communicate with their adolescent children. Chaffee, McLeod, and Wackman (1973) first developed two major dimensions of family communication patterns: the social-oriented and the concept-oriented dimensions. Social-oriented families are authoritative and controlling families. Children in this type of family should defer to parental authority, maintain harmonious relationships, and avoid any conflict with their parents or others. Conversely, concept-oriented communication emphasizes individual ideas, beliefs, and feelings. This type of family encourages children to express their ideas openly and to challenge the views of others.

By using these two dimensions, McLeod and Chaffee (1972) first categorized families into four different types and created a model of family communication patterns.

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The researchers categorized families according to whether individuals' "responses are high or low on social-oriented and concept-oriented. Four family communication types were identified; these were as follows: protective (low on concept-orientation and high on socio-orientation), pluralistic (low on social-orientation and high on concept-orientation), laissez-faire (low on both dimensions), and consensual (high on both dimensions) (See Figure 1).

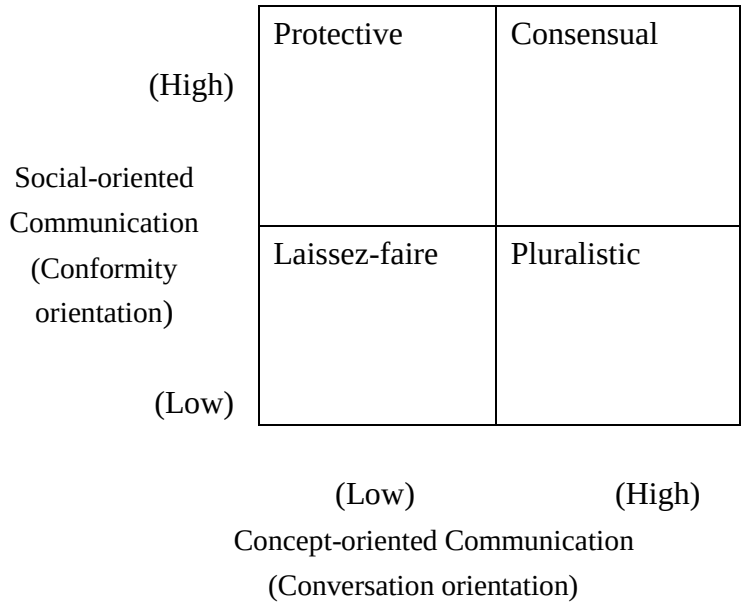

Figure 1. Four-fold Typology of Family Communication Patterns According

Protective communication shows little concern for conceptual matters. In protective families, children are discouraged from expressing different opinions and are encouraged to maintain harmonious relationships. In pluralistic families, children are not only exposed to controversial issues, but are encouraged to develop strong and different opinions without fear of

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punishment. Laissez-faire families are neither concerned with conversation nor with conformity. This communication pattern neither encourages challenging others' opinions nor developing harmonious relationships. On the other hand, consensual families stress on both relational harmony and open communication between parents and children. Fitzpatrick and Ritchie (1994) identified two infrastructural aspects in family communication patterns: conversation-orientation and conformity-orientation. Conversation-orientation refers to the fact that families provide conditions to some extent as this will ensure that all family members are encouraged to engage freely and easily in discussions on a wide scope of issues. Conformity-orientation also stands for the extent to which families have emphasized on the conditions in which attitudes, values, and beliefs are similar. A certain amount of research has been conducted on the relationship between family communication patterns and critical thinking disposition. Koesten, Sherodet, and Ford (2009), in a study, indicated that the family expressiveness feature (which corresponds to the orientation towards family conversation) positively predicts cognitive flexibility. The study results also showed that cognitive flexibility, by avoiding conflict (i.e., one of the characteristics in conformity orientation) will be predicted negatively. "Metacognition" refers to the awareness and the control that a person exerts on his thinking (Magnuo, 2010). The personality trait of "openness to experience" refers to curiosity experience for the inside and the outside world. Open-to-experience people look for new ideas and unusual values (Costa & McCarry, 1992), The "Conscientiousness" trait belongs to people who are purposeful, determined, energetic, and determined (Costa & McCarry, 1992). "Epistemological Beliefs" refer to a set of belief systems

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that embrace the process of obtaining, maintaining, and raising knowledge (Ordonez, Ponsoda, Abad & Romero, 2009). In addition, "Critical Thinking Disposition" is a tendency that incites the person to practically use his skills in critical thinking, without which he/she is reluctant to apply his/her critical thinking skills. In general, tendencies are dimensions of personality, inner tendencies, and habits that affect human behavior (Fasciane, 2011).

Magno (2010) tested two models in his research in order to examine the role of metacognitive skills in the development of critical thinking. In the first model, metacognition was formed by two factors. In the second model, metacognition was formed by eight factors affecting critical thinking. The results showed that in both models, metacognition has a significant role to play in critical thinking. In another study, Kelly and Iren (2010) studied metacognitive strategies that improve critical thinking; the results of that study showed that a good critical thinker is engaged in metacognitive activities, especially at a high-level in planning and assessment strategies. In addition, the studies showed that information-seeking behavior in learners is influenced by their epistemic beliefs.— In particular, the epistemic beliefs during the investigative process (including the detection of the need for information, the identification and the selection of the topic, the review of information about the subject in general, a focus on the issue, gathering information related to the subject of focus, and ultimately, the delivery of the results of the research) will affect the topic selection, asking for help from teachers and classmates, searching techniques, evaluation of information during the search process, and the ability to distinguish references (Whitmire, 2003; Botha, 2013). In this case, learners with a low level of epistemic growth took

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every story that was printed or posted on a site for granted and also rejected any conflicting information. On the contrary, students with high levels of epistemic growth, evaluated the information, and used their own criteria and perspectives to select the sources (Botha, 2013).

In addition, Rabinz (1996, translated by Parsaian and Aarabi, 2016), in the book *Organizational Behavior*, states: "personality traits and features may influence all of the person's behaviors". In this regard, in two studies conducted by Clifford, Boufal, and Kurtz (2004), among the five personality traits, openness to experience was the only trait that explained %6/3 of critical thinking variance. In a study by Hogan and Ones (1997) on the contentiousness subscale, the researchers found that people with a high score in this subscale are fertile, purposeful, and persistent thinkers. Although this subscale (contentiousness), like the need for knowledge and the openness to experience, has not been studied as a personality structure, increasing evidence supports it and this factor plays an important role in critical thinking and problem solving (Spector, Schneider, Vance & Hezlett, 2000). In addition, a few studies have already been conducted in the field of critical thinking disposition which examined the relationships between the different variables and the various inclinations. However, a review of these studies demonstrates that they have mainly paid attention to the existing relations up to a correlation effect. In addition, these studies examined the influences of different variables separately and as far as the researcher has investigated, there was no study to date to examine the impact of family communication patterns (conversation and conformity), metacognition, personality traits (openness to experience and conscientiousness) with critical thinking disposition mediated by epistemic beliefs via the

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potential impact of variables on each other and in the form of a model. Hence, the present study is going to design and test a model that is based on previous research and literature to examine the impact of factors influencing critical thinking disposition. Figure 1 shows the proposed model:

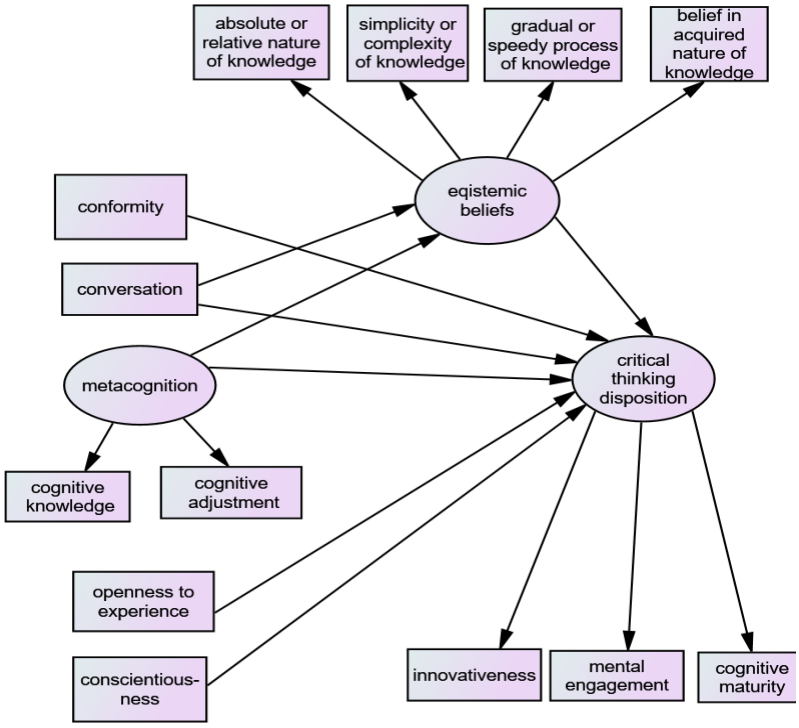

Figure 1. The Proposed Model of Causal Relationships of Family Communication Patterns, Metacognition, and Personality Traits with Critical Thinking Disposition, Mediated by Epistemic Beliefs of Female High School Students

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Method

This study was a type of correlational research, namely structural equation modeling or causal modeling method. Structural equation modeling is a powerful multivariate analysis method through which one can test hypotheses about causal relationships between latent variables. The studies that use causal relationships to test modeling between variables apply this method. In this method, different parameters and various fitness indicators are used.

Population, Sample, and Sampling Method

The statistical population of this research included third-grade female students in the first stage of high school and third-grade female students in the second stage of high school in Ahvaz, who were studying in the academic year of 2016. In using the structural equation modeling method, Garson (2010) has emphasized that the most common method is to estimate the maximum likelihood, and therefore, it includes a sample size of 200 of acceptable results. Kline (2010) also emphasized that the sample size ratio for each estimated parameter is at least 5 and at the most, 20. Therefore, according to the number of parameters of the present model (16 parameters), for each parameter, 13, the sample consisted of 402 students who were selected by the multi-stage random sampling method. For this purpose, from the four educational districts of Ahwaz, two districts were selected, and from the selected areas, ten high schools were selected, and from each high school, compared to the students of the third grade of primary school and the third grade of secondary school, 402 girls (201 students from the third grade of primary school, 201 students from the third grade of secondary school) were randomly selected.

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The following instruments were used in this study:

The Revised Scale of Family Communication Patterns

This scale was designed by Koerner and Fitzpatrick (2002) with 26 items; it was designed to assess the family communication status. This scale has the two following subscales: conversation orientation and conformity orientation. The first 15 items relate to conversation-orientation and the next 11 items relate to conformity-orientation; each item is rated by a five-point Likert type scale (complete disagreement=1, complete agreement=5). Based on theoretical structures, the scale measures both factors favorably, and therefore, has contextual validity. The studies by Koroshnia and Latifian (2011), and Keshtkaran (2009) in Iran, confirmed the validity of this scale, using the factor analysis method. In addition, Koerner and Fitzpatrick (2004) reported the Cronbach's alpha coefficients of this scale for the conversation orientation as .89 (in the range .84–.92) and for the conformity orientation as .79 (in the range .73–.84). In addition, in the present study, in to order to determine the validity of the revised scale of family communication patterns, a confirmatory factor analysis was carried out. The results indicated that all of the items, except Items 3 and 25, which had a factor loading of less than .3, had good factor loadings; i.e., all the items were loaded significantly on their related factors ($p < .001$). In addition, its reliabilities, based on the Cronbach's alpha for both subscales of conversation- and conformity-orientation, were .83 and .76, respectively.

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Metacognitive Awareness Questionnaire

This scale was made by Schraw and Dennison (1994), with 52 items that were designed to measure the dimensions of metacognitive awareness. This questionnaire has two subscales: cognitive knowledge and cognitive adjustment. Cognitive knowledge was measured by 17 items and cognitive adjustment was measured by 35 items. The responses were rated based on a five-point Likert type scale (complete disagreement=1; complete agreement=5). Schraw and Dennison (1994) reported its reliability coefficients, based on the internal consistency method, from .88 to .93; based on Cronbach's alpha method, the reliability coefficient was .93. In addition, in the present study, in order to determine the validity of the metacognitive awareness questionnaire, a confirmatory factor analysis was carried out on this scale, and all of the items (except for the Items 10 and 18, which had factor loadings of less than .3) had good factor loadings; i.e., all of the items loaded significantly on related factors (P <.001). In addition, its reliability, based on Cronbach's alpha method for the entire questionnaire, subscales of cognitive knowledge, and cognitive adjustment were .94, .90, and .92, respectively.

Neo Five-Factor Personality Questionnaire

This questionnaire was made by MacCarey and Costa (1985) with 60 items. It is used to assess personality traits and has the following five subscales: openness to experience (O), conscientiousness (C), adaptation (A), extroversion (E), and neuroticism (N). Each of these subscales was measured by 12 items. The responses are based on a five-point Likert type scale (complete disagreement=1 to complete agreement=5). MacCarey and Costa (1985), in a study on students, reported the

reliability coefficients of its subscales as .80 for being open-to-experience and .79 for conscientiousness. In the present study, a confirmatory factor analysis was performed on the two subscales (openness to experience and conscientiousness) of the scale. All of the items, except Item 11, had good factor loadings; i.e., all of the items loaded significantly on their related factors (P < .001). In addition, its reliability, based on the Cronbach's alpha method, for both subscales of openness to experience and conscientiousness, were .88 and .85, respectively.

Epistemic Beliefs Questionnaire

This scale was made by Bayless (2009), with 34 items, and it is used to assess epistemic beliefs. This questionnaire has the four following subscales: believing in the innate or acquired nature of learning, gradual or speedy learning processes, viewing knowledge as complex or simple, and the relative and the absolute nature of knowledge. The responses are based on a five-point Likert type (complete disagreement=1 to complete agreement=5). The reliability coefficient of the epistemic beliefs questionnaire's total score, using Cronbach's alpha method, has been reported as .86 (Bayless, 2009). In the present study, to determine the validity of the epistemic beliefs questionnaire, a confirmatory factor analysis was carried out. The results showed that all the items, except for Items 1 and 2 of the subscales of belief in the relative and the absolute nature of knowledge and belief in the gradual or the speedy learning process, had good factor loadings; i.e., all the items loaded significantly on their related factors (P< .001). In addition, its reliability coefficients, based on the Cronbach's alpha method, for the entire questionnaire and for the subscales of viewing knowledge as complex or simple, belief in gradual or speedy learning process,

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belief in relative and absolute nature of knowledge, and belief in the innate or acquired nature of knowledge were .94, .75, .79, .83, and .94, respectively.

Critical Thinking Disposition Questionnaire

This scale was made by Ricketts (2003) with 33 items and it is designed for assessing critical thinking disposition. This questionnaire has three subscales, including innovativeness (13 items), cognitive maturity (9 items), and mental engagement (13 items). Each item is rated by a five-point Likert type scale (complete disagreement=1 to complete agreement=5). Ricketts reported the reliability coefficients of the foregoing scale for the entire questionnaire as .86; the specific reliability coefficients for innovativeness, cognitive maturity, and mental engagement were .79, .75, and .89, respectively. In the present study, in order to determine the validity of the critical thinking disposition questionnaire, a confirmatory factor analysis was conducted and all the items (except for Items 12 and 19 of the cognitive maturity subscale) had good factor loadings. That is, all items loaded significantly on their related factors (P< .001). In addition, the reliabilities (based on Cronbach's alpha method) for the entire scale as well as for the subscales of innovativeness, cognitive maturity, and mental engagement were .91, .84, .70, and .82, respectively.

Results

The descriptive statistics (means, standard deviation, and minimum and maximum scores) and correlations among research variables were reported in Tables 1 and 2.

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Table 1

Descriptive Findings of the Research Variables

Variables	Mean	SD	Minimum Score	Maximum Score
Conversation	42.06	6.75	11	55
Conformity	35.90	5.24	15	45
Critical thinking	118.74	15.38	80	140
Innovativeness	43.26	5.09	25	52
Maturity	19.96	2.73	12	26
Mental engagement	55.51	7.84	31	65
Epistemic beliefs	123.081	20.13	77	155
Viewing knowledge as complex or simple	23.70	4.29	13	30
Belief in gradual or speedy learning process	24.047	4.41	11	30
Belief in relative and absolute nature of knowledge	47.48	8.40	26	60
Belief in innate or acquired nature of knowledge	27.84	4.84	14	35
Metacognition	184.54	22.87	103	220
Cognitive knowledge	58.67	7.99	30	70
Cognitive adjustment	125.87	16.83	73	150
Conscientiousness	36.87	3.87	20	49
Openness to experience	48.64	8.09	25	60

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Table 2
The Correlation Matrix of Research Variables

variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.40*														
2	.51*	.44*													
3	.50*	.45*	.60*												
4	.43*	.38*	.87*	.74*											
5	.49*	.51*	.59*	.81*	.79*										
6	.42*	.36*	.89*	.79*	.70*	.79*									
7	.49*	-.56*	.51*	.51*	.41*	.48*	.45*								
8	.53*	.52*	.53*	.58*	.43*	.47*	.49*	.86*							
9	.17*	.22*	.53*	.36*	.51*	.51*	.58*	.34*	.24*						
10	.44*	.54*	.47*	.46*	.38*	.46*	.41*	.93*	.71*	.41*					
11	.62*	.47*	.64*	.65*	.53*	.61*	.56*	.63*	.61*	.34*	.59*				
12	.53*	.41*	.78*	.75*	.71*	.73*	.70*	.56*	.57*	.43*	.52*	.83*			
13	.58*	.44*	.50*	.52*	.38*	.48*	.43*	.59*	.55*	.66*	.55*	.69*	.65*		
14	.37*	.16*	.27*	.25*	.22*	.24*	.28*	.30*	.31*	.78*	.30*	.39*	.31*	.38*	
15	.49*	.39*	.49**	.48**	.38*	.50*	.39*	.41*	.38*	.61*	.39*	.60**	.47*	.59*	.29*

*p <.001 Note: 1- Conversation 2- Conformity 3- Epistemic beliefs 4- Belief in simplicity of knowledge 5- Belief in gradual or speedy

learning process 6- Belief in relative and absolute nature of knowledge 7- Belief in innate or acquired nature of knowledge 8- Critical thinking disposition 9- Innovativeness 10- Cognitive maturity 11- Mental engagement 12- Metacognitive awareness 13- Cognitive knowledge 14- Cognitive adjustment 15- Conscientiousness 16- Openness to experience.

The structural equation modeling (SEM) results indicated that the hypothesized model fitted the data properly (CMIN= 273.649, df =50, CMIN/df = 5.473 (P< .001), GFI = .90, AGFI= .83, NFI= .91, IFI= .92, TLI= .89, CFI = .92, NFI= .91 RMSEA= .09). The standardized regression weights of the paths are represented in Figure 2.

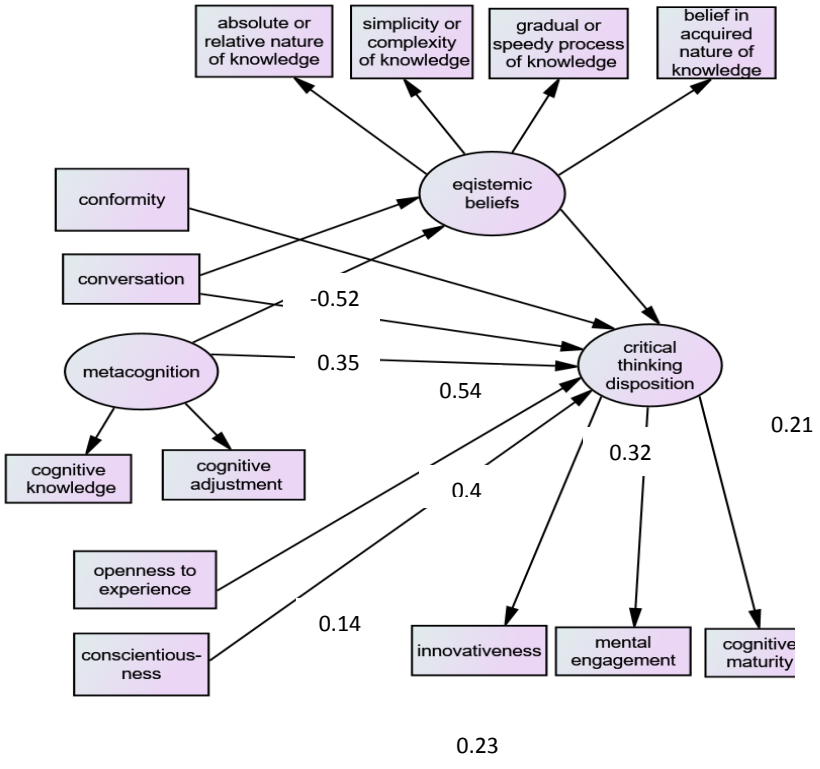

Figure 2. The Standardized Parameters of the Structural Model *P < .001

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As shown in Figure 2, all the paths in the model were statistically significant (P < .001). To determine the significance of the mediating effect, the bootstrapping procedure was used to determine the 95% bias-corrected confidence intervals around these effects. A confidence interval that did not span zero indicated a statistically significant effect (see Table 3).

Table 3

Results for Bootstrapping Analysis with On Mediator: Effects on Critical Thinking Disposition

					95% Confidence interval	
	Data	Boot	Bias	SE	Lower	Upper
Co → epistemic belief → Critical Thinking Disposition	.127	.128	.003	.018	.101	.179
Me → epistemic belief → Critical thinking disposition	.070	.070	-.003	.011	.043	.068

Co: Conversation Me: Metacognition

As illustrated in Table 3, the confidence interval, with one mediator (epistemic beliefs), indicates that epistemic beliefs act as mediators.

Discussion

The purpose of the present study was to test the model of casual relationships of family communication patterns (conversation and conformity), metacognition, and personality traits (openness to experience and conscientiousness) with critical thinking disposition mediated by epistemic beliefs of female high school students in Ahvaz. The results showed that the conversation

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variable affects critical thinking disposition. The findings of this study are consistent with Koesten, Sherodt, and Ford (2009), and Koroshnia and Latifian (2011). By the same token, Koerner and Fitzpatrick (2002) believe that in the families with high conversation orientation and low conformity, the settings for free discussion on a variety of topics will be provided without restriction in terms of the discussed issues, the diverse opinions, and the attitudes of the members of the family will be taken into consideration. In such families, it is more likely that the children will experience a feeling of competence in dealing with different opinions. This feeling of competence drives individuals to explore the environment and helps them to deal with the world around them with more flexibility (Deci & Ryan, 2000), and thereby keep their minds open to it. In addition, the results of the present study indicated that there is a significant negative relationship between critical thinking disposition and conformity. The findings of this study are consistent with Koesten et al. (2009), Koerner and Fitzpatrick (2002), and Koroshnia and Latifian (2011). To explain this finding, the theories of self-determination (Deci & Ryan, 2000) and the Weiner documents (quoted by Karshki and Mohseni, 2012) stress on the role of social factors, such as culture, community, school, and family, in perceptions and emotions. More specifically, for the setting of the formation of emotional orientations, such as the scientific spirit or the critical disposition, the same framework can be taken into consideration. So, in general, it can be concluded that family communication patterns can influence personality traits, and those parents who support conversation and do not emphasis conformity, help their children towards achieving a positive change in dignity, socialization, and the willingness to restrain

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oneself. On the contrary, too much emphasis on conformity not only cannot prevent the occurrence of problems but also paves the way for major problems in the future (quoted from Sepehri and Mazaheri, 2009).

In the field of family communication patterns, the findings showed that family conversation directly affects epistemic beliefs. The findings of this study are consistent with the studies of Schommer (1990), Kennell (1994), and Yousefi (2007). To explain these findings, it can be said that more encouragement by parents toward conveying accountability to their children at home—so that they can think for themselves—means more complex epistemic beliefs for the students (Schommer, 1990). Another explanation about the relationship of family communication patterns and epistemic beliefs goes back to the perspective presented by Belenky et al. (1986), who found that social relations are an effective factor in the growth of epistemic beliefs. In addition, the present study showed that metacognition directly affects critical thinking disposition. The findings of this study are consistent with Magno (2010), Choy and Cheah (2009), Kelly and Iren (2010), and Halpern (2010). In explaining these findings, Brown (2004) believes that without metacognition, critical thinking is unavailable as critical thinking is a high-level mental process that requires the assessment of reasons, critical spirit, and metacognition. In addition, Halpern also believes that metacognitive strategies are used when people face difficult cognitive tasks, such as problem-solving and critical thinking. In addition, the results of this study showed that metacognition directly affects critical thinking disposition. The findings of this study are consistent with Schraw, Krippen, and Hartley (2006), Cano (2005), and Yilmaz-Tuzun and Topcu (2010). In all of these studies, a

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significant relationship between metacognition and epistemic beliefs has been reported. In explaining these findings, the results of a study showed that elementary school students (from the fourth and the sixth grades), who believed learning means understanding, processed scientific texts more deeply than students who believed learning is a mirroring expression of facts (Chan & Sachs, 2001). Hence, it can be said that epistemic beliefs can affect the use of learning strategies by the learners.

Students, who hold a more complex view about knowledge, probably process most of the content more deeply; according to Bandura's self-efficacy theory (1997), students who believed that they had the ability to do a job were mostly motivated internally and showed higher levels of self-efficacy in learning settings. In addition, the results of this study indicated that the personality trait of openness to experience directly affects critical thinking disposition. These findings were also consistent with Clifford et al. (2004), West et al. (2008), Halpern (2007), and Toplak and Stanvich (2002). For example, Clifford et al. showed that among the five-factor personality traits, openness to experience was the only factor that explained 6.3% of critical thinking's variance. In this regard, Rabinz (1996, translated by Parsaian and Aarabi, 2016) in *Organizational Behavior* stated that personality traits and factors may affect all behaviors of the individual. This could explain personality traits like openness to experience and critical thinking disposition. In addition, from another angle, it can be said that the openness to experience dimension includes elements such as having an open mind, independence, courage, authenticity, reflection, and complexity of individual's mental and experimental life (Hasting & O'Neill, 2009).

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In addition, the results showed that the personality trait of conscientiousness directly affects critical thinking disposition. This finding is consistent with Spector et al. (2000), Hogan and Ones (1997), and Halpern (2007). In explaining this finding, the desires approach explains that the critical thinker characteristic includes features like the need for order, systematic problem solving styles, perseverance and precision, thinking before acting, following norms and rules, planning, and organizing and prioritizing tasks. All of these features are in the subset of the conscientiousness factor (Halpern, 2007). In addition, in relation to epistemic beliefs and critical thinking disposition, the results indicated a significant positive relationship between epistemic beliefs and critical thinking disposition. The relationship between epistemic beliefs and critical thinking disposition among students has been examined in various studies. In this regard, Baxter (1992) points out that critical thinking and its development is one of the basic needs of human life to decide and choose, and gain a deep understanding of various topics; in order to achieve this important ability, its aspects should be investigated. One of these important factors is the human understanding of oneself and epistemic beliefs. In this respect, the results of the study by Henry Wyre (2007) suggest that a focus on the skills to change the beliefs relative to knowledge affects the development of critical thinking. Therefore, with a change in beliefs about the definite or the acquired nature of knowledge and wisdom, people's orientation towards critical thinking can be changed.

In addition, the findings of this research showed that the conversation variable, through the epistemic beliefs, indirectly affects critical thinking disposition. The findings of this study are consistent with Schommer (1993, 1990), Belenky et al.

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(1986), and Allen and Razvi (2006). In explaining these findings, it can be said that effective factors affect the development of epistemic beliefs in students and it starts as a harmonious process at home, and determines children's behavior at school, at university, the work environment, and the whole community. The relationship between parents and children is an important matter that has attracted the attention of education and training professionals for years. The family is the first base that creates links between the infant and its surroundings. Parenting practices, as a set of behaviors that describe parent–child interactions in a wide range of situations, were assumed to create an effective interactive setting.

In addition, the findings of this study showed that the metacognition variable indirectly affects critical thinking disposition through epistemic beliefs. The results of this study were consistent with Schommer (1990), Young (2005), Chan (2004), and Schommer-Aikins (2004). In explaining these findings, a study by Schommer (1990) on the effect of epistemic beliefs on students' cognition can be mentioned. The results of this study indicated that believing in the speediness of learning and the definitive nature of knowledge predict simple and absolute conclusions, respectively. Therefore, it seems that epistemic beliefs affect the processing of information and the monitoring of cognition. In addition, when people jump to conclusions about complex and contradictory information, the conviction about the definitive nature of knowledge determines the person's move toward a critical examination of knowledge and to conclude accordingly; on the other hand, it can distort information to make it fit his/her beliefs about the definitive nature of his/her knowledge. In addition, epistemic beliefs affect learning strategies used by the students in such a way that the

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complex epistemic beliefs are associated with the use of deep learning strategies and simple epistemic beliefs are associated with the use of superficial learning strategies (Young, 2005; Chan, 2008).

Limitations and Recommendations of this Study

With regard to the fact that the subjects of this research were high school students in the city of Ahvaz, the results of this study cannot be extended to other high school students in various schools around the country. In addition, a causal conclusion cannot be definitely derived from using a structural equation modeling method. The existence of a large number of measurement items was another limitation of the present study. Testing the proposed model of the present study on other academic levels as well as university students to increase the generalizability of the mentioned model has been also recommended. We suggest that other researchers pursue the recommendation of using demographic variables, such as comparing students from different socioeconomic backgrounds, type of residence (rural or urban), age, academic field of study, and cultural values in their future studies. According to the results of this study, epistemological beliefs of learners have positive effects on their critical thinking. Accordingly, it is suggested that these features should be targeted at educated students by compiling and executing applications. The results of this study indicate that the communication model of conversation and metacognition is directly related to critical thinking. Teachers and school counselors can provide students with the necessary information and the resources to help them.

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