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The Relationship between Innovativeness and Cognitive Ability in Rhinoplasty Candidates with the Mediating Role of Cognitive Distortion

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Abstract

Introduction: The purpose of this study was to find the relationship between innovativeness and cognitive ability in rhinoplasty candidates with the mediating role of cognitive distortion via the Bootstrap approach.

Method: The correlation research method was path analysis. The statistical population included all rhinoplasty candidates in Iran from August 2022 until May 2023. In this study, 320 people who were candidates for cosmetic rhinoplasty were selected via the available method. They completed the Innovativeness Questionnaire (1990), the Cognitive Abilities Questionnaire (2013), and the Interpersonal Cognitive Distortions Scale (2004) through Google form due to the Covid-19 outbreak. For data analysis, SPSS-21 and Amos software were used.

Results: The results showed that innovativeness had a direct effect on cognitive ability (t=2.52; ß=0.60) and cognitive distortion (t=2.09; ß=0.45), but cognitive distortion had an inverse effect on cognitive ability (t =1.99; ß=-0.40). The bootstrap test results indicated that cognitive distortion had a negative role as a mediator between innovativeness and cognitive ability.

Conclusion: By examining the underlying cognitive and psychological factors of a tendency to rhinoplasty, it is suggested that cognitive interventions should be conducted on all candidates for cosmetic surgeries to prevent unnecessary rhinoplasty candidates by creating modified cognitive schemas.

Keywords: Cognitive Ability, Innovativeness, Cognitive Distortion, Cognitive Ability, Rhinoplasty

Introduction

Cosmetic rhinoplasty has different medical, psychological, social, aesthetic, and even luxury dimensions [1]. Various psychological variables are also considered such as body image, psychopathological factors like anxiety, and psychosomatic factors [2]. Studies have indicated that cosmetic rhinoplasty immediately increases the quality of life of people, but over time the quality of life of these people decreases, and the tendency for more cosmetic surgeries increases. The statistics of developed countries show that the purpose of plastic surgery is therapeutic and it is equally prevalent in men and women [3]. In Iran, plastic surgery, especially rhinoplasty, is conducted with the aim of cosmetic surgery, and it is more common in women. Studies in this field presented that cognitive factors play a major role as one of the psychological factors in the desire for cosmetic rhinoplasty and its repetition in people [4]. It seems that cognitive factors affect a person's understanding of cosmetic rhinoplasty. Therefore, cognitive factors play an important role in accepting and going under this surgery [5]. In general, people who are candidates for cosmetic surgery have

poor cognitive flexibility compared to other people [6]. Cognitive abilities or cognitive capacities are brain-based skills that are needed for adaptation and necessary in the acquisition of knowledge, manipulation of information, perception, learning from past experiences, and reasoning [7]. Cognitive abilities and their factors govern our body. Indeed, cosmetic surgery, especially rhinoplasty manipulates the perception of candidates and changes the network of perceptions [1].

Innovativeness is considered a latent personality trait that is effective in preferring new and different experiences or in deciding to take action [11]. Plastic surgery enhances the sense of innovativeness [9]. Innovativeness has two important parts including cognitive and sensory. Cognitive innovativeness is based on new purposeful experiences that arouse the mind and mental process, while sensory innovativeness focuses on new experiences that focus on arousing the senses and our emotions [10]. Psychologically, innovativeness is related to many health and cognitive factors. A study indicated we have a mindset of innovativeness for our cognitive capacity [11]. Another study demonstrated the meaningful relationship between cognition levels and individual innovativeness state in teachers [12]. Innovative people enjoy thinking, solving problems, and getting confused about problems and other mental struggles and they seek experiences because of their high and complex cognitive abilities [13]. A study demonstrated that cosmetic rhinoplasty candidates had high novelty-seeking in contrast to non-candidates [14]. As a study showed, innovativeness and cognitive capacity are related together [15].

Sometimes, sensory innovativeness causes cognitive distortions [16]. Cognitive distortion is an irrational mental pattern that causes the onset of psychological disorders, such as depression anxiety, and obsessive-compulsive disorder, and causes a misunderstanding of reality. According to Beck's theory, cognitive distortions are inflexible and broad misinterpretations of information [17]. Cognitive distortions lead to depression and can make depression worse [18]. A study indicated cognitive development, and early maladaptive schemas in can predict cognitive distortions [19]. Hence, Body-dysmorphic image is a form of cognitive distortion [20]. In other words, the body-dysmorphic image in people who are candidates for rhinoplasty surgery is caused by cognitive distortion that is rooted in mental health problems [21]. Therefore, it can be said that psychological factors such as depression and anxiety play a role in body image distortion, which is a type of cognitive distortion [22].

Currently, cosmetic surgery is known as the most common type of surgery which is increasing day by day and it seems that many women and even men are exposed to this phenomenon via media advertisements and the virtual world and they become interested in doing it [23]. As mentioned earlier, cosmetic surgeries are related to many psychological and cognitive factors, and maybe the improvement of these factors will lead to the reduction of unnecessary cosmetic surgeries [24]. Cosmetic rhinoplasty can alter the psychological and cognitive states of patients after this surgery. Therefore, considering the strong psychological and cognitive problems of people who are candidates for cosmetic surgery, especially rhinoplasty and the repetition of these surgeries, and to help the mental and psychological state of these people, the present study seeks to answer two questions including: first, is there a relationship between innovativeness and cognitive distortion with cognitive ability in rhinoplasty candidates? Second, has the model of cognitive ability of rhinoplasty candidates the fitness of goodness based on innovativeness with the mediating role of cognitive distortion or not?

Method

The correlation research method was path analysis. The statistical population included all rhinoplasty candidates from August 2022 until May 2023 in Iran. According to the target population and based on the formula $n=z^2(1-p)/ d^2$, the sample size when the researcher, in consultation with methodological experts, considered the value of d^2 equal to 0.06. The sample size based on the above formula (Cohen's Path Method) to conduct this study was 320 people [25]. The entry criteria were to be between the ages of 18 and 40 years and have a history of rhinoplasty or be a candidate for rhinoplasty. The exclusion criterion was the refusal of the participants to continue completing the questionnaires. A call was given on Instagram for those who want to participate in this study to complete the questionnaires of this study through Google form, email, or WhatsApp. Furthermore, the Google form link was sent to people's numbers or on WhatsApp. An email was sent to those who wanted to complete the link via email. The main researcher of this study supervised all these steps. Confirming the informed consent was obtained from each participant and the purpose of the study was explained at the beginning of the form. Participants were free to answer these questions and could leave the Google Form page. To maintain ethical principles, they were assured that the information would remain confidential. In this study, 320 people who had cosmetic rhinoplasty or were candidates; participated in the research. In terms of gender, 215 people (67.2%) were women and 105 people (32.8%) were men. The mean and standard deviation of the age of participants were 34.54±5.76.

The data were collected using three instruments:

Innovativeness Questionnaire (IQ): This questionnaire was created by Venkatraman and Price in 1990 and has 16 questions with two subscales, sensing innovativeness and cognitive innovativeness. The scoring of the questionnaire is in the form of a 5-point Likert scale (agree=5 and disagree=1). The range of scores of this questionnaire is between 16 and 80. Moreover, the higher score of people in this questionnaire represents the higher the level of innovativeness. The creators of this questionnaire have reported the content validity of this questionnaire as

favorable and its reliability according to Cronbach's alpha is above 0.65 [10]. The Iranian version of the innovativeness questionnaire indicated Cronbach's alpha is 0.69. In this study, the content and formal validities of this questionnaire were confirmed [26]. The Cronbach alpha recorded in this study was 0.83, which indicates the desirability of the validity coefficient of this questionnaire.

Interpersonal Cognitive Distortions Scale (ICDS): Interpersonal cognitive distortion questionnaire was designed by Hamamci and Büyüköztürk in 2004. This scale has 19 items and includes three subscales of rejection in interpersonal relationships, unrealistic expectations in relationships, and misunderstanding in interpersonal relationships. This questionnaire is graded on a Likert scale from "strongly disagree (1) to strongly agree (5)" which gives an overall score from a minimum of 19 to a maximum of 95. The lower the scores of people on this scale represent the lower the cognitive distortion. The reliability of this questionnaire was obtained through internal consistency by Cronbach's alpha and also through retesting after two weeks for the whole scale, 0.67 and 0.74, respectively. The validity of this questionnaire was obtained through correlation with the Irrational Beliefs Scale, Automatic Thoughts Scale, and Conflict Tendency Scale in interpersonal relationships 0.45, 0.53, and 0.53 respectively [27]. In Iran, the construct validity of the questionnaire of the presence of three rejection factors in relationships interpersonal, unrealistic expectations in relationships, and misunderstandings in interpersonal relationships were confirmed. Concurrent validity indicated a significant relationship between this questionnaire and the Borderline Personality Trait Scale. The reliability of this questionnaire was calculated through Cronbach's alpha. Cronbach's alpha for the subscale of expectations of rejection in interpersonal relationships was 0.79, unrealistic expectations in relationships were 0.82, and misunderstandings in interpersonal relationships were 0.81, and 0.85 for the whole scale [28]. The Cronbach alpha recorded in this study was 0.86, which indicates the desirability of the validity coefficient of this scale.

Cognitive Abilities Questionnaire (CAQ): This Questionnaire was designed by Nejati in 2013. This questionnaire contains 30 items that measure cognitive ability on a five-point Likert scale from 1 (almost never) to 5 (almost always). This questionnaire has seven factors including memory, inhibitory control and selective attention, decision-making, planning, sustain attention, social cognition, and cognitive flexibility. The range of scores of this questionnaire is between 30 and 150. In addition, the higher score of participants in this questionnaire represents the higher the level of cognitive ability. This questionnaire has a strong Cronbach's alpha (0.83). To measure the concurrent validity of this questionnaire the Pearson correlation test showed a significant correlation in the test-retest analysis ($P<0.01$) [29]. The Cronbach alpha recorded in this study was 0.81, which indicates the desirability of the validity coefficient of this questionnaire.

For data analysis, SPSS-21 was used. Moreover, the Bootstrap test was used in the Amos Analysis of Moment Structures version 24, to determine the significance of the mediation relationship.

Results

In this study, 31.4% of the participants were single, and 41.54% were divorced. Most of them (42.4%) had a diploma's degree. Pearson's correlation coefficient was used to examine the relationship between cognitive ability and innovativeness in cosmetic rhinoplasty candidates. The results showed that the correlation coefficient of cognitive ability with cognitive innovativeness ($r=0.34$), sensory innovativeness ($r=0.32$), and total innovativeness score ($r=0.33$) is directly significant. In other words, as people's cognitive ability increases, their cognitive innovativeness increases. The relationship between cognitive ability and cognitive distortion is negative and meaningful ($r=-0.36$) ($P=0.01$). All variables and their subscales are significant at levels 0.01, and 0.05 (Tables 1 and 2).

Therefore, the hypothesized model as the relationship between cognitive innovativeness and cognitive ability with the mediation role of cognitive distortion was investigated. At first, the pre-assumptions of structural equation modeling including the level of data for all variables are interval, the normality of data, the absence of outliers, linearity, and the absence of multiple collinearities, it was checked that the assumption had been observed. The fit indices as a result of the model test indicated that the model has good fitness (Table 3).

The direct effect of innovativeness on cognitive ability with a standardized beta coefficient and on cognitive distortion with a standardized beta coefficient is positively significant ($P<0.01$). Also, the direct effect of cognitive distortion on cognitive ability is negatively significant ($P<0.01$) (Table 4).

Bootstrap provides the most powerful and logical method to obtain indirect effects. As a result of this method, if the upper and lower limits of the percentage for the intermediate path are of the same sign (both either positive negative), or the zero value is not placed between these two limits. The indirect causal path is significant. As can be seen in Table 3, the path of innovativeness to cognitive ability with the mediating role of cognitive distortion is significant with a standard coefficient of -0.18 at the 0.02 level. In other words, cognitive distortion has a negative role as a mediator (Table 5).

As you can see in Figure 1, innovativeness has a direct effect on cognitive ability ($t=2.5$; $ß=0.60$) and cognitive distortion ($t=2.09$; $ß=0.45$), but cognitive distortion has an inverse effect on cognitive ability ($t=1.99$; $ß=-0.40$). Considering that in the structural model, the significance of the path coefficient is determined by using the t value. If the value of t is more than 1.96, the relationship between the two constructs is significant. Therefore, all the above standard coefficients are significant (Figure 1).

Table 1. Descriptive Indicators of the Main Variables

Main Variable	Subscales	Number	Mean	Standard Deviation
Cognitive ability	Memory	320	18.23	7.91
	Inhibitory control	320	16.09	6.83
	Decision making	320	17.19	7.62
	Planning	320	7.24	4.28
	Sustain attention	320	6.81	4.08
	Social cognition	320	9.25	4.56
	Cognitive flexibility	320	12.47	6.24
	Cognitive ability	320	72.21	16.01
Innovativeness	Cognitive innovativeness	320	27.78	5.65
	Sensory innovativeness	320	23.44	8.18
	Innovativeness	320	33.5	9.48
Cognitive distortion	Rejection	320	35.02	10.26
	Unrealistic expectations	320	30.21	9.69
	Misunderstanding	320	28.86	9.94
	Cognitive distortion	320	81.21	11.04

Table 2. Correlation Matrix Subscales of Cognitive Ability, Innovativeness, and Cognitive Distortion

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Memory	1														
2. Inhibitory control	0.45**	1													
3. Decision making	0.52**	0.48**	1												
4. Planning	0.61**	0.46**	0.56**	1											
5. Sustain attention	0.43**	0.43**	0.54**	0.53**	1										
6. Social cognition	0.51**	0.51**	0.47**	0.49**	0.38**	1									
7. Cognitive flexibility	0.49**	0.53**	0.46**	0.45**	0.41**	0.53**	1								
8. Cognitive ability	0.67**	0.71**	0.75**	0.76**	0.73**	0.69**	0.73**	1							
9. Cognitive innovativeness	0.29*	0.21*	0.28*	0.26*	0.19*	0.17*	0.25*	0.34**	1						
10. Sensory innovativeness	0.27*	0.38**	0.34**	0.36**	0.28*	0.30**	0.34**	0.32**	0.71**	1					
11. Innovativeness	0.31**	0.35**	0.37**	0.34**	0.35**	-0.33**	0.39**	0.38**	0.74**	0.75**	1				
12. Rejection	-0.23*	-0.27*	-0.28*	-0.22*	-0.21*	-0.21*	-0.27*	-0.31**	-0.27*	-0.20*	-0.25*	1			
13. Unrealistic expectations	-0.20*	-0.25*	-0.27*	-0.23*	-0.22*	-0.25*	-0.24*	-0.33**	-0.26*	-0.21*	-0.21*	0.45**	1		
14. Misunderstanding	-0.18*	-0.23*	-0.22*	-0.19*	-0.24*	-0.28*	-0.20*	-0.35**	-0.23*	-0.18*	-0.17*	0.47**	0.46**	1	
15. Cognitive distortion	-0.24*	-0.21*	-0.26*	-0.33**	-0.23*	-0.27*	-0.21*	-0.36**	-.0.19*	-0.17*	-0.31*	0.50**	0.53**	0.51**	1

(**) Significance at level 0.01 and (*) significance at level 0.05.

Table 3. The Results of Fit Indices of the Path Analysis Model of the Relationship between Innovativeness and Cognitive Ability (mediating role of cognitive distortion in candidates)

Fit indices	The obtained amount
X^2/df	0.75
RMSEA	0.04
PNFI	0.51
GFI	0.99
AGFI	0.98
NFI	0.91

Table 4. Direct and Indirect Effects of the Relationship between Innovativeness and Cognitive Distortion with Cognitive Ability

	Criterion variable	Independent variable	Direct effect	Mediating variable	Indirect effect
Standardized	Innovativeness	Cognitive ability	0.73	Cognitive Distortion	-0.11
	Sensory innovativeness		0.61		-0.12
	Cognitive innovativeness		0.63		-0.09
Non- standardized	Innovativeness	Cognitive ability	0.68	Cognitive Distortion	-0.13
	Sensory innovativeness		0.61		-0.07
	Cognitive innovativeness		0.58		-0.08

Table 5. The Results of the Bootstrap Test for the Mediating role of Cognitive Distortion between Innovativeness and Rhinoplasty Candidates' Cognitive Ability

Independent variable	Mediating variable	Dependent variable	Re-sampling	Bootstrap limits		Estimated error	Effect size	P
				High Limit	Low Limits			
Innovativeness	Cognitive distortion	Cognitive ability	2000	-0.03	-0.31	0.04	-0.18	0.02*

Significance at level 0.05 (*)

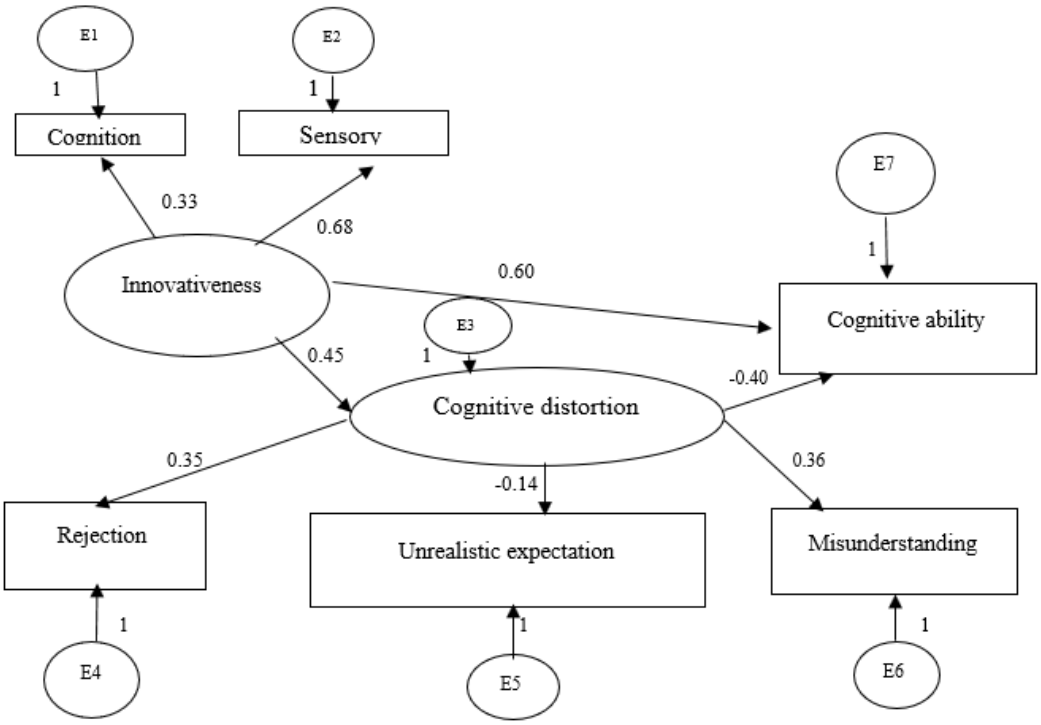

Figure 1. Path analysis model of the relationship between innovativeness and cognitive ability with the mediating role of cognitive distortion.

Discussion

The purpose of this study was to find the relationship between innovativeness and cognitive ability with the mediating role of cognitive distortion in cosmetic rhinoplasty candidates. The first finding of this study showed that there was a relation between cognitive ability with innovativeness (cognitive innovativeness, and sensory innovativeness) in rhinoplasty candidates. Findings revealed that innovativeness has a direct effect on cognitive ability. In other words, the results of the present study revealed that a part of the scatter in cognitive ability was the product of differentiation in the values attributed to cognitive innovativeness, and sensory innovativeness. On the other hand, as people's cognitive ability increases, their cognitive innovativeness increases. In confirming the relationship between cognitive ability with innovativeness (cognitive innovativeness, and sensory innovativeness) some studies demonstrated cognitive ability is intertwined with innovativeness. For example, Barlach [11] found innovativeness is related to cognitive ability.

Cognitive abilities manage our body, and psychological factors especially cognitive variables are effective in the tendency of cosmetic rhinoplasty. Innovativeness stimulates cognitive capacities to convince a person to undergo cosmetic surgery. As previous literature indicated, people who are interested in cosmetic surgery have less flexibility in terms of cognitive dimensions and body dissatisfaction [30]. In confirming the relationship between cognitive ability with innovativeness, Funakoshi et al. [5] indicated that cognitive abilities, innovativeness, and diversity-seeking can manage our body and body perception.

All cognitive, emotional, and behavioral dimensions and body image or body distortion are important in cosmetic surgery [31]. A study demonstrated that people's cognitive performance had not changed even after cosmetic surgery [32]. Although rhinoplasty may increase the aspects of internal and cognitive characteristics such as self-concept or self-esteem [33], but the reason for its action and demand is cognitive and psychological. According to the cognitive framework or theory, people who apply for cosmetic surgeries have cognitive viewpoint changes. In other words, the person will accept herself/himself and accept their new characteristics or schemas and finally, it will give in to cosmetic surgeries. This phenomenon reinforces cognitive abilities and processes [34].

The second finding indicated that cognitive distortion had a negative role as a mediator of innovativeness with cognitive ability. Furthermore, cognitive distortion had an inverse effect on cognitive ability and innovativeness. In

other words, when cognitive ability and cognitive innovativeness increase in rhinoplasty candidates, so, the cognitive distortion decreases. As mentioned before, cognitive distortion has a main role in psychological disease as a kind of depression. Cognitive distortion can be the basis of depression and mood disorders [35]. On top of that, cognitive distortion acts as a barrier to cognitive ability and challenges innovativeness in rhinoplasty candidates. In confirming the relationship between innovativeness and with mediating role of cognitive distortion in rhinoplasty candidates, Omar et al. [21] argued that depression and anxiety play a role in body image distortion and the tendency to cosmetic plastic surgery. Sun et al. [20] revealed that psychological factors such as depression and anxiety play a role in body image distortion, which is a type of cognitive distortion [24]. In the studies that were mentioned, cognitive distortion and its factors are related to mental disorders. However, in this study, the cognitive distortion is related to other cognitive variables that are involved in cosmetic rhinoplasty.

Even psychologists believe that innovativeness is one of the important variables along with other cognitive variables such as creativity and situation changes [35]. One of the reasons for people's tendency toward plastic surgery is the innovativeness of people. Regarding the mediation of cognitive distortion in the relationship between cognitive ability and innovativeness, it can be stated that since cognitive and innovativeness factors are involved in the tendency to rhinoplasty and they can give a person a whole new look, they can equally distort the person's cognitive system [36]. The theory of cognitive distortion states distortions in our cognitive capacities target the core system of beliefs. A study displayed that catastrophizing as one of the cognitive distortions caused mental disorders, and emotion dysregulation problems [37]. Cognitive distortions are negative thinking biases that make people vulnerable to mental disorders and mental disorders disable people's cognitive system, such as innovativeness and cognitive ability [38]. According to the characteristics of the sample of this study and their psychological status, cognitive distortion plays a negative role in innovativeness and cognitive ability.

The present study had some limitations. The authors of this study faced many challenges finding samples with plastic surgery. It was difficult to gain their trust. The most important and prominent limitation was online data collection. Because of the nature of the study, there was no possibility of face-to-face interaction, and paying attention to the participants' reactions was not possible. Therefore, it is suggested that in future studies, real conditions should be considered and cognitive interventions should be conducted on people who are candidates for cosmetic surgeries to prevent unnecessary rhinoplasty candidates by creating modified cognitive schemas. Also, it is suggested to apply methods such as interviews (individual, group, family) and observation to obtain more information. According to these findings, it is recommended that psychologists and researchers in the field of psychology pay attention to the underlying psychological factors of the tendency toward plastic surgery, especially cosmetic rhinoplasty.

Conclusion

There is a significant positive correlation between innovativeness (cognitive innovativeness, and sensory innovativeness) with cognitive ability. Another finding was a negative correlation between cognitive distortion between innovativeness (cognitive innovativeness, and sensory innovativeness) with cognitive ability in rhinoplasty candidates. In other words, as rhinoplasty candidates' cognitive ability increases, their cognitive innovativeness increases, and when cognitive ability and cognitive innovativeness increase, the cognitive distortion decreases. The direct effect of innovativeness on cognitive ability is positively significant. In addition, the direct effect of cognitive distortion on cognitive ability is negatively significant. Innovativeness has a direct effect on cognitive ability and cognitive distortion, but cognitive distortion has an inverse effect on cognitive ability. Cognitive distortion has a negative role as a mediator between innovativeness (cognitive innovativeness, and sensory innovativeness) with cognitive ability in rhinoplasty candidates in Iran. In sum, the fit indices as a result of the model indicated that the model has good fitness.

Conflict of Interest

The authors declare no competing interests.

Ethical Approval

All ethical principles were considered in this study. The participants were informed about the purpose of the research and its stages. They were also assured about the confidentiality of their information. The participants were free to leave the research at any time and not provide personal information other than age. The first author is the designer, methodologist, analyst, and writer of this article, and the second author assisted in data collection.

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