



## Research Article

# Conceptual Application of the Adapted Health Belief Model to Parental Understanding of Child Weight

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### Abstract

The prevalence of obesity in children and adults remains at 18.5% and 39.8% respectively. The continued rates of obesity and the identified issue of parents being unable to recognize weight deviations highlights a need for better understanding of the problem. This issue of parental inability to recognize weight has been identified frequently, though the modifying factors are not fully understood. This article discusses a proposed conceptual model that can help identify potential modifiable factors that can be used as a basis for future intervention and prevention strategies. The Health Belief Model has historically been associated with a person's ability to change. This model takes the three factors most often identified as influential in change and applies them to understanding parental classification of weight. This novel approach addresses parental perception and attempts to encourage research that further explores influential factors for obesity in children within the family context.

**Keywords:** Conceptual model; Health belief model (HBM); Parental perception; Child; Weight; Obesity

### Introduction

Obesity issues are a continued problem in both children and adults with prevalence in the United States at 18.5% and 39.8% respectively [1]. These latest figures represent a significantly increasing trend in prevalence since 1999-2001. Coupled with this issue is the significant inability of parents to recognize their children as overweight or obese, which could affect their motivation to seek intervention or engage in prevention efforts [2].

This issue is even more substantial when examining subpopulations of parents with obese children [2-4]. More than one in three obese children were identified as about the right weight by a parent in a sample examining 1,445 U.S. children [5] and other research has identified the rates of parental misperception of their clinically obese child as low at 17% and as high as 81.4% [2].

Despite continued evidence of parental inability to recognize weight deviations in children, this issue has potential for improvement if contributing factors can be identified. It is important to understand factors that contribute to child weight misclassification and the implication these factors might have when weight changes are needed. If parents cannot recognize increased weight or potential for weight deviation before it is blatantly present, they may not understand or implement needed changes in diet and lifestyle [6]. Though considerable research has examined parental misclassification of obesity, a thorough literature review shows a scarcity of studies that employ theoretical frameworks to examine misclassification [2]. Those studies that did use a model, though, most often used the Health Belief Model (HBM) [2,7].

The HBM was conceptualized as a framework to understand health-related behaviors and predict when changes can occur [8]. Using this model to examine misclassification could prove helpful to the weight problem as it may help

identify modifiable parental factors that would improve weight recognition and weight trajectories for their child.

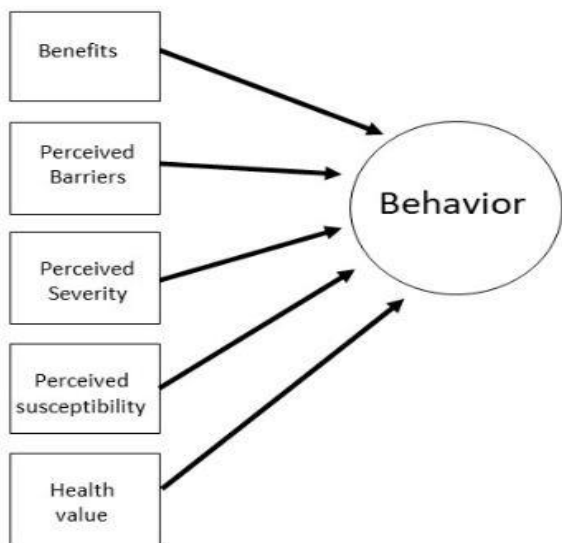
The ability to identify influential factors that could affect perception and be used as a basis for future intervention and prevention efforts could make this a novel application. This review describes a conceptual framework that is informed by the HBM.

### HBM origins and interpretations

The HBM is a social-psychological theory that addresses health behavior and shows how theory-based scientific research can better understand health behaviour [9]. The model has been applied successfully to health screenings and physical activity [10]. It has been used to explain participation in healthy actions that reduce the chance of disease and premature death with a focus on beliefs that relate to readiness for action and beliefs related to modifying factors that can either facilitate or inhibit actions [11].

This model has been associated with five components that are needed to inspire change: Benefits, barriers, severity, susceptibility, and health value as depicted in Figure 1 [11].

However, other researchers have used susceptibility, severity, cost, benefits, and cues to action as variables motivating behavior change [12]. The key components of the interpretations are the same. The HBM specifies that an individual must be ready to make the change, which means that they feel susceptible to the condition and this occurrence could have serious consequences [13]. Further, the individual must find the benefit of reducing susceptibility to the condition and that the benefits of doing something outweigh the psychological and real costs [13]. The HBM explains individual behaviors and emphasizes the importance of perceiving conditions as severe or as a severe risk as necessary to increase the likelihood of action to counteract it [14].



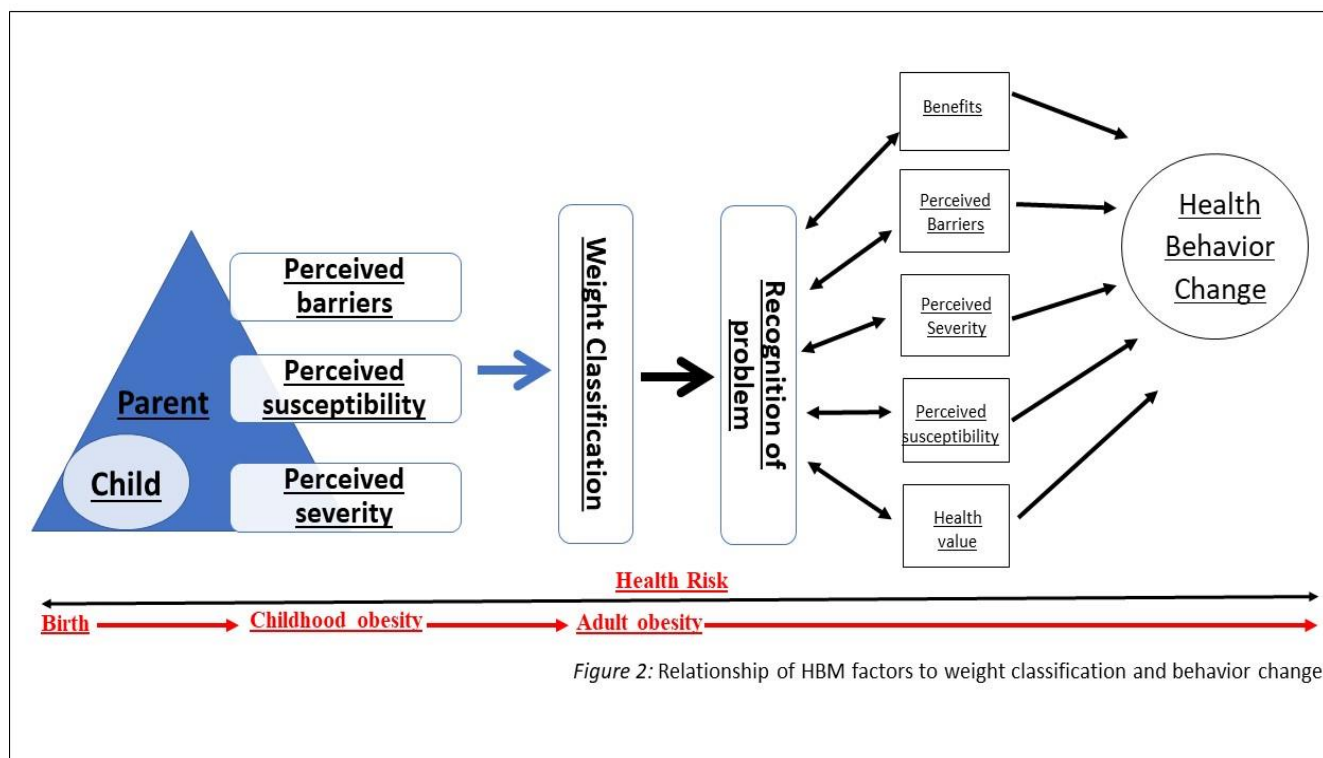
**Figure 1:** The five factors of the Health Belief Model that inspire change. Adapted from “Development and Evaluation of The Health Belief Model Scale in Obesity,” by O. Dedeli

and C. Fadiloglu [11], 2011, *TAF Prevention Medical Bulletin* 10, p. 534.

Self-efficacy as a separate important factor needed for behavioral change has also been used and justified as confidence in the ability to change as important, though self-efficacy has also been considered as part of the perceived barriers factor [15].

**The conceptual model**

The proposed, adapted conceptual model describes the use of the HBM to evaluate parental weight classification, recognition of a problem, and behavior change (Figure 2). Perceived susceptibility, perceived barriers, and perceived severity have been noted as the most influential factors on predicting behavior change [16]. This was identified via an examination of 18 studies, the components of the HBM were analyzed to determine what factors had the most influence [16]. Desired target behavior changes were found to be most influenced by severity, barriers, and benefits with the last two also being correlated as the strongest predictors of change [16].



*Figure 2: Relationship of HBM factors to weight classification and behavior change*

**Figure 2:** Relationship of the HBM factors to weight classification and behavior change.

With these factors being identified as the most important for behavior change, they are proposed as the most influential in affecting weight recognition. This proposed model also recognizes the parental influence in the 2 to 5-year-old ages and proposes that parents who have accurately understood perceived barriers, perceived susceptibility, and perceived severity can then correctly classify weight and realize when it

is a problem. These steps are precursors for the ultimate end of making a health behavior change. It is proposed that the same factors that can predict behavior change may also affect the accuracy of parent’s perceptions of child weight as demonstrated in Figure 2. Examination of these factors could identify potential moderating factors that could be used in future intervention and prevention strategies to improve

parental classification of weight, improve understanding of weight deviations, and target improvements in healthy behavior.

This model provides a novel approach to identifying influential factors that can affect parental assessment of younger children.

### **Perceived severity as examined by knowledge of obesity risks**

Parental knowledge of obesity health risks correlates to important components of the HBM, such as perceived severity. The importance of that awareness and motivation is an integral component of the HBM. It is currently unclear if parents have adequate knowledge and if they connect weight to health risk, or if they understand how early life weight issues affect future obesity and health conditions, especially for children ages 2 to 5 who are at a critical point in their development. The need to further explore this concept was identified in a meta-analysis [17] and literature review [2].

The HBM indicates individuals must be ready to change, which means they must feel susceptible to the health condition and that developing it could have serious consequences [13]. Individuals must also find benefit in reducing susceptibility to the condition and decide that the benefits of doing something outweigh the costs, which can be psychological or real [13]. Perceived severity relates to the perception of how developing an illness personally impacts the individual [15]. This model conceptualizes this concept as how parents perceive the child's risk of developing an illness, which is like the application done by others [7].

As represented by research on early life risk factors for obesity, there are modifiable risks as early as the in-utero period [18,19]. However, there is also a lack of realization of the importance of this time-period on the future weight and health status of children [20]. This lack of knowledge and understanding of health risks relates to perceived severity and is like previous applications seen with anti-smoking campaigns that have related to perceived severity and the impact of smoking as part of health promotion teaching [10]. Just as knowledge of the risks of smoking was used to motivate behavior changes, knowledge of obesity risks and the implications of excess weight can motivate parents to make changes.

However, those who are obese or overweight and actively seeking treatment see obesity as a disease and recognize it, but others have a flawed perception of obesity [14]. This flawed perception of weight has been demonstrated by the misclassification rates discussed earlier as parents are more likely to underestimate weight, thus not recognizing when a child passes the threshold from normal to overweight or obese.

Further, in a meta-synthesis [21] of 15 cross-sectional studies, only 26% of parents of overweight or at-risk children were concerned about health risks associated to weight status [21]. Recognition of health risks has been related to the HBM as important to behavioral change but is also recognized as a problem for parents who misclassify child weight as they do not understand the harm of excess weight in childhood and are not always aware of what comprises a healthy diet and

adequate exercise [7]. These findings point to the need to examine knowledge.

Studies have also shown that parents do not understand the significance of obesity and may even have a desire to shield their children from negativity associated with diagnoses of weight problems [22]. Parents of normal weight children have even been reported to have significantly greater knowledge of risk factors compared to parents of overweight children [7]. Knowledge of obesity and related health risks could be a factor to help parents gain the needed awareness and motivation required for change, though it has not been explored much in classification research. Only one study [7] was identified as attempting to examine the relationship of these concepts. This adapted model can be used for future research to determine whether parents' misclassification of their young child's weight is related to their knowledge of obesity and its health risks.

**Parental health knowledge related to obesity and classification:** Health-related knowledge in parents has been examined minimally. Limited understanding of risk factors early in life as well as incorrect weight-related beliefs has been identified in Hispanic women [20]. Another study [23] has shown parents do not consistently associate childhood obesity with potential for adult weight issues and did not recognize that BMI is a predictive risk factor for developing hypertension, heart disease, type II diabetes, and depression. At present, only limited research has evaluated whether parents of younger children realize there are future risks associated with weight status.

No study was found that evaluated parental classification of preschool child weight status and compared it to the parental knowledge of obesity and related health risks. However, a study involving pregnant women and women intending to become pregnant examined existing weight status versus misclassification of weight and knowledge of obesity health risks [26]. Of the 126 planning to be pregnant, 51% had low obesity risk knowledge and 31% misclassified their body weight. These findings point to a problem in both obesity risk knowledge and adult ability to correctly classify their own weight.

**Potential effect of knowledge on weight:** While classification and knowledge have limited presence in the literature, the effect of knowledge on successful weight change has been explored more often. Results indicate a change in knowledge can correlate to healthier weights and increased weight loss [27].

### **Perceived susceptibility as examined by parental concern and obesity exposure**

Perceived susceptibility relates to a person's perceived risk of developing a specific illness or health problem [15]. This conceptual model relates the parental view of how likely their child is to develop overweight and obesity. Misclassification research has similarly explored parental concern with child weight and related it to parental ability to classify child weight, though the application has been limited and results inconsistent [2,28]. This is partially evidenced by the lack of mention of concern as an explored factor in a meta-analysis involving 128 studies [28].

Meanwhile, another review [17] including 13 articles, found concern was explored in four studies published from 2006 to 2011. An important finding in those four studies was that parents who had overweight and obese children and underestimated weight status also had a more evident lack of concern with child weight, though no overall analysis was conducted to quantify the finding. Two additional studies found parental concern can moderate appropriate weight classification, allowing more accurate weight perceptions when parents express concern for the child's future weight [29,30]. The first found 29.9% of parents reported concern over future child weight [29]. The second found parents who were concerned over future child weight status also were more likely to incorrectly classify their child's weight [30]. Specifically, they showed that in their sample if 361 parents, 28.6% of those who misclassified weight were unconcerned about future weight while 42.9% were a little concerned, 7.9% concerned, 12.7% fairly concerned, and 7.9% very concerned. Concern over future child overweight was statistically different among parents who misclassified child weight compared to those who correctly classified child weight. This study also showed that concern about the nation's risk for weight-related issues was evident both in parents who misclassified child weight and correctly classified child weight, although the differences between these groups were not significant. Researchers posited parents who incorrectly perceive weight were also less likely to engage in improvements in lifestyle and behavior changes that could improve the weight of children [30].

While these above-discussed results describe parental concern as a potential moderating factor of child weight classification, at least one study had findings contradicting this claim with parental concern for future weight found as a minimal and non-significant factor in a parent's classification of their child's weight [31]. With this observed discrepancy among studies examining parental concern and the overall limited amount of research examining parental concern, further investigation of parental concern as a potential moderating factor of parental classification of child weight is needed.

**Obesity exposure:** The concept of obesity exposure has been examined by a few studies and related to the presence of obesity-related disease in families [32,33]. With population weight shifts, there are a larger number of overweight and obese individuals, which can be problematic as comparison to others is a noted gauge for relative or acceptable size [33]. The two studies examining how exposure affects perception were inconclusive. The first examined how the presence of obesity-associated diseases like high blood pressure, coronary artery disease, high cholesterol, and type 2 diabetes in parents and grandparents were associated with misclassification and found no significance [33]. The second study with a larger sample found 65.4% of the sample had a family history of obesity-related disease, and this was more common (though not a statistically significant finding) in overweight and obese children [32]. While parent misclassification and several reported illnesses were found to be associated in a univariate correlational analysis, this finding was not sustained in the final adjusted regression model. However, family history of diabetes remained significantly correlated to misclassification of overweight and obesity in the final model.

The idea that family history of obesity-related disease is important in classification is identified in multiple studies [29,32]. The prevalence of obesity and thus heightened exposure to it (and potentially to related disease) may make it difficult for people to determine healthy versus unhealthy weights [29].

### **Perceived barriers as examined by self-efficacy**

Perceived barriers relate to both the difficulties and consequences of performing specific behaviors, cues to action, and even the self-efficacy needed for action [15]. Bandura's Social-Cognitive Theory [34] also highlights self-efficacy as an important concept that relates to the ability to perform behaviors and notes that self-efficacy is a bridge between knowing how to do something and actually doing it [34]. Self-efficacy has been related to parents and their ability to inspire health-related changes. High parental self-efficacy has been shown to be an important factor in affecting healthy child behaviors, such as improved sleep and less television time, as well as in improving parental depressive symptoms [35].

Perceived self-efficacy (PSE) has been shown to be a causal mechanism in behavior change that could also prove to be important in prevention efforts. Prevention efforts have been deemed a more realistic and cost-effective approach to managing childhood obesity. This was the premise used to create a measurement scale to examine self-efficacy in relation to behaviors that affect obesity [36]. These researchers are among those that contend self-efficacy is an important and under-studied component in childhood obesity. While there have been studies relating parental self-efficacy to some obesity-related measures, like diet and physical activity, few were found that discussed how self-efficacy related to issues like misclassification [37,38].

A cross-sectional study involving data from a three-year family-based intervention (randomized controlled trial) to prevent obesity found self-efficacy had a significant positive correlation with child sleep and significant negative correlations to the amount of time children watched television and to parental depressive symptoms [35]. They concluded that parental self-efficacy could be important in fostering a supportive home environment that aligns with healthy child growth.

While the limited self-efficacy research has indicated positive associations between child health measures and higher parental self-efficacy, even less research is available to describe its relation to child weight or misclassification. However, a potential connection between these factors was found in at least two studies [37,38]. A significant negative correlation between children's body mass index and parental self-efficacy has been identified [37,38].

### **Limitations**

This article examined multiple databases to identify conceptual frameworks used in obesity perception research. Due to the limited findings, it is difficult to determine the benefits and drawbacks for use of any specific conceptual model. More work that is grounded in this type of research is needed. Further, there is a chance that relevant articles were not identified and thus were not included in the review. Also,

only articles that were available in English were included, so articles written in another language that did not have a translation could not be included. This could lead to some relevant research being excluded. The last and most important limitation is the lack of studies that included mention of using any conceptual model.

The HBM has been supported via other research as a health-related theory that is important in behavior change. However, it has not been applied enough to parental identification of weight or to other weight-related issues to assess its validity. This drawback also means the HBM was conceptualized through other associated work, such as with health issues like smoking, and could not be related to how it worked on an adequate sample of work regarding perception or weight-related issues. This means that while insight and a basic conceptual plan were able to be made, there is insufficient proof of studies using this model successfully to support it.

## Conclusions

This proposed model is novel as it applies components of the HBM model to parental ability to classify child weight. A parents' ability to positively influence a child can be affected by their perception of obesity and its importance. This model accounts for the need to not only recognize obesity but also understand its links to health risks now and in the future.

Obesity in children requires an understanding of causative factors for the individual as well as an understanding of influential factors within the family. These factors can be due to parental influences on diet, exercise, habit formation, and even attitude and beliefs. These are part of the socialization effect that can occur. Socialization is crucial for preschool children where parents are major influencers on development and lifestyle. Determinants of obesity in children of preschool age have not been fully explored, particularly parental social factors that might affect child weight status. It is unclear if parents understand the short- and long-term health consequences associated with obesity in early childhood and whether it affects the weight of their children and their perceptions of their child weight status.

## Conflict of Interest

None

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