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# The role of maternal health beliefs in prevention of preschoolers' obesity

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## Abstract:

**BACKGROUND:** Childhood obesity is one of the most serious global public health challenges of the 21<sup>st</sup> century, affecting every country in the world. Mothers' beliefs and perceptions about their children's obesity and overweight are key to obesity prevention. Given the importance of this issue, the present study aimed to determine perceptions and beliefs of mothers' nutritional behaviors related to overweight preschool children.

**MATERIALS AND METHODS:** This cross-sectional study was conducted on 350 mothers of preschool children with health records who were referred to child health assessment centers. The data collection tool was a researcher-made questionnaire based on the health belief model. SPSS19 was used for data analysis.  $P < 0.05$  was considered significant.

**RESULTS:** The participants (350) included 52% 25–36 years old, and 57.3% live in rural areas. There was a significant difference in the mean perceived susceptibility between mothers with obese children and normal-weight children ( $P < 0.05$ ). There was a significant positive relationship between severity and perceived benefits and a significant negative relationship with mothers' knowledge. There was also a significant negative relationship between self-efficacy and perceived barriers ( $P > 0.05$ ).

**CONCLUSIONS:** The results of this study showed that maternal health beliefs were effective in the formation of obesity prevention behaviors in children. In this regard, educational interventions can play an important role in the proper practice of such behaviors.

## Keywords:

Health belief model, obesity, overweight, perception, preschool

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## Background

Childhood obesity is one of the most serious global public health challenges of the 21<sup>st</sup> century, affecting every country in the world.<sup>[1]</sup> In just 40 years, the number of school-age children and adolescents with obesity has risen more than tenfold, from 11 million to 124 million (2016 estimates). The prevalence of obesity among American preschoolers (2–5 years old) was 13.9%.<sup>[2]</sup> A total of 38 million children under the age of 5 were overweight or obese in 2019, almost half of whom lived in Asia.<sup>[3]</sup> There is a relationship between childhood obesity and the increased risk of adulthood obesity and its associated physical problems,

including coronary artery disease, diabetes, etc.<sup>[4]</sup>

Unhealthy food choices, physical inactivity, unhealthy lifestyles, poor parenting, parental lifestyle effects, school community effects, and the like can be effective in significantly increasing the prevalence of childhood obesity.<sup>[5,6]</sup> Also, the family as a social environment can be considered as one of the parameters of obesity in children. Perceptions of mothers about child health highly influence children's nutrition and physical activity.<sup>[7]</sup> Also, mothers play a vital role in sculpting the knowledge, behavior, and attitudes of their children at early ages.<sup>[8,9]</sup> Studies showed that parents had

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a poor attitude toward overweight, and there was a gap between nutrition knowledge and attitudes, especially regarding the causes of overweight and its prevention.<sup>[10-12]</sup>

Perception of the importance of obesity and its complications as a serious threat to children's health by mothers can alter obesity-related behaviors.<sup>[13,14]</sup> On the other hand, studies have found that the majority of parents of overweight children did not perceive their children to be at any health risk.<sup>[7,15,16]</sup>

Management of obesity requires behavior change including diet and physical activity. Therefore, and it is very important for behavioral specialists to identify these factors in order to change people's behaviors.<sup>[17]</sup>

The health belief model (as one of the models in behavioral sciences) has conceptual frameworks for identifying behavioral health problems and has positive effects on lifestyle modification.<sup>[18,19]</sup> The core of this model is how people perceive various issues surrounding health and how they influence individual behavior. In particular, people have the most beneficial behavior considering the costs and benefits of choosing alternatives. The HBM model has been used in many studies related to obesity and has been effective in explaining various factors affecting behavior<sup>[20]</sup> [Figure 1]. Some studies have identified maternal factors affecting children's obesity based on this model.<sup>[21-23]</sup>

Considering the importance of the topic and the role of the model in identifying the most important determinants of behavior change (in this study, overweight and obesity behavior), this study was conducted with the aim of determining the role of mother's health beliefs in preventing obesity in children.

## Materials and Methods

### Study design and setting

This cross-sectional study was conducted to investigate perceptions and beliefs of mother toward obesity and overweight preschool children from December 2019 to July 2020.

Hashtgerd community health centers (Karaj, Iran) and health assessment centers for preschool children were selected for the research setting.

### Study participants and sampling

Based on the data obtained from a similar study<sup>[24]</sup> and taking into account the mean self-efficacy score of 2.4 for childhood obesity prevention behaviors, the standard deviation of 1.03, and the accuracy of 11%, the sample size was determined to be 350. Including 10% dropout, the number of 385 people was considered, of which 358 completed questionnaires were returned.

$$n = \frac{(Z_{1-\frac{\alpha}{2}})^2 \times \sigma^2}{d^2}$$

The random sampling method (clustering and simple random sampling) was used in this study. The samples were randomly selected from among the mothers with preschool children referring to health centers in Hashtgerd city (three centers as three clusters). Thus, according to the population of each center and based on the determined sample size, the number of samples of each center was determined. Next, the samples of each center were included in the study by simple random sampling method. In this way, a list of mothers was extracted from the "SIB System," and they were included in the study based on the inclusion criteria and by simple random sampling.

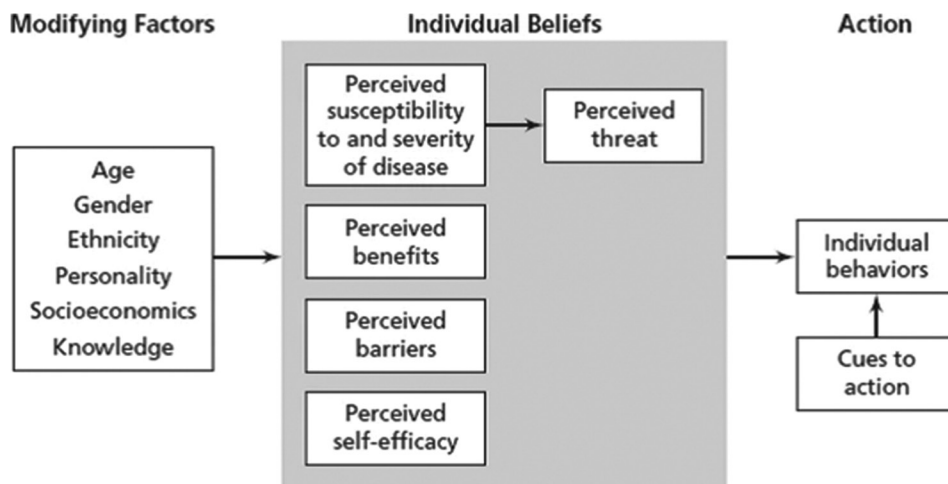


Figure 1: Health belief model's components

### Inclusion and exclusion criteria

Having satisfaction to participate in the study and not having serious diseases related to children (child depression, thyroid, metabolic disease, and any illness that impeded the children to eat) were the inclusion criteria. Also, not completing the questionnaire in full. Three questions in demographic information or five questions in the evaluation of constructs related to the health belief model) was the exclusion criteria.

### Data collection tools and technique

The data were collected using a researcher-made questionnaire (paper form) based on the health belief model constructs. A literature review and experts' approach were used to develop the tool. This instrument consisted of two main parts as follows:

**Part one:** Demographic characteristics including maternal age, education level, occupation, etc.

**Part two:** Constructs of the health belief model, which include: Knowledge (10 questions, i.e., "Are overweight and obese children at risk for diabetes?" perceived susceptibility (4 questions, i.e., "Like any other child, my child is at risk of overweight and obesity"); perceived severity (4 questions, i.e., "Overweight makes my child susceptible to many diseases."); perceived benefits (4 questions, i.e., "The normal weight of my baby is good for her/his health."); perceived barriers (4 questions, i.e., "It is difficult for me to maintain my child normal weight."); and self-efficacy (2 questions, i.e., "I can plan to maintain my child's normal weight even though it is hard work.").

The questions on the Health Belief Model were answered based on the Likert scale as strongly agree, agree, neutral, disagree, and strongly disagree, with a range of 1 to 5 scores. Therefore, the range of scores for the constructs of perceived sensitivity, perceived severity, perceived benefits, and perceived barriers is between 1 and 20, and for the perceived self-efficacy construct, the range of scores is between 1 and 10. Two trained investigators were cooperated to conduct the study and collect the data. We considered about 20 minutes for each participant to complete the questionnaire.

### Validity and reliability

In this research, the content validity method (CVR and CVI) was used to evaluate the questionnaire, considering 8 experts in the fields of health education, nursing education, and noncommunicable diseases. In CVI, the questionnaire was examined in terms of compliance with grammar and the use of appropriate and balanced words. Also, CVR was performed by the same experts considering the three keywords "necessity," "useful but not necessary," and "non-necessity" for each

item. It should be noted that no questionable items were removed in this section. Also, the reliability of the tool was done using the internal consistency method (Cronbach's alpha), and this coefficient for the constructs of perceived sensitivity, perceived intensity, perceived benefits, perceived obstacles, and self-efficacy was 0.81, 0.87, 0.76, 0.79, and 0.85, respectively.

### Procedures

The weight and height of all the selected children were measured, and the BMI was then calculated. The height was measured in a standing position and without shoes using a standard strip meter with a precision of 0.5 cm, and the weight was measured using a dial scale (SECA model) with a precision of 0.5 kg.

The National Center for Health Statistics/World Health Organization (NCHS/WHO) BMI percentiles were used to determine OW/OB: underweight: <5<sup>th</sup> BMI-for-age; normal weight: 5<sup>th</sup> < BMI-for-age <85<sup>th</sup>; overweight: 85<sup>th</sup> BMI-for-age <95<sup>th</sup>; and obese: BMI-for-age ≥95<sup>th</sup>. Obesity in children is defined as a body mass index, which is 95 percent relative to age and sex. We used BMI-for-age weight status categories.<sup>[25]</sup>

### Ethic consideration

All methods carried in the study have been approved by the Ethics Committee of Alborz University of Medical Sciences (IR.ABZUMS.REC.1397.060). Participants were provided information about the study and consented by proceeding to take the survey; this implied consent was approved by the Ethical Board Committee of Alborz University of Medical Sciences. Verbal consent to participate in the study, anonymity and confidentiality of information, explanation of the research method, and objectives for the participants were significant points in the ethical considerations of the present study.

### Statistical analysis

The collected data were analyzed using the SPSS19 software as well as descriptive and analytical tests. The primary outcome measure was child BMI status (overweight versus non-overweight Bivariate associations were determined using Chi-square tests for categorical data and t-tests for continuous variables with normal distributions. Spearman correlation coefficient was used to achieve correlation between data that was not normally distributed. In addition, independent *t*-test and Chi-square to assess the demographic characteristics of mothers as well as the mean score of their knowledge and health beliefs in the two groups of mothers with normal weight children and mothers with obese or overweight children. The statistical significance level ( $P < 0.05$ ) was calculated for all the tests.

## Results

As shown in Table 1, the sample under analysis was composed of 350 mothers aged 15 to 45 years, of whom 52% were 25–36 years old and most of them lived in rural areas (57.3%). Of all the participants, 52.20% had daughters and 47.80% had sons. Regarding occupation, the majority of the mothers were housewives, 67.3% had completed basic education and lower secondary education, and about 80% had monthly household income of about \$ 300. The results showed that there was no significant relationship between maternal age and child BMI. Twenty-five of children (7%) were overweight (at or above the 95<sup>th</sup> percentile age- and sex-adjusted BMI).

The participants' mean ± SD scores of knowledge and health beliefs are illustrated in Table 2.

**Table 1: Participants' demographic characteristics**

Variable	n (%)
Age	
15–25	71 (19.80)
26–35	186 (52)
36–45	101 (28.20)
Education	
Illiterate	94(26.30)
Basic Education and Lower Secondary	241 (67.30)
College or university	23 (6.40)
Occupation	
Housewife	328 (91.60)
Employed	30 (8.40)
Monthly income	
<\$300	76 (21.20)
>\$300	28 (78.80)
Number of Children	
One	184 (51.4)
two	132 (36.9)
Three or more than three	42 (11.7)
Child BMI	
Normal	333 (93)
Over weightand obesity	25 (0.7)
Sex	
Girl	187 (52.2)
Boy	171 (47.8)

In accordance with Table 2, participants achieved the highest score in perceived benefit while their score in the perceived barrier was less than other constructs. Besides there was a significant difference between participants' mean score of perceived susceptibility ( $P = 0.05$ ) in two groups of mothers with normal weight children and mothers with obese or overweight children.

According to the results of the study, there was a significant and direct correlation between perceived severity and perceived benefits ( $P < 0.01$ ). In addition, significant and direct correlations were found between the participants' knowledge with their perceived severity ( $P < 0.01$ ) and perceived benefits ( $P < 0.01$ ) and similarly, we found significant and Inverse correlations between the participants' knowledge with their perceived barrier ( $P < 0.05$ ), and between the participants' self-efficacy with their perceived barrier. In addition, significant and direct correlations were found between the participants' self-efficacy with their perceived severity ( $P < 0.01$ ) and perceived benefits ( $P < 0.01$ ) [Table 3].

## Discussion

The present study aimed to investigate the role of the health beliefs of the mothers with preschool children in obesity prevention behavior using the health belief model. Parental beliefs are the basic factors that determine eating habits and play a key role in shaping children's eating patterns early in life,<sup>[14]</sup> and mothers' feeding practices are implicated in children's BMI and weight.<sup>[13,26]</sup>

Seven percent of the preschoolers were overweight. In agreement with our results, other studies reported similar findings. For instance, a study by McDonald SW *et al.* reported 74% of children had a healthy BMI, 10% were underweight, 9% were overweight, and 7% were obese. In addition, in other studies Karimy *et al.*<sup>[27]</sup> and Mohd Hatta *et al.*<sup>[28]</sup> showed that the prevalence of obesity (OB) was 11.5% in boys and 7% in girls,<sup>[29]</sup> and 10.45% of children were overweight.

Based on the results of the present study, mothers could achieve 77.8% (the mean score of  $7.77 \pm 2.07$  out of 10)

**Table 2: Comparison of participants based on health belief model constructs**

Variable	Mean±SD			P*
	Normal Weight (n=333)	Overweight (n=25)	Total (n=358)	
Knowledge	7.76±2.06	7.92±2.21	7.77±2/07	0.72
Perceived susceptibility	11.19±3.10	10.04±2.70	11.11±3.08	0.05*
Perceived severity	16.85±2.46	16.80±3.20	16.85±2.51	0.91
Perceived benefit	18.03±1.98	17.40±3.85	17.98±2.16	0.15
Perceived barrier	7.73±2.83	7.44±3.17	7.71±2.86	0.62
Self-efficacy	10.541±2.67	11.28±3.14	10.57±2.71	0.17

t-test



**Table 3: Correlation matrix between knowledge and constructs of mothers' health belief model and preschool children's BMI**

Variable	Knowledge	Perceived Susceptibility	Perceived Severity	Perceived Benefit	Perceived Barrier	Self-efficacy	Child BMI
Knowledge	1						
Perceived Susceptibility	-0.015	1					
Perceived Severity	0.212*	-0.196**	1				
Perceived Benefit	0.141**	-0.163**	0.421**	1			
Perceived Barrier	-0.114*	0.150**	0.432**	-0.093	1		
Self-Efficacy	-0.089	-0.045	0.190**	0.172**	-0.179**	1	
Child BMI	-0.031	0.107*	-0.010	-0.034	0.031	-0.076	1

\*Correlation is significant at the 0.05 level. \*\*Correlation is significant at the 0.01 level

of the total score of knowledge, which was a good score level. This showed good knowledge of mothers about the health consequences of obesity 80% of all respondents named at least one of the following: heart problems (mentioned by 90%), diabetes (85%), and hypertension (84%). This may be due to the exposure to information on the effects of childhood obesity, which is available on internet and mass media. The results of the present study were in line with the studies such as Karimy *et al.*,<sup>[27]</sup> Babela *et al.*<sup>[9]</sup> and Assefa *et al.*<sup>[30]</sup> and contrary to some other studies such as the study conducted by Gies *et al.*<sup>[31]</sup> showed low knowledge of the participants. This can be due to the demographic variables of the study subjects, such as age, access to data related to children's health, receiving education related to the subject by mothers, educational conditions, etc.

In the present study, participants achieved 55.55% of the total score in perceived susceptibility, 84.25% in perceived severity, 89.9% in perceived benefits, 51.4% in perceived barriers, and 70.46% in self-efficacy. These findings suggest that the perceived susceptibility of the participants was low, while their levels in other constructs were good.

Likewise, in our study, perceived susceptibility in Heydaratabar *et al.*<sup>[32]</sup> and Shamsi *et al.*<sup>[33]</sup> were low. The highest mean score of our participants was related to their perceived benefits and the lowest mean score belonged to perceived susceptibility; nonetheless, in Heydaratabar *et al.*,<sup>[17]</sup> study perceived barriers and perceived susceptibility had the highest and the lowest mean scores, respectively.

Likewise, to our study, perceived benefits in both Heydaratabar *et al.*<sup>[17]</sup> were good.

In our study, no significant difference was observed between the scores for knowledge of mothers with normal BMI and those with obese BMI. This could be justified by the fairly good scores of mothers in the present study. This result expresses the scientific logic that knowledge is a necessary condition for behavior, but it is not sufficient, and besides knowledge, other factors

such as beliefs and perceptions can influence behavior. This finding is in line with those of the study by Karimy *et al.* and Hatta *et al.*<sup>[27,28]</sup>

In the present study, there was a significant difference between the mean score of individuals' perceived susceptibility in two groups of mothers with normal weight children and mothers with obese or overweight children. This finding could indicate that the perceived susceptibility of mothers can be effective in adopting obesity prevention behavior; it is consistent with the findings of Alatawi<sup>[34]</sup> who reported that perceived susceptibility was a predictor of adherence behavior to taking medication by type-2 diabetes patients. Also, Armoon and Karimy perceived that threat was the significant predictor of the child's BMI.<sup>[35]</sup>

We couldn't find this difference between perceived (benefits, barrier, severity, and self-efficacy) and child BMI. It is consistent with the findings of Armoon and Karimy.<sup>[35]</sup>

This finding as the probability of performing an action by an individual for his own health depends on his understanding of the susceptibility of the children's obesity and in favor of the positive effect of perceived susceptibility with child BMI.

The results of this study showed no significant relationship between mothers' knowledge and BMI, indicating the importance of attention to other factors along with knowledge in order to have a normal BMI. This is in line with the results of the study by Gibson *et al.*<sup>[36]</sup> who found no significant relationship between maternal knowledge and children's vegetable and macronutrient intake but inconsistent with the results of the study by Zarnowiecki *et al.*<sup>[37]</sup> The inconsistency might be related to our study sample size. Thus, further studies with more samples are recommended.

We found a direct correlation between participants' knowledge with their perceived severity ( $r = 0.212$ ), perceived benefits ( $r = 0.141$ ), and inverted correlation with a barrier ( $r = 0.114$ ). With regard to the significant

correlation between perceived susceptibility and child BMI in our study and with respect to the significant correlation between perceived susceptibility and desired health behaviors in other studies conducted by Heydaratabar R *et al.*<sup>[32]</sup> and Karimy M *et al.*<sup>[27]</sup> we conclude that providing the bases of health education to increase perceived susceptibility in a society of preschool mothers in order to train prevention behavior of obesity could be beneficial to promote public health in different groups of preschool mothers.

Limitations of the present study are as follows: First, the questionnaire was completed by the target group as a self-report. Second, our study included only mothers who had health records and did not include all mothers, thus limiting its generalizability.

### Conclusion

Childhood obesity has reached epidemic proportions, the results of this study showed that maternal health beliefs were effective in the child BMI, Hence, mothers with higher perceived susceptibility levels who found their children susceptible to obesity tried to get their children to have a normal BMI. Interventions targeting mother's attitude behaviors may prove to be most effective for the promotion of healthy BMI in children.

On the one hand, understanding the cultural context for how Iranian mothers perceive weight in themselves and their child is important for the development of obesity prevention strategies within this population. On the other hand, the role of health providers cannot be understated in this community.

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### Conflicts of interest

There are no conflicts of interest.

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