

## Original research

## Modeling children's obesity based on the mediating role of child's emotional overeating in the relationship between mother's attachment style and child's body mass index

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### **Abstract**

**Introduction:** The rapid increase in the prevalence of obesity, which is a multi-causal problem, in the past twenty years, in addition to genetic factors, has been attributed to cultural environmental factors, including family environment, eating and activity. . This research was conducted with the aim of predicting children's body mass index based on the mother's attachment style, taking into account the mediating role of emotional overeating in children.

**Research method:** The research method was applied and of the correlation type, which was done using structural equation modeling. 280 children aged 7-12 years (including 144 boys and 136 girls) along with their mothers were selected to participate in the research by using the purposeful sampling method, based on the referral of nutritionists. Research tools include body mass index (BMI), Hazen and Shaver attachment style questionnaire and emotional eating scale (EES).

**Findings:** The investigated model had a good fit and the results showed that mother's secure, avoidant and anxious attachment styles predict the child's body mass index both directly and indirectly through the mediation of the child's emotional overeating.

**Conclusion:** This research highlights the role of the child's early environment, especially the mother, in the development of childhood obesity.

**Keywords:** attachment styles, body mass index, child obesity, child's physical activity level, emotional overeating

**Received: 24/ September/ 2023**

**Accepted: 21/ November/ 2023**

**Citation:** Sattari A, Heydari A, Asgari P. Modeling children's obesity based on the mediating role of child's emotional overeating in the relationship between mother's attachment style and child's body mass index, Family and health, 2024; 14(1): 11-26

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## **Introduction:**

Obesity in children and adults is one of the most important public health problems in developed and developing countries. The prevalence of childhood obesity has greatly increased over the past 20 years and has caused concern about the future health and well-being of millions of children around the world (1). The 2017 World Nutrition Report found that 2 billion adults are overweight/obese and 41 million children are overweight worldwide (2). The results of various researches conducted in Iran have also shown that the prevalence of obesity in Iranian students was 11% based on body mass index and the prevalence of overweight was 12%. The rate of obesity in elementary school students is more than other levels reported (3).

According to the definition of the World Health Organization, the assessment of obesity in children is based on the percentile of the body mass index, so that children above the 85% percentile are considered overweight and children above the 95% percentile are considered obese. Obesity is assessed based on the child growth standards of the World Health Organization, in infants and children under 5 years of age, based on weight for height and for 5-19 years based on body mass index for age (4). During childhood, body fat levels change; therefore, obesity and overweight in children are defined by percentiles of body mass index using special charts. The World Health Organization and Centers for Disease Control and Prevention charts are recommended for all children.

In the growth and development of obesity, special attention is directed to the periods of childhood and adolescence as a time of risk for the development and maintenance of obesity, which can lead to consequences in adulthood. The negative effects of obesity and overweight on children's health and development can continue into adulthood and increase the risk of chronic diseases and disability. Childhood obesity is associated with a wide range of serious health complications and an increased risk of premature diseases, including diabetes and heart diseases (5). The psychosocial performance of obese children is also compromised and they are more prone to psychological problems such as depression, anxiety, low self-esteem and negative body image, which later affects their quality of life (6). Considering the vulnerability of children and the complex nature of their environment, strategies to help overcome what is called the "obesity epidemic" are still challenging, and very little research has been done on the psychological factors influencing childhood obesity; Therefore, identifying the factors that cause obesity in children is important for appropriate intervention in order to prevent and control obesity and its complications. In this regard, the family, which primarily forms the child's primary environment, is a suitable platform for examining these factors (7).

As the first place where a child grows, the family is important from various dimensions. Several studies that have been conducted in the field of factors related to obesity in children have indicated the important role of parents in the occurrence of obesity in children. Heredity on the one hand and behavioral and nutritional patterns on the other hand justify this relationship. Emotional and social aspects of parent-child interaction influence the risk of obesity in children, even when these

interactions are not directly related to eating or physical activity (8). There is strong evidence that shows that the family lifestyle and eating habits formed in the family play an important role in the type of nutrition and the child's weight. Parents influence children's behaviors, habits, and attitudes through multiple socialization processes. It has been shown that such parental influences expand the development of children's weight problems (9) and understanding these influences can be an important way in prevention and interventions for children's nutritional problems and overweight (10).

In the early years, a significant part of the relationship between the child and the mother is formed through eating. For example, parents provide a family eating environment where the child learns how to eat and forms healthy and unhealthy eating habits. Exposure to food variety, quantity and quality of foods, physical and emotional environments in which eating takes place, formation of the child's food preferences and the ability to regulate food consumption are among the things that are taught in the early years of the child in the family (11). These experiences affect a person's eating habits and final weight in the future (12).

Another influential factor regarding parents is that in communicating effectively with the child, the mother plays an essential role that can affect the child's social adaptations and emotion regulation (13). Children learn these skills through interaction with their caregivers and important people in their lives (14). It is clear that through different levels and types of parent-child interactions, children learn overtly and unobtrusively about emotional reactions and how to manage them (15). Emotional eating is defined as a tendency to eat in response to a series of negative emotions such as anxiety, depression, anger and loneliness, in order to overcome the negative emotion (16). According to some views, emotional eating is a coping mechanism to reduce negative emotions that are called by stressful events. Other theories have also argued that people who suffer from emotional eating actually confuse arousal with hunger, when these people experience sadness and anxiety, their inhibitions are disrupted and lead to overeating (17). In the research of Babakhanlou et al. (18), it has been shown that emotional processing is damaged in obese people. There is evidence that eating disorders including anorexia,

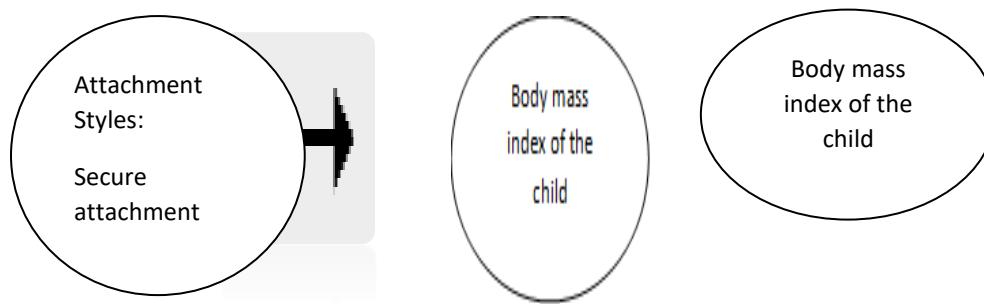


Figure 1. Proposed research model

## **Research Method:**

The research method is based on the objective, practical, and in terms of the method of data collection, it is a descriptive correlation type, which was done by using structural equation modeling method. The statistical population of the present study was made up of clients aged 7 to 12 years of nutrition and health centers in Tehran in 2017 and 2018. Among these, 280 subjects (including 144 boys and 136 girls) were selected using the purposeful sampling method, based on the referral of nutritionists and according to the entry criteria. Entry criteria include: not having a specific physical disease that causes obesity; including glandular or hormonal problems; Not taking drugs that lead to side effects of obesity, being between 7-12 years old for children, being diagnosed with obesity or overweight based on the chart of the Center for Disease Control and Prevention. At this stage, after obtaining informed consent, the child's body mass index was evaluated and the research tools, which are attachment styles and emotional eating questionnaires, were completed by the mothers.

Body mass index (BMI), the percentile table of body mass index, is known as the best measurement tool for diagnosing obesity and overweight in childhood (39). Body mass index 1 provides a guide to weight in relation to height and is equal to body weight (in kilograms) divided by the square of height (in meters). Body mass index changes during childhood and is also different between girls and boys; therefore, in this research, the reference data of the Center for Disease Control and Prevention was used according to age and gender.

The attachment style questionnaire was created by Hazen and Shaver in 1987 and has 15 items, 5 items are assigned to each of the three attachment styles: secure, ambivalent and avoidant. Scoring is done on a Likert scale from never (score 0) to always (score 4). Hazen and Shaver obtained the total test-retest reliability of this questionnaire as 0.81 and the reliability with Cronbach's alpha as 0.78. Collins and Reid (40) also obtained high reliability with Cronbach's alpha of 0.78. Cronbach's alpha validity of this questionnaire in the research of Rahimianboger et al. (41) for the whole test, ambivalent, avoidant and secure attachment style was obtained as 0.75, 0.83, 0.81 and 0.77, respectively, which shows good reliability. Gives. Cronbach's alpha coefficient was estimated at 0.85 in this research.

The Emotional Eating Scale (EES) was developed by Arno, Kenardy and Agras (42). This 25-item parent-report questionnaire is scored on a 5-point Likert scale (from no desire to irresistible desire to eat) that assesses the extent to which a person eats in response to emotions. The emotional eating scale consists of three subscales that reflect the tendency to eat in response to: anger/frustration, anxiety, and depression. In addition to the parent-report form of this questionnaire, this scale was modified in 2007 by Tanfski-Kraf et al. for the use of children aged 8-17. The subscales of this scale show internal consistency (alpha: 0.83 to 0.95), convergent validity and adequate temporal stability (43). In this study, Cronbach's alpha coefficient was calculated as 0.79.

Data analysis was done using descriptive statistical indicators such as frequency distribution table and using SPSS software to check for independence, normality and multicollinearity and to test research hypotheses, structural equation modeling method was used using AMOS software. .

### **Findings:**

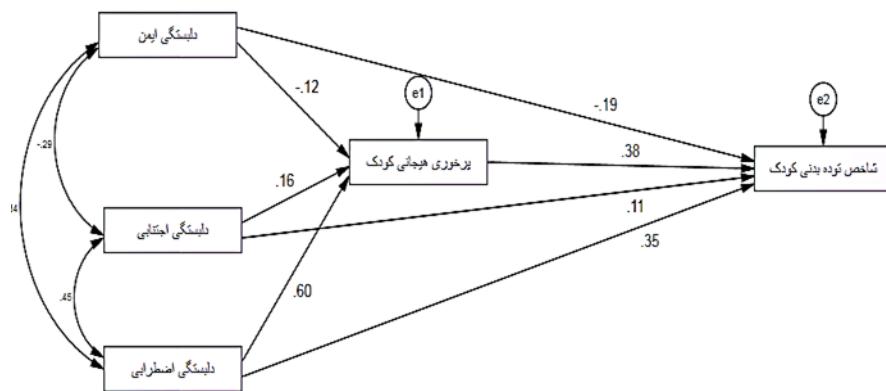
In this section, first the descriptive findings of the research variables and then the results of the path analysis which were carried out in order to investigate the research hypotheses are presented. Descriptive information including mean and standard deviation of research variables as well as correlation coefficients of research variables are presented in Table 1.

**Table 1:** Correlation matrix, Mean and standard deviation of variables Research

	Average	The standard deviation	1	2	3	4	5
<b>1- Safe attachment</b>	-7/53	-958/1	1				
<b>2-attachment</b>	--8.05	-825.1		-0.291	1		
<b>Avoidance</b>	--	--					
			**--				
<b>3-attachment anxiety</b>	--7.8	-436.1		-0.431	447.0**	1	
			**--				
<b>4- Child's emotional overeating</b>	--32.55	-401.4		-0.371	466.0**	717.0**	1
			**--				
<b>5- child's body mass index</b>	-22.19	-992.3		-476.0**	495/0**	733.0**	749.0**
							1

As shown in Table 1, the correlation coefficients of the model's dependent variable (child's body mass index) with other variables are significant at the P<0.1 level. The significance of coefficients provides the prerequisite for path analysis. In order to test the research model, path analysis using Amos software was used. Before using path analysis, univariate outlier data were checked using box plot and multivariate outlier data were checked using Mahalanobis statistic and excluded from the data set. The skewness and kurtosis of the variable scores distribution were calculated using SPSS software and the results showed that none of the skewness and kurtosis values were greater than  $\pm 1$  range. The normality of the data was checked using the Kalmogorov-Smirnov test. The results showed that the distribution of scores of all 4 model variables is normal (P<0.5). The assumption of independence of errors was investigated with Durbin-Watson's statistic to calculate the regression equations of the research model, and the obtained value indicates the establishment of this assumption. The assumption of collinearity between variables was investigated using

Pearson correlation between pairs of variables. Considering that the correlation of 2 variables of 0.8 and above indicates collinearity, this problem was not observed in the data of this research. In addition, the tolerance statistic and variance inflation factor were calculated in order to investigate multiple collinearity. The results showed that none of the values of the tolerance statistic are smaller than the permissible limit of 0.1 and none of the values of the variance inflation factor are larger than the permissible limit of 10; therefore, based on the 2 mentioned indicators, the existence of multiple collinearity was not observed in the data. After examining the assumptions and making sure that they are established, path analysis was used to evaluate the investigated model. The results of the standard coefficients of the proposed model in order to investigate the mediating role of child's emotional overeating in the relationship between attachment styles and the child's body mass index are presented in Figure 2.



**Figure 2:** Standard coefficients of the role model Mediator of overeating emotional Child at Relation among Attachment styles \_ With Indicator mass physical Child

**Table 2:** Model fit indices

Fit index	fitness index (GFI)	NFI	mean square error (RMSEA)	root error	Comparative fitness index (CFI)	Increased fitness (IFI)	Standard Mean Residual	Root Square (SRMR)
<b>Accepted domain</b>	0.9>	0.9>	<8.0		0.9>	0.9>	<08.0	
<b>observed value</b>	-0.957	-0.958	-0.71		-0.959	-0.959	0.66	

In Table 2, the fit indices of the model are presented. The root mean square error of approximation (RMSEA) is equal to 0.71 and the square root of the residual mean square (SRMR) is equal to 0.66, which is smaller than the criterion value (0.8) and as a result, it confirms the fit of the model. IFI, CFI, GFI and NFI indices are also greater than the desired criterion (0.9). The obtained

coefficients indicate the optimal fit of the model. The relationships between the variables in the model include the direct, indirect and total effects of the variables as shown in Table 3.

**Table 3:** Effects direct, Indirect and the whole door Model the final

from variable	the to the variable	Variance explained	total effect	Indirect effect	effect direct
Secure attachment	Indicator mass physical Child	682.0	-0.230** --	-45.0**	<b>-0.185** --</b>
affection	_		169.0**	0.61** --	<b>108.0**</b>
Avoidance					
affection	_		579.0**	228.0*	<b>351.0**</b>
anxiety					
Child emotional overeating			378.0**	-	<b>378.0**</b>
Secure attachment	gluttony emotional Child	--0.552	-441.0*	-	<b>-119.0**</b>
affection	_		132.0*	-	<b>0.162**</b>
Avoidance					
affection	_		93.0*	-	<b>0.604** --</b>
anxiety					

\* Significance at the 0.5 level \*\* Significance at 0.1 level \_

According to the information contained in the tested model and Table 4, all research hypotheses were confirmed. Based on the results of path analysis, secure attachment styles ( $\beta=0.185$ ,  $P<0.1$ ), avoidant attachment ( $\beta=0.108$ ,  $P<0.1$ ), anxious attachment ( $\beta=0.351$ ,  $1 P < 0.001$ ) and emotional overeating of the child ( $\beta = 0.378$ ,  $P < 0.1$ ) directly predicts the body mass index of the child.

To investigate the mediating role of child's emotional overeating in the relationship between attachment styles and the child's body mass index, Boytstrap method was used. The obtained results showed that attachment styles indirectly predict the child's body mass index. Indirect standardized coefficients for secure attachment styles ( $\beta=0.45$ ,  $P<0.5$ ), avoidant attachment ( $\beta=0.61$ ,  $P<0.5$ ) and anxious attachment ( $\beta=0.228$ ,  $P<0.5$ )  $>P$  is significant. Also, the results of the model showed that 68.2% of the variance of the child's body mass index and 55.2% of the variance of the child's emotional overeating are explained using the variables in the model.

### Discussion and conclusion:

The significant increase in the prevalence of childhood obesity during the last few decades has changed the existing attitudes about childhood obesity, and this issue has been considered as one of the ten most important problems related to health at the global level today (44). Obesity in childhood and adolescence, especially during the second decade of life, is proposed as a strong

predictor of adult obesity (45). Without intervention, babies and children who are overweight during childhood, adolescence and adulthood will increase their weight (46). Researches have repeatedly shown that the onset of obesity in childhood leads to a wide range of serious health complications as well as psycho-social problems, and this issue adds to the importance of further investigating the problem of childhood obesity. In this regard, the aim of this research was to investigate the prediction model of body mass index based on mother's attachment style, taking into account the mediating role of emotional binge eating in primary school children of Tehran city, using structural equation modeling, and the results of statistical tests showed that the investigated model was appropriate. It has been favorable.

Based on the findings of this research, mother's secure, avoidant and anxious attachment styles as well as child's emotional overeating directly predict the child's body mass index. Research on childhood obesity shows the important role of parents' attachment styles and their influence on the growth and development of obesity in children. Parents of normal weight children have more secure attachment style compared to parents of overweight and obese children (47). Studies have shown that insecure attachment in both mothers and fathers predicts child obesity. As has been repeatedly pointed out in the research background, an unhealthy attachment relationship can contribute to the development of overweight and obesity in children. Children who have insecurely attached mothers show more obesity. Likewise, fathers' insecure attachment is associated with greater severity of the problem. It has also been shown that insecure and unresolved/disturbed parental attachment are risk factors for higher levels of food consumption in children (48). In Fraley and Roizman (49), the prevalence of insecure attachment style in the group of mothers with obese children was (66.6%) compared to the control group of mothers with normal weight children (38.5%). In the research of Hepworth, Berlin, Martocchio and Jones Harden (50), a significant direct effect of mother's attachment style on the weight-height score of babies was found. Babies of mothers who classified themselves as secure had lower weight-height scores than babies of insecure mothers (avoidant or anxious). The sensitivity of the mother did not mediate this relationship, but it had a positive relationship with the weight-height score of the baby. Faber and Dobbie (2015) showed that parental insecure attachment, both actual (Study 1, children) and recalled (Study 2, adults), significantly and positively related to high-calorie food intake in both samples predicts. The findings of this research also emphasize the importance of parental attachment and its relationship with unhealthy eating patterns in children and adults. In the research of Bahrami, Keli Shadi, Jafari et al. (51), the relationship between children's obesity and parental attachment has been shown. The quality of attachment has a direct effect on obesity, and attachment has a direct effect on self-control and impulsivity.

The obtained results also showed that attachment styles indirectly predict the child's body mass index through the mediation of emotional overeating. In explaining this finding, the effect of attachment style on psychological health and emotional control can be considered. Anxious attachment (fear of abandonment) is associated with unrestrained eating in adults, and this unrestrained mother eating is related to emotional eating in children (52). Research results show

that disturbances in food control, diet quality, planning and organization of eating behaviors occur mainly in people with insecure attachment (53). A number of previous studies, for example Rakubogdan (54); Maishi et al. (55); Mikulincer and Shaver (56); Cichanowski et al. (56) point out that people with insecure attachment apply negative regulatory strategies in stressful situations and regulate their emotions through eating. Emotional states resulting from parent-child interactions can affect eating behaviors. Parents' secure attachment is a source of availability and emotional support for children. Secure attachment enables the child to express and experience his feelings. Parents in secure relationships are consistent in their behavior and are sensitive to the stimuli coming from their children, they have a set of adaptive and flexible strategies to deal with new and stressful situations; Therefore, there is no need to use food to regulate the emotional states of parents and children (57). Parents with an emotionally insecure attachment style neglect their child and in fact do not manage his feelings and emotions, as a result, the child also does not learn to manage his emotions, which results in the failure to develop adaptive strategies to regulate emotions, which can lead to emotional overeating in the relationship. Occur with negative emotions in obese or overweight children. If the mother is not in harmony with the baby and does not respond to the child's needs continuously and appropriately, the child may develop a confusing concept of hunger and satiety and, as a result, irregular eating behaviors. In addition, since a healthy infant-mother relationship promotes the development of healthy regulatory behaviors, the absence of a responsive mother may lead to permanent changes in the child's behavior and physiology, resulting in disordered eating (58). Various types of self-regulation skills that are developed in the context of attachment, such as emotional regulation (59), feeding and eating regulation, low inhibitory control (60) and high sensitivity to reward (61), have been identified as risk factors for obesity in children and adolescents. In line with this finding of Har Deman, Christiansen and Wilkinson (62) showed in their research that anxious attachment of mothers has a direct effect on children's emotional overeating. These findings highlight the influence of mothers' anxious attachment on parents' reports of maladaptive eating behaviors in children. While this effect may be due in part to the use of emotional feeding methods, there is stronger evidence for the "responsive infant" model, according to which anxiously attached mothers use these feeding methods in response to emotional overeating in the child. In the research of Goossens, Bratt, Van Durme, Decalvo, Bozemans (63), father's insecure attachment was a predictor of children's emotional binge eating. This provided evidence of a longitudinal association between attachment and eating pathology and adolescent weight gain. In addition, it appears that mother's attachment and father's attachment are differentially related to children's disordered eating attitudes and their body mass index. Research also shows that insecure attachment causes parents to be at risk of using negative emotion regulation strategies in response to their child's distress, which may have important consequences for the interpersonal environment related to food and the development of the child's early eating behaviors (64). In this regard, Mazshi et al. (65) also showed that insecurely attached parents may use negative emotional regulation strategies in response to the child's distress, which has important consequences in interpersonal fields including food and the development of eating behaviors, including children's emotional overeating. The results of this

research are also in agreement with the researches of Hepworth et al. (66), Pastek-Olpica et al. (67), Bergmayer et al. ), Lo et al.

### **Limitations of the research:**

The use of available sampling and the completion of the sample only from nutrition and health centers in Tehran caused the sample to be limited to those children who have referred for treatment, which has limited the generalization of the research results; Therefore, it is recommended to use a more comprehensive sample with a wider range of children with obesity and overweight, as well as the participation of fathers in future research.

### **Application of research:**

The findings of this research highlighted the importance and necessity of paying attention to variables such as mother's attachment style and child's emotional overeating as influencing factors on body mass index in children. By identifying these psychological structures as intermediate variables in children, an effective step can be taken in preventing the adverse consequences of childhood obesity. Based on the findings of this research, knowing the importance of role modeling by parents and especially mothers in children's body mass, it is possible to develop preventive programs based on changing and modifying environmental variables, especially those related to parents. More researches are recommended to accurately identify factors related to childhood obesity in order to design appropriate interventions to prevent childhood obesity. In addition, the findings of this research can be used for intervention research. In addition, it is suggested that the results of the above researches be used in the parent education program to intervene in children's obesity and overweight.

### **The ethical considerations**

The ethical considerations of the research were to submit a written letter of introduction and obtain permission from the authorities in order to conduct the research, introduce yourself to the research units and explain the objectives and nature of the research, assure the research units about the confidentiality of the studies and obtain consent from the people under investigation and comply Trustworthiness and honesty in the review of texts and analysis of studies and the lack of registration and surnames of the people under investigation were among the important aspects of observing ethical considerations in this research.

### **Acknowledgments:**

The authors of the article know their duty to thank and appreciate all the colleagues and participants who helped us in conducting the research.

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