The Influence of Maternal Feeding Behavior and Body Size Perception on Childhood Obesity

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Abstract

Abstract Objective: To preliminarily explore the influence of maternal feeding practices and body shape perception on childhood obesity, and to compare the differences based on whether the mother is the primary caregiver, thereby providing reference for future interventions for childhood obesity in the family feeding environment. Methods: Eight kindergartens were selected in four cities (Beijing, Xi' an, Jiangsu, and Shenzhen), and convenience sampling was conducted among mothers of children, with a total of 456 valid questionnaires collected. A mother-reported method was used. The survey content included socio-demographic characteristics, body figure chart perception, and the Child Feeding Questionnaire. Results: 81.66% of mothers of overweight children and 70.15% of mothers of obese children underestimated their children' s weight status. Perception bias was significantly positively correlated with pressure to eat ($r=0.11$, $P<0.05$) and concern ($r=0.15$, $P<0.01$). Hierarchical regression analysis revealed that perceived responsibility and pressure to eat among mothers as primary caregivers had greater predictive effects on children' s BMI than those among non-primary caregivers. Conclusion: Mothers of overweight and obese children are more likely to have perception bias and adopt unscientific feeding practices. Both unscientific maternal feeding practices and incorrect body shape perception increase the risk of childhood obesity.

Full Text

The Influence of Maternal Feeding Behavior and Body Cognition on Childhood Obesity

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Abstract

Objective: To preliminarily explore the influence of maternal feeding behavior and body cognition on childhood obesity, and to compare differences based on whether the mother is the primary caregiver, in order to provide reference for future interventions for childhood obesity within the family feeding environment.

Methods: Using convenience sampling, we selected eight kindergartens in four cities (Beijing, Xi' an, Jiangsu, and Shenzhen) and surveyed mothers of children aged 2–5.5 years. A total of 456 valid questionnaires were collected using a mother-report method. The survey included socio-demographic characteristics, body figure chart cognition, and a child feeding questionnaire.

Results: Among mothers of overweight and obese children, 81.66% and 70.15% respectively underestimated their children' s weight status. Cognitive bias was significantly positively correlated with pressuring feeding behavior ($r = 0.11$, $P < 0.05$) and concern ($r = 0.15$, $P < 0.01$). Hierarchical regression analysis revealed that among mothers who were primary caregivers, responsibility cognition and pressuring feeding demonstrated stronger predictive effects on children' s BMI compared to non-primary caregivers.

Conclusion: Mothers of overweight and obese children are more likely to exhibit cognitive bias and adopt unscientific feeding behaviors. Both unscientific maternal feeding behaviors and incorrect body cognition increase the risk of childhood obesity.

Keywords: Childhood obesity; Mother; Primary caregiver; Body cognition; Feeding behavior

In recent years, domestic and international scholars have made significant progress in research on childhood obesity, particularly in the two domains of children' s body cognition and feeding behaviors within the family environment [**?**]. However, few studies have examined the relationship between cognitive

bias and feeding behavior, the impact of maternal feeding behavior and body cognition on childhood obesity, or the variable of whether the mother serves as the primary caregiver. Therefore, this cross-sectional study of mothers of children aged 2–5.5 years aims to preliminarily explore the influence of maternal feeding behavior and body cognition on childhood obesity, providing reference for future interventions within the family feeding environment.

2.1 Participants

From June to August 2016, we conducted convenience sampling of mothers of children aged 2–5.5 years across eight kindergartens in four cities: Beijing, Xi' an, Jiangsu, and Shenzhen. A total of 456 valid questionnaires were collected, representing an 83.21% response rate. Questionnaires that were incomplete or from children older than 5.5 years or younger than 2 years were considered invalid.

2.2 Instruments

The entire questionnaire utilized a mother-report method [**?**]. The survey content included socio-demographic characteristics, body figure chart cognition, and a child feeding questionnaire.

2.2.1 Socio-Demographic Characteristics

The questionnaire collected basic information about children and families, including child gender and age, child height and weight, and maternal height and weight. Additionally, the question "Who is primarily responsible for the child' s diet at home?" was used to identify whether the mother was the primary caregiver. Children' s and mothers' actual BMI values were calculated based on mother-reported heights and weights using the formula: weight (kg) / height $(m)^2$. Children' s BMI categories followed the standards for Chinese children established by Li et al. (2009): BMI $<$ 5th percentile as underweight, 5th BMI $<$ 85th percentile as normal weight, 85th BMI $<$ 95th percentile as overweight, and BMI 95th percentile as obese [**?**]. Maternal BMI categories followed the standards for Chinese adults established by Ji (2005): BMI $<$ 18 as underweight, 18 BMI $<$ 24 as normal weight, 24 BMI $<$ 28 as overweight, and BMI 28 as obese [**?**].

2.2.2 Body Figure Chart Cognition

This study employed the child body figure charts developed by Eckstein et al. [**?**], which are applicable for ages 2–18 years, though only the charts for boys and girls aged 2–5 years were used. The chart consists of seven figures with progressively increasing weight from left to right, numbered 1 through 7. Based on the child classification standards of Li et al. (2009), these seven figures were categorized as: 1 = underweight, 2–4 = normal weight, 5 = overweight,

and 6–7 = obese. Cognitive bias refers to the difference between the child' s actual weight and the mother' s perceived weight after viewing the figure chart. Child body cognition bias was assessed in three ways: overestimation (perceived weight > actual weight), underestimation (perceived weight < actual weight), and accurate perception (perceived weight = actual weight).

2.2.3 Child Feeding Questionnaire

The questionnaire items were adapted from the Child Feeding Questionnaire (CFQ) developed by Birch et al. [**?**], comprising four dimensions with 20 items. Each item used a 5-point Likert scale (1–5), with each dimension score calculated as the mean of its constituent items. Higher scores indicated greater manifestation of maternal feeding attitudes and behaviors in that dimension. In this study, the internal consistency (Cronbach' s) of the questionnaire' s subscales ranged from 0.65 to 0.95.

1.3 Data Processing

Returned questionnaires were uniformly numbered and processed using SPSS 20.0 statistical software for database establishment and statistical analysis. Cramer' s V coefficient was used to examine consistency between mothers' perceptions of their children' s weight status and children' s BMI categories [**?**]. Correlation and regression analyses were employed to test the relationship between cognitive bias and feeding behavior. Hierarchical regression analysis was used to examine the effects of feeding behavior and cognitive bias on childhood obesity.

3.1 Child Weight Status

In this study, children' s mean age was (4.30 ± 0.78) years, including 238 boys (52.20%) and 218 girls (47.80%). The mean BMI was (15.87 ± 2.46) kg/m², with 42 children (9.20%) underweight, 287 (62.90%) normal weight, 60 (13.20%) overweight, and 67 (14.70%) obese. The overweight rate was higher among boys (13.90%) than girls (12.40%), and the obesity rate was also higher among boys (17.20%) than girls (11.90%).

3.2 Maternal Body Cognition

This study found poor consistency between mothers'perceptions of their children' s weight status and actual weight status. Specifically, 81.66% of mothers of overweight children and 70.15% of mothers of obese children underestimated their children' s weight level (see Table 1).

Table 1 Consistency Between Maternal Perception of Child Weight Status and Child BMI Categories (N, %)

[Table content]

Note: Cramer' s V coefficient = 0.34, P < .001.

3.3 Relationship Between Cognitive Bias and Feeding Behavior

Cognitive bias was significantly positively correlated with pressuring feeding behavior (r = 0.11, P < 0.05), and this relationship remained significant even after controlling for child gender, age, and maternal BMI (P = .01, = 0.28). Cognitive bias was also significantly positively correlated with concern (r = 0.15, P < 0.01), and this relationship likewise remained significant after controlling for child gender, age, and maternal BMI (P = 0.00, = 0.27).

Table 2 Correlation Analysis Between Cognitive Bias and Maternal Feeding Behavior

[Table content]

Note: ** Correlation is significant at the 0.01 level (two-tailed); * Correlation is significant at the 0.05 level (two-tailed).

3.4 Factors Influencing Childhood Obesity

As shown in Table 4, responsibility cognition and pressuring feeding among mothers who were primary caregivers demonstrated greater predictive power for children' s BMI compared to non-primary caregivers. This may be because non-primary caregivers are less involved in children' s feeding behaviors. In the overall regression model, the inclusion of four feeding dimensions and cognitive bias produced the largest change in R^2 (all VIF values were less than 4, ranging from 1.00 to 1.19).

Table 3 Hierarchical Regression Analysis of Four Feeding Dimensions and Cognitive Bias on Child BMI

[Table content]

Note: A = mother as primary caregiver; B = mother as non-primary caregiver. *P < 0.05,* ***P < 0.01,*** P < 0.001.

The purpose of this study was to examine the influence of maternal feeding behavior and body cognition on childhood obesity. This research question was motivated by the fact that in many countries, particularly China with its long history, traditional beliefs influence perceptions that a plump child is healthy, which also suggests good maternal care and better feeding. Yilmaz et al. (2009) and Jackson et al. (1990) similarly described this feeding philosophy. When feeding children, mothers feel happy if the child is full or feel gratified seeing the child gain weight [**?**, **?**].

4.1 Most Mothers of Overweight and Obese Children Exhibit Cognitive Bias

The results indicate that the vast majority of mothers of overweight and obese children demonstrate cognitive bias and underestimation of body size, consistent with findings from domestic and international studies [**?**, **?**, **?**, **?**, **?**, **?**, **?**, **?**, **?**]. This suggests that maternal misperceptions are more likely to occur among overweight and obese children. Further inference indicates that mothers' errors in perceiving children's body size are not due to a lack of general cognitive ability but rather are influenced by maternal emotional factors [**?**]. Such misperceptions may occur because mothers believe that as children age, their body size will distribute evenly [**?**].

4.2 Relationship Between Cognitive Bias and Feeding Behavior

The results show a significant positive correlation between cognitive bias and pressuring feeding behavior. This indicates that mothers who underestimate their children' s weight are more likely to adopt pressuring feeding behaviors, which are primarily observed among obese children. Previous research has shown that mothers tend to adopt pressuring feeding behaviors more often with underweight children [**?**, **?**, **?**, **?**, **?**]. This divergent finding may be related to China' s national conditions or influenced by regional and traditional cultural factors. The study also found a significant positive correlation between cognitive bias and concern feeding attitudes, suggesting that the more mothers underestimate their children' s weight status, the more concerned their feeding attitudes become. Further inference indicates that the more overweight or obese the child, the more worried the mother becomes, which aligns with previous research findings [**?**, **?**, **?**, **?**, **?**].

4.3 Implications for Intervention and Treatment of Childhood Obesity

This study demonstrates that feeding behaviors and cognitive bias are factors influencing childhood obesity. This suggests that medical experts and healthcare providers should focus on feeding behaviors within the family environment [**?**] when intervening in childhood obesity, and should scientifically guide mothers to correctly perceive their children' s weight status, thereby helping mothers adopt scientific and reasonable feeding behaviors and attitudes.

4.5 Limitations and Future Directions

The primary limitations of this study are the relatively small sample size [**?**, **?**, **?**] and the cross-sectional design, which precludes analysis of causal relationships between variables [**?**]. Longitudinal research designs are needed to determine causal relationships between cognitive bias and feeding behavior [**?**].

Future research should encourage more scholars to develop hypotheses about the relationship between body cognition and feeding behavior, and to conduct

laboratory and longitudinal studies [**?**] to establish causal relationships between cognitive bias and feeding behavior, thereby better guiding medical experts and healthcare providers in intervening in childhood obesity within the family environment [**?**].

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Note: Figure translations are in progress. See original paper for figures.