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Original Article

Prediction Modeling of Eating Behavior based on Attachment Styles Mediated by Anxiety among Adole Scent Girls

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Abstract

Background and Objective: Unhealthy eating behavior is one of the four major risk factors for diseases. This study was conducted to model the prediction of eating behavior based on anxiety mediated attachment styles.

Materials and Methods: This correlational research was carried out based on a path analysis approach. The statistical population (n=461) included all high school female students in Tehran, Iran, in the school year of 2018-19, who were selected using the cluster sampling method. The required data were collected using the Attachment Styles Questionnaire, Spielberger Anxiety Inventory, and Eating Behavior Questionnaire. The gathered data were analyzed by path analysis based on regression equations in LISREL software (version 8.80).

Results: Based on the findings, secure, ambivalent, and avoidant attachment could influence students' eating behavior both directly and indirectly. It was also revealed that state anxiety (β=0.24) and trait (β=0.34) could directly increase unhealthy eating behavior in the samples (β=0.41). Model fit indices showed that the presented paths could explain the data well.

Conclusions: It can be concluded that a secure attachment style reduced unhealthy eating behavior by reducing anxiety. Moreover, avoidant and ambivalent attachment styles increased anxiety and resulted in unhealthy eating behavior.

Keywords: Adolescent, Anxiety disorders, Feeding behavior

Background

One of the main aspects of the life of all creatures is eating [1]. A large body of studies has specified the correlation of the nutrition, foods, and dieting patterns [2]. In this respect, the Researchers are looking for factors that influence eating behavior and habits [3]. According to the literature review, food preferences and eating behaviors are among changing behaviors that are affected by biological, social, and environmental factors during life [4]. These factors are key determinants in eating behavior and habit selection [5]. Ecological models of eating, including Bronfenbrenner's theory, are based on the theory that environmental factors, such as patterning style in the early stages of life, along with personality traits, such as genetic, gender, and age, can provide an appropriate explanation of eating behavior. According to the Family systems theory, problems threaten the unity of the family among the family members as a whole and will have negative effects on eating behaviors [6].

Two other theories, namely Stimulus Substitution and cognitive-contextual theories, indicated that family greatly affects eating disorders. According to the substitution learning theory, eating behaviors in a family are learned through observation and will lead to psychological problems in a child [7]. The cognitive-contextual theory explains that the individual's interpretation and understanding of their patterns' behavior in response to food issues can be predictor factors of their knowledge and perceptions [8]. Although several theories are provided concerning the role of parents and their influence on the eating behavior of children and adolescences and numerous studies have been conducted regarding

this, the main mechanism of this effect has not been specified yet [9].

A positive family system can determine the beneficial conditions of nutrition [10]. Some approaches, such as Bandura's approach, believed that child-family interaction in the early years of life could make up the child's attitude towards this phenomenon [11-12]. Regarding this, the most important theory concerning the formation of the attitude by the parents is the attachment theory.

Attachment style is a generalized pattern of reactions to the intimate relationship of a person, which is believed to reflect previous experiences of intimate relationships and is relatively stable during the time [13]. According to Bowlby's theory, the nature of early intimate relationships (mother-infant) determines how an individual interacts with the environment through his life [14]. Attachment styles affect thoughts, emotions, and memories and are known as factors that reflect new perspectives in the diagnosis of psychological pathology [15]. Some researchers emphasized the importance of the attachment system's organizational action in the integration of emotional, motivational, cognitive, and behavioral components [16]. Meanwhile, the results of scientific studies were indicative of the existence of a relationship between attachment and psychological pathology during childhood, adolescence, and adulthood [17].

Some theorists believed that the individuals' attachment style could develop symptoms of damage, which are accompanied by anxiety states in the person [30]. In this view, it is believed that attachment style caused such individuals to turn to unhealthy eating behaviors by creating anxiety [18]. Some theorists developed an anxiety model to explain the eating disorder [19]. Most empirical theories concerning disturbed eating behaviors indicated that such reactions are reactions to anxiety states [20]. According to empirical pieces of evidence, anxiety is considered a vulnerability to and a risk factor for eating disorders [21]. According to the anxiety model of eating behaviors, individuals' tendency to decrease anxiety makes them select desirable strategies, most of which will lead to anxiety reduction in the short term [22]. Overeating can provide escape and avoidance of undesirable self-conscious and negative emotions through distracting the attention from negative, anxious thoughts [23].

It seems that to explain eating behaviors, it is necessary to search for the structural factors of personal behavior. Accordingly, many mental problems and disorders can be formulated based on a theoretical mechanism, in which the child-parent relationship in the family framework is considered as a key and central element [24]. Attachment theory explains different aspects of parents' effect on the children, including cognitive, emotional, and behavioral processes. Based on the attachment and emotional security theories, secure, positive, and stable assessment of the family can prevent damage, and therefore, provide a strategy for formulating eating behavior, which is affected by emotional and cognitive aspects [25]. On the other hand, it should be noted that although the results of some studies showed that a sense of security and attachment styles influence eating behavior, there is evidence indicating that their effects do not lead directly to the emergence of damage and disorder among children. It was found that through some intermediate factors attachment styles develop damages in children [26].

Objectives

This study aimed to model the prediction of eating behavior based on attachment styles mediated by anxiety.

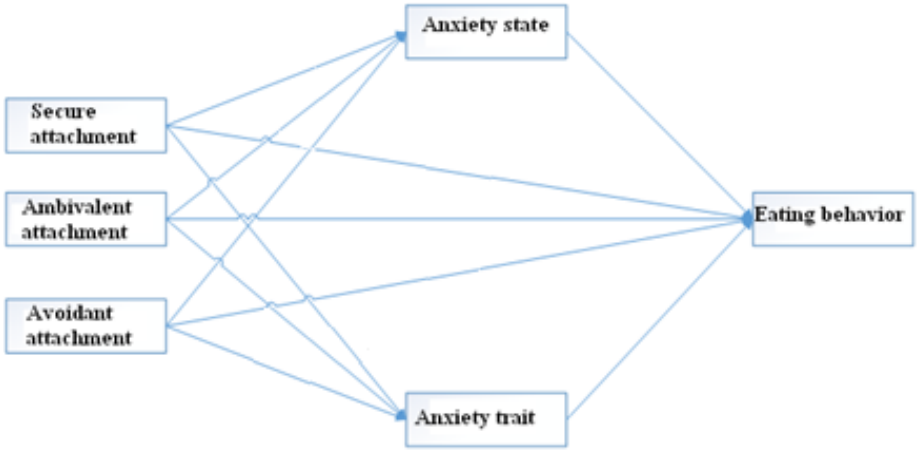

Figure 1. Model developed based on the hypothesis of this study

Materials and Methods

This descriptive correlational study was conducted based on a path analysis approach. The statistical population of this study was selected from all high school female students in Tehran, Iran, in 2018-19. Given the variables under study, the minimum sample size was obtained at 90 cases using Tabachnick and Fidell formula [27]. Subsequently, as can be seen, the final sample size was determined at 461 individuals that was larger than what was proposed as a minimum. Therefore, the cluster sampling method was applied to reach the desired sample size. In this regard, 50 female high schools were selected from 4 different districts of geographical areas in Tehran. Finally, a specified number of individuals were randomly selected from each high school. The inclusion criteria were to be satisfied to participate in the study and be able to share one's information and experiences. On the other hand, the cases who were unwilling to continue the research process and those who did not respond the questionnaire completely were excluded from the study. To prevent the role of gender influencing eating disorders, only female students were chosen as the subjects of the study. In this research, Lisrel software (version 8.80) with a path analysis method was used to provide the model of the current study.

Adult Attachment Style Questionnaire

This 18-item questionnaire, developed by Collins and Read in 1990, is scored on a 5-point Likert scale (strongly disagree to strongly agree). This questionnaire consists of three scales, namely secure, avoidant, and ambivalent/anxiety. Collins and Read [28] indicated that subscales of intimacy, dependence, and anxiety remained stable during twice, and even during 8 months. The validity of this instrument, calculated by Cronbach alpha coefficient, was estimated at a range of 0.78-0.85.

Spielberger State-Trait Anxiety Inventory

This 40-item questionnaire was designed to assess anxiety state (items=20) and anxiety trait (items=20). The anxiety state scale (i.e., obvious anxiety) measures the general and ordinary emotions of a person. Its validity was confirmed using internal consistency and reported to be 0.86-0.95 in working with adults, students, and those who were recruited for military service. Moreover, the test-retest method was used to measure its reliability, rendering for 0.77 and 0.70 for school and university students, respectively [29]. The reliability values of anxiety trait and anxiety state scales were calculated at 0.86-0.65 and 0.92 using test-retest and Cronbach alpha coefficient, respectively [29].

Eating Behavior Questionnaire

This questionnaire has two sections. The first section consists of demographic information and some information regarding the subject's height, weight, and weight fluctuations, as well as having periodical overeating. The second section of the questionnaire includes 33 items and 3 subscales, which measure emotional, external, and avoidant eating styles. These items ask about the person's eating habits (e.g., 'Do you tend to eat when you are angry?'). The scores are rated on a 5-point Likert scale, in which the lowest and highest degrees belong to the lowest and highest scores, respectively. This questionnaire has been reported to have a good test-retest and its internal consistency validity was confirmed using Cronbach alpha coefficient ($0.8<\alpha>0.95$) [30].

Results

According to Table 1, since the skewness and kurtosis values are less than the absolute value of 2, data analysis can be started. On the other hand, given that the measured indices are at the framework of path analysis methodology and regression equations, then some hypotheses are required, which are necessary to observe. For this purpose, firstly, multilinear relations between external and internal independent variables were measured. The results indicated that the amount of tolerance for each independent variable was higher than 0.1, and the variance inflation factor was obtained lower than 5. The Durbin-Watson test for self-correlation of the variables was estimated at 1.79, which was acceptable. It was specified that multivariable outlier data did not affect our analysis using a box diagram and Mahalanobis test. The

Table 1. Mean, kurtosis, and skewness scores of the main variables

	Mean	SD	Skewness	Kurtosis
Unhealthy eating behavior	16.8438	6.85514	0.039	-1.122
Secure attachment	20.2343	7.14762	-0.373	-0.955
Avoidant attachment	17.8612	7.22452	-0.188	-1.290
Ambivalent attachment	28.1128	11.31391	-0.038	-0.628
Anxiety state	33.1540	12.41336	-0.173	-1.214
Anxiety trait	92.4230	24.17070	-0.055	-1.334

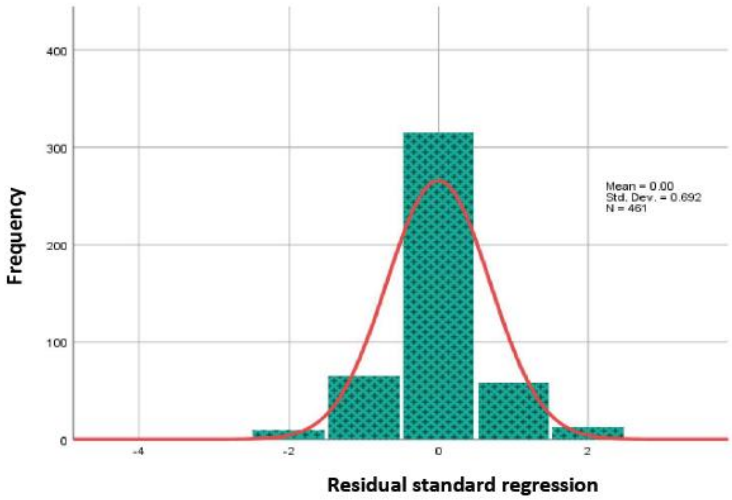

Figure 2. Diagram of normal distribution of residuals

normal distribution of residuals was assessed using a diagram (Figure 2).

Given that the research pre assumptions were confirmed to analyze data, the path analysis method was used. The early results of the analysis are depicted in Figure 3 based on t indices.

The calculated coefficients for the effect of each variable in the above equations were reported in terms of t value. When the p-value is ≥ 0.05 and the t-value is < 2, the effect is not significant since the t-value is less than the criterion. When P < 0.05 and 2 ≤ t <3, the effect is significant with more than 95% confidence. When t ≥ 3 and P < 0.05, the effect is significant with more than 99% confidence. The results of investigating the model indicated that the paths were significant at the provided model. Standardized coefficients, given that they are significant, are reported for the paths of the model (Figure 4).

As can be seen in Figure 4, secure, ambivalent, and avoidant attachment can influence students eating behavior both directly and indirectly. The anxiety state (β=0.24) and anxiety trait (β=0.34) directly increased unhealthy eating behavior among the samples (β=0.41). Table 2 presents the significance of the model assessed by Lisrel's output fit indices.

Table 2 reports that fitness indices for the model are at good levels, and it can be said that the provided model is acceptable. In this model comparative fit index, the goodness of fit index**,** adjusted goodness of fit index**,** normed fit index**,** non-normed fit index, and incremental fit index were higher than 0.9 indicating that the model is confirmed. Root mean square error of approximation and standardized root mean residual were obtained less than 0.05 showing the good fitness of the model. Further direct and indirect significant paths on the main variable, namely eating behavior, are reported in Table 3.

According to Table 3, the anxiety state and anxiety trait have mediating roles regarding the relationship between attachment styles and unhealthy eating behavior. It was revealed that a secure attachment style decreased unhealthy eating behavior by

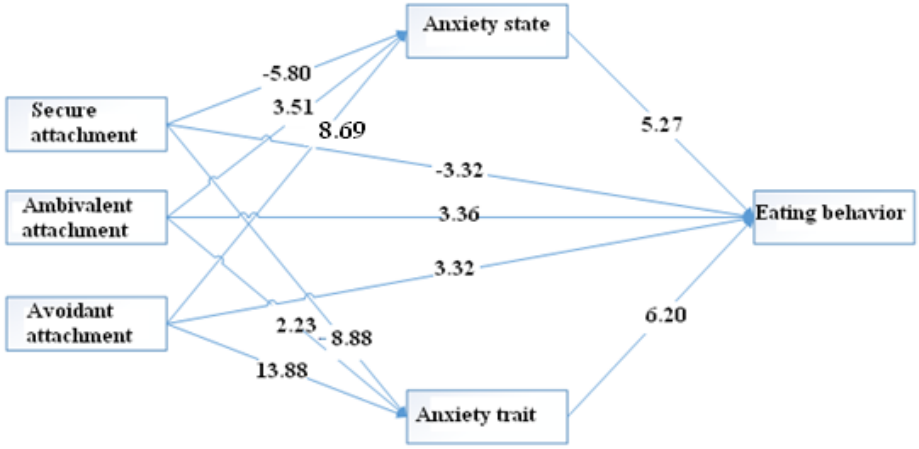

Figure 3. Proposed model of study based on the t coefficients

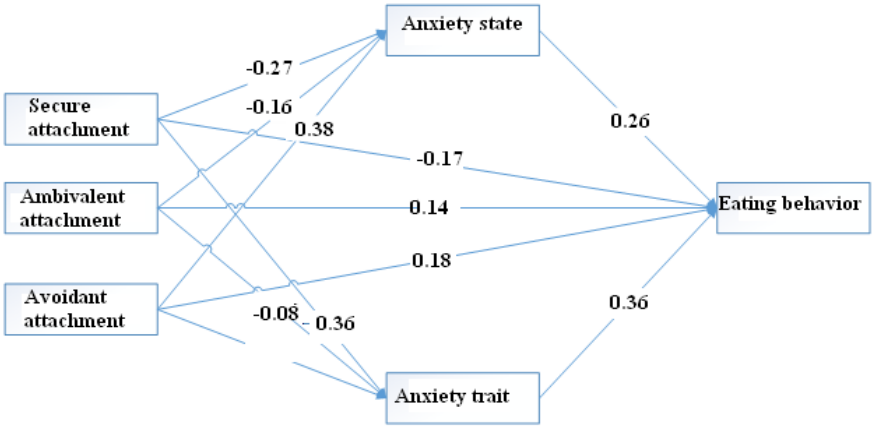

Figure 4. Proposed model of study based on the standardized coefficients

decreasing state and trait anxiety. Moreover, ambivalent and avoidant attachment styles increased state anxiety and trait anxiety, which in turn, increased unhealthy eating behaviors. Based on the obtained results, prediction equations are as follow:

State anxiety=-0.44×secure attachment+0.25×ambivalent attachment+0.59 avoidant attachment, R^2=0.47

State anxiety=-0.61×secure attachment+0.15×ambivalent attachment+0.85 avoidant attachment, R^2=0.64

Eating behavior=-0.51×state anxiety+0.66×trait anxiety+0.58 secure attachment+047×ambivalent attachment, 0.58×avoidant attachment, R^2=0.50

Table 2. Fitness indices of the initial and adjusted models

Fitness indices	Value
Comparative fit index	0.96
Goodness of fit index	0.93
Adjusted goodness of fit index	0.93
Normed fit index	0.96
Non-normed fit index	0.93
Incremental fit index	0.96
Root mean square error of approximation	0.063
Standardized root mean residual	**0.049**

Table 3. Influential direct and indirect paths on eating behavior

Independent variable	Dependent variable	Direct effect	Indirect effect	Total effect
Secure attachment	Eating behavior	-0.17	0.17	0.34
Ambivalent attachment	Eating behavior	0.14	0.05	0.19
Avoidant attachment	Eating behavior	0.18	0.26	0.44
State anxiety	Eating behavior	0.24	-	0.24
Trait anxiety	Eating behavior	0.34	-	0.34
Secure attachment	State anxiety	-0.27	-	-0.27
Ambivalent attachment	State anxiety	0.16	-	0.16
Avoidant attachment	State anxiety	0.38	-	0.38
Secure attachment	State anxiety	-0.34	-	-0.34
Ambivalent attachment	State anxiety	0.08	-	0.08
Avoidant attachment	State anxiety	0.5	-	0.50

Discussion

The results of this study indicated that a secure attachment style could decrease unhealthy eating behaviors by decreasing anxiety. In addition, ambivalent and avoidant insecure attachment style increased anxiety, and therefore, led to the formation of unhealthy eating behaviors. The findings of the present research are consistent with those of Wilkinson et al. [31].

Alignment with the obtained descriptive model, Wilkinson et al. [31] reported that sensitivity to hunger and emotional eating play mediating roles in the relationship between anxiety and body mass index. According to the mentioned study, food consumption resulted from personal stress was a significant mediator between anxiety and body mass index. Moreover, individuals with less secure attachment were less able to suppress negative feelings, and consequently, they try to decrease such feelings through eating behaviors, which in turn, impact their body mass index. Insecure attachment imposes some of its effects through increasing fear, decreasing emotion adjustment strategies, and decreasing self-esteem. According to the meta-analysis findings of most studies, it has reported that anxiety avoidant styles and the styles based on fear and phobia significantly influence unhealthy eating behaviors. It is noteworthy to mention that lower unhealthy eating behaviors accompany secure styles. On the other hand,

according to the latest comprehensive meta-analysis, healthy eating behavior was less related to avoidant attachment [32].

In conclusion, several important aspects are found to be significant in determining eating disorders through the attachment model with the mediating role of anxiety. The first path is a general view believing that insecure attachment is a non-specific factor that worsens mental and health conditions [33]. To be more specific, insecure individuals experience considerable negative psychological problems due to their inability to create safe and stable cognitive bases, which causes a lack of adjustment and power to confront stress [34]. In this view, it is assumed that insecurity can describe psychological aspects, including eating behavior, as a decreasing component of mental health [35]. The "General vulnerability" view specifies special mechanisms about the relationship between attachment styles and mental health. Accordingly, it is believed that insecure relationships can directly describe physical health and mental well-being [36]. In general, in the vulnerability view, intermediate mechanisms are not taken into account clearly and it is more focused on the direct relationships between attachment and eating behavior. The results of the current study are inconsistent with such findings, and the mentioned theoretical model confirms the path. However, based on the findings of this study, there were also some intermediate mechanisms in a second path suggesting that attachment could impose its effect both directly and indirectly. In the same vein, according to the anxiety model of eating behavior [37], anxiety is a risk and vulnerable factor for eating behavior, which is reflected through more fundamental factors during childhood, such as the process of attachment formation. Therefore, it can be inferred that sometimes insecurity feeling increases in a person to the extent that he/she tries to decrease his/her negative thoughts by turning to unhealthy eating behaviors [38]. Accordingly, it can be said that unhealthy eating behavior in an individual is a kind of defensive mechanism to decrease anxieties resulted from their insecure attachment.

Based on the obtained results, a theoretical model of this study, namely the intermediate role of anxiety in the relationship between attachment and unhealthy eating behavior, can be accepted. Nevertheless, since this research was merely conducted on female students, its generalization to other cases in the society should be made by caution. It is recommended to investigate the role of gender, as a moderator variable, in future studies. It is also suggested to take into account the other intermediate mechanisms in future works, which will result in the formation of a descriptive comprehension model for eating behavior. In this regard, the model can be developed using other intermediate variables, including persons' thinking process, and personal social context, such as family features, and cultural, socioeconomic status. Since eating behavior is an important issue in public health, especially for adolescences, it is proposed that some protocols and consultations are arranged to make on-time interventions in the schools.

Conclusions

It can be concluded that a secure attachment style could reduce unhealthy eating behavior by reducing anxiety. Moreover, avoidant and ambivalent attachment styles would increase anxiety and result in unhealthy eating behavior.

Compliance with ethical guidelines

All ethical principles were considered in this research. The participants were informed about the purpose of the research and its stages. Informed consent was obtained from all the study subjects. The participants were also assured of the confidentiality of their information. Moreover, they were informed about the possibility of study withdrawal at any research stage, and that they would be provided with the results of the research if desired.

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Authors' contributions

Conceptualization [Sedigheh Ghalandari]; Methodology [Ahmad Borjali]; Investigation [Ahmad Borjali]; Writing Original Draft [Fariborz Bagheri]; Writing, Review, and Editing [all author]; Funding Acquisition [all author]; Resources [all author]; Supervision [Ahmad Borjali].

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Conflicts of Interest

The authors declare that there is no conflict of interest.

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