

CHAPTER 2

LITERATURE REVIEW

The literature review presents the following topics:

1. Overview of obesity and overweight in children
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 - 1.3 Health problems of overweight children
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Overview of Overweight in Children

Childhood obesity and overweight has increased rapidly in recent years (Mayer, 2009; Ogden et al., 2010). The World Health Organization has defined obesity as abnormal or excessive fat accumulation (WHO, 2011). Body mass index (BMI= weight (kg)/height (m)²), a weight-for-height index, has been widely recommended to assess overweight and obesity as it correlates highly with body fatness and long-term health risks (Van Vliet et al., 2011; Zimmet et al., 2007), and it is easy to measure. The cut-off point of overweight and obesity is based on reference populations or on the severity of morbidity and mortality associated with increment of body fat.

Situation of Overweight in Children

Globally there are over 1.6 billion overweight children, with at least 400 million more obese (WHO, 2011). Overweight in childhood and adolescence has also increased dramatically over the last few years in both developed and developing countries (Jansen et al., 2010). Future projections by the WHO state that by 2015 approximately 2-3 billion people will be overweight and 700 million will be obese.

Prevalence of overweight children in Western countries. According to a report by the US Department of Health and Human Services (2008), the prevalence of overweight among children in western countries including the USA was 37%. In Europe, the prevalence of overweight children has also increased. A report from the International Obesity Task Force (IOTF) in Europe indicates that the highest prevalence

of overweight was found in southern European countries, where it ranges from 24.7 to 40% (International Obesity Task Force, 2011).

Spain, Portugal and Italy all have rates of overweight in excess of 35% among children aged 7-11 years old. In addition, England, Ireland, Cyprus, Sweden and Greece reported overweight rates of more than 25%, while France, Switzerland, Poland, the Czech Republic, Hungary, Germany, Denmark, Netherlands and Bulgaria reported overweight rates of 25% among the same age group. The IOTF provides growth curves which relate cut-off points for different age groups for overweight, including customized age and sex-specific cut-off points for children (International Obesity Task Force, 2011).

Prevalence of overweight in children in Asian countries. The prevalence of overweight has also increased among children in Asian countries. A study among school-age children highlights the trend towards childhood overweight in China, where the incidence of overweight has increased from 14.6% (1999) to 21.8% (2002) (Wang, Mi, Shan, Wang, & Ge, 2007). Similarity, in Singapore, levels of overweight in school-aged children had increased from 6.2% to 14.6% (Ministry of Health Singapore, 2010).

In Thailand, the prevalence of overweight of children between 10 and 12 years old has increased from 15.1% in 2001 to 16.7% in 2005 (Mo-suwan, 2008). In addition, the prevalence of overweight in children aged 6-15 years old in Chiang Mai, Thailand was 15.72% (Pruenglampoo et al., 2007). Moreover, the incidence of overweight in children between 10 and 12 years old in Lampang, Thailand was 14.2% (Lampang Provincial Public Health Office, 2012). This situation remains a major

health concern as this rate is in excess of the national goal of 10% stipulated in the tenth National Economic and Social Development Plan (2007-2011).

Screening and Identification of Overweight Children

The World Health Organization defines overweight as having a BMI-for-age $> +1$ S.D. (according to 2007 WHO growth reference: BMI for age (Z-scores) 5 to 19 years (WHO, 2007). Establishing the appropriate BMI cut-off point for overweight in children is more complex than that in adults because of different rates of growth and adiposity rebound, as well as the scarcity of longitudinal data on for children and its connection to adult health outcomes. Nevertheless, the age-and gender-specific BMI reference curve continues to be recommended for use to assess weight status in children.

The international standard BMI-for-age chart was developed based on growth data from children in six countries: Brazil, Great Britain, Hong Kong, the Netherlands, Singapore, and the United States (Cole, Bellizzi, Flegal, & Dietz, 2000). It uses percentile curves that pass through the points 25 and 30 kg/m² at 18 years to provide age and gender specific BMI to define overweight and obesity in children (aged 2-18 years old). More recently, the International Obesity Task Force has proposed that the BMI cut-off point for overweight should be ≥ 25 kg/m² for Asian-Pacific populations (International Obesity Task Force, 2011).

A reference with age-and gender-specific data for Thai children has not been developed and it is a national priority. Nutritional status in Thai children has primarily been assessed using weight for height, with age-and gender-specific percentiles.

It is divided into six categories: 1) obese = >3 S.D.; 2) pre-obese = 3 S.D. to >2 S.D.; 3) overweight = 2 S.D. to >1.5 S.D.; 4) normal weight = 1.5 S.D. to - 1.5 S.D.; 5) pre-underweight = <-1.5 S.D. to -2 S.D. 6) underweight = <-2 S.D. (Department of Health, Ministry of Public Health, 1999).

In this study, WHO growth reference: BMI for age (Z-scores) 5 to 19 years (WHO, 2007) was used. BMI for age provided the most useful for classify overweight children. Using BMI for age developed by WHO was a standardized to compare with other same age group children with same reference.

Health Problems of Overweight Children

Overweight in children has a variety of important health consequences such as high blood pressure, type-2 diabetes mellitus (DM), and cardiovascular diseases (Van Vliet et al., 2011; Zimmet et al., 2007). Moreover, eating disorders such as bulimia nervosa and anorexia nervosa are a major problem in adolescence because of variety of physical, psychological and social factors in the development of this age group (Cornette., 2008). Overweight in children also contributes to the development of mental and emotional health issues. Indeed, the psychological stress of social stigmatization of obese children may be just as damaging as the medical morbidity and mortality (Harbaugh, Jordan-Welch, Bounds, Blom, & Fisher, 2007). Indeed, several health experts have suggested that health risks due to overweight are not the greatest problem; rather, the mental and emotional damage is more severe (Cornette, 2008; Hwang et al., 2006).

From the discussion above, it is clear that overweight in children has significant effects on their health. Therefore, public health organizations have set high-priority research goals for the prevention and remedy of overweight and obesity (WHO, 2011). However, effective interventions have to fit the needs of the children, and their environments, which are particularly dynamic for this group. As a consequence, only by understanding these specific needs and environmental factors can interventions be developed that fit the characteristics of specific populations of children and their environments.

Factors Related to Overweight in Children

Multiple factors are associated with overweight in children include personal factors, parental factors, and environmental factors (Abdelkafi et al., 2012; Ayala et al., 2007; Elder et al., 2010). These factors influence energy intake and expenditure and are considered to be important in weight gain as well as the development of an overweight condition.

Personal Factors

Personal factors that may cause children to become overweight include genetics and unhealthy behavior of children.

Genetic. Genetic conditions known to be associated with overweight and obese include Prader-Willi syndrome, Bardet-Biedl syndrome, and Cohen syndrome. Overweight is clearly demonstrated as a familial tendency. Children becoming obese if the father, mother or both were obese (Epstein, Paluch, Roemmich, & Beecher,

2007). The one year study, found both father and mother BMI to be positively correlated with excess weight gain in children (Butte et al., 2007). In a cross-sectional study, maternal BMI was strongly correlated with the children's BMI (Elder et al., 2010). Villa-Caballero, Arredondo, Campbell, and Elder (2009) found a significant association between increased parental BMI and becoming overweight in children among Mexican American families. Maternal BMI and the maternal history of gestational diabetes were also significant predictors of increased infant BMI at birth. In addition, parent' BMI was related to birth weight and adiposity, further supporting the theory that genetics have some influence on weight.

Unhealthy behavior of children.

Unhealthy eating behaviors. Being overweight is a consequence of an energy imbalance where energy intake exceeds energy expenditure over a considerable period. Any imbalance of energy will result in a change in body weight. Energy density is also of concern as it is a key determinant of overall energy intake and therefore of body weight regulation. Both fat and carbohydrate are related to food energy density, although carbohydrate rich foods have lower energy density than fat rich foods. Energy dense foods are palatable and can be easily overeaten. In addition, fat and sugar consumption together, appears to have a synergistic effect and a strong influence on energy density (Livingstone & Rennie, 2006).

Nevertheless, the role of carbohydrate in relation to children overweight has also been considered to be inconclusive (Newby, 2007). In addition to evaluating the importance of energy and macronutrients in relation to overweight children, consumption of some food groups such as snacks and sweet beverages, and eating patterns, have been shown to be linked to the development of children overweight.

Snack foods are known to be higher in energy density with high saturated fat and low vitamin and mineral levels (Kontogianni et al., 2010).

Children prefer high calorie food over high fiber food as they learn to associate the taste of these foods and eating when they are hungry. However, as a result of cross-sectional studies, it is difficult to determine whether children are overweight because they have difficulty in regulating intake and consume high fatty food. The relationship between children's status and macro-nutrient composition of the diets has been reported, in which overweight children consume diets that provide a greater proportion of energy from fat (Wilfley, Stein et al., 2007).

Regarding soft drinks that are ready to use and drinks, carbonated or containing sugar or intense sweeteners, the trend in soft drink consumption among children suggested that they may be replacing more nutritious beverages such as milk and possibly fruit juices. Soft drinks constitute of added sugar, for example, a 12-ounce (360ml) can of soft drink, contains eight to ten teaspoons of sugar (WHO, 2011). A study in 6-13 year old children found consumption of excessive sweetened drink was much more than that of milk. Thus, children who have a high level of sweetened drink consumption also have high energy intake and gain more weight (Davis & Carpenter, 2008).

Existing research has already documented how eating behavior effects change in children's weight. These factors include the child feeding method, the way in which parents regulate their children intakes as well as dietary composition, particularly, energy density of the diet. A study in Thailand demonstrated that a higher daily energy intake, fat intake, high-caloric food, and milk consumption correlated with becoming overweight or obese in the country (Mo-suwan, 2008).

Furthermore, results of a survey of eating behavior and nutritional status of grade 4-6 students in Bangkok show that children, especially girls consumed more high-fat foods and high-sugar foods or beverages and consumed vegetables less often than boys (Department of Health, Ministry of Public Health, 2005). This eating behavior was found to be a factor related to childhood overweight.

In conclusion, unhealthy eating behaviors are structured by a variety of individual behavior, knowledge, attitude towards behavior, and perceived behavior (Prelip, Wendelin, Thai, Kinsler, & Erausquin, 2011). To improve eating behavior by increasing knowledge on healthy eating, improving the skill of eating behavior should be consider (Pender, Murdaugh, & Parsons, 2011).

Lack of physical activity. The term physical activity refers to any body movement produced by skeletal muscle that results in a substantial increase over resting energy expenditure. Physical activity is a promising strategy to prevent overweight and obesity in children (Jansen et al., 2008). A child's level of physical activity is influenced by their socialization and their environment including home, school, and neighborhood (Hume, Salmaon, & Ball, 2005; Slawta, Bentley, Smith, Kelly, & Syman-Degler, 2008).

Moreover, the results from U.S. studies found that the age at which physical activity level begins to drop is around 10-12 years old (Smith et al., 2011). In Europe, a study of children aged 9 to 15 years old revealed that the amount of physical activity is related to age, gender, and country. The younger children were more active than the older children both for overall level of physical activity and moderate to vigorous activities. Males were more active and spent more time in activities of moderate intensity than females both at 9 years old and 15 years old

(Riddoch et al., 2004). In summary, the results from the above studies concluded that physical activity decreases with age, and that males are more active than females.

Increasing sedentary behaviors. An increasing number of studies suggesting that sedentary behavior may be partly responsible for the obesity epidemic in children. Common types of sedentary activities that are used in epidemiological studies on overweight are television viewing and video game/computer use. Cross-sectional studies evaluating the relationship between TV viewing and children overweight have reported an elevated risk of overweight development in children who frequently watch TV or have a TV set in their room.

Television (TV) viewing has been cited as one causative factor of children overweight (Thongbai, Fongkaew, Kennedy, Aree, & Patumanond, 2011). The impact of TV viewing on overweight reflects both the displacement of more vigorous activities, and food intake. Advertised food on TV are more frequently of high sugar and high fat content; a correlation among a number of hours of TV viewed by children and their requests for and consumption of advertised foods has been demonstrated (Wang et al., 2007).

Findings from longitudinal studies have confirmed that TV viewing is an independent factor of the change in the child's BMI (Cecil-Karb & Grogan-Kaylor, 2009). The effect of TV viewing showed that the metabolic rate during TV viewing was significantly lower than exercise time (Thunfors, Bradley, & Alexandra, 2009). Generally, energy expenditure is higher in obese children than in lean children, but is similar after adjustment for differences in body size. Excess weight gain occurs in obese children because of they often spend less time in active physical activities but more time in sedentary activities.

Parental Factors

Parents play a significant role in developing unhealthy eating habits and sedentary behaviors which place the child at risk for overweight or obesity (Ventura & Birch, 2008; Thongbai, 2011). Intervention studies that include the family generally yield better outcomes. Unfortunately, the knowledge of parenting practice on the development of overweight children in Thailand is extremely limited. Nevertheless, other family factors such as parenting practice related to eating behavior, physical activity and sedentary behavior have also been reported to correlate with overweight in children (Epstein et al., 2007).

Furthermore, parenting eating style may influence the eating behavior in children. Snack food intake was significantly correlated between parent and child. Children had higher intakes of both healthy and unhealthy snacks if their parents reported greater attempts to control their child's diets. These parents also had higher dissatisfaction with their own body images. When parents tried to control the food intake of children such as offering one food as reward for eating another food, it often resulted in the opposite effect intended with preference for the distasteful healthy food decreasing and preference for the reward food increasing (Galloway, Fioritio, Francis, & Birch, 2006). A study examined parental perceived responsibility for child's eating, parental perceptions of the child's weight, and parents' own eating patterns. This study found that among parents in France, monitoring was associated with parental perceived responsibility for child's eating, parental restrained eating, and parents' desire for their child to be thinner. Restriction of foods for reasons of body weight was more prevalent in France while the use of foods for unhealthy eating behavior

was more prevalent in the United States (De Lauzon-Guillain, Musher-Eizenman, Leporc, Holub, & Charles, 2009).

Similarly, the study examined the socio-cultural differences between the United States and France in levels of feeding practices and the relationships between parent and child BMI and parental feeding practices in both cultural contexts. The study found that parental feeding practices such as monitoring, modeling of healthy eating habits, and use of food as a reward was associated with child BMI in both countries (Musher-Eizenman, de Lauzon-Guillain, Holub, Leporc, Charles, 2009). In Thai society, most parents use all three methods of childrearing, but the permissive style is the most favored method. This style is appropriate to help the children into using reasons for decision making in behavioral events.

According to Bandura (2000), parents were role models for children's habits. Similarly in a study by Kim et al (2008) children who consumed more fruit and vegetables had parents who consumed more fruits and vegetables. According to this evidence, it can be concluded that eating behavior and physical activity levels of children and adolescents are shaped by parental behavior. Parents provide the children with a contextual environment that can help them to become well-adjusted adults, including minimizing problem behaviors and maximizing self-efficacy and emotional, personal, and cognitive development. Furthermore, Thailand has changed in its social and economic structures during the past three decades. These changes encourage the consumption of excess energy and discourage energy expenditure.

Environmental Factors

The environment is a factor in the increasing overweight epidemic. Overweight children are affected by peers, school, mass media and advertising

Peers. A major influence on children's behavior is their friends. They spend a large amount of time eating with friends. It means that friends are an important determinant in food selection and acceptability (Elder et al., 2010). In addition, children also see a change of social support from parents to friends (Ventura et al., 2008). A result from an investigation carried out by Attakrisna (2005) found that a factor that leads to eating junk food in children is encouragement from friends.

School. School can play an important role in children health behaviors because they spent most of their time at school (Jansen et al., 2010). Therefore, the school food environment such as the shop in school will have an impact on children's food choice and dietary quality. The study of Chotibang et al. (2008) show that the school policy, school had organized activities to promote healthy eating behaviors under Health Promoting School project, which related to overweight intervention in children including school curriculum teaching, and organizing a healthy eating promotion program

Most children spend their time in the school so therefore school can play an important role in forming children health behavior. For example, the school food environment can influence children as to which food they select. Thus, schools should be promoting healthy eating behavior to children by improving the curriculum, and changing the school food environment to help children achieve good health.

Mass media and advertising. Mass media and advertisement are another aspect of environmental factors that influence health behavior (Pender et al., 2011). The effectiveness of advertising relies on recognition memory rather than recall. These can affect a person's decision making when selecting things. Advertisement particularly aimed at children is a big business that has spent more money on promoting high-fat/energy-dense foods than on promoting healthy foods (WHO, 2011). Food advertising promoted more consumption of less healthy foods and unhealthy snacks, which leads to choosing less vegetables and fruit (Taylor et al., 2006). Advertising food does not only increase children's desire for high calorie foods but also fosters belief that the food consumption behaviors are not related to becoming overweight, as the actors in advertisements have normal weight (Taylor et al., 2006).

Advertising during children's programs can affect the beliefs, attitudes, and buying behavior of children and adolescents. It can also influence family relationships, self-esteem, eating habits, and behavioral decision making and choice (Kaufman & Karpati, 2007). The effectiveness of advertising relies on recognition memory rather than recall. Recognition of a brand in advertising can affect a person's decision when faced with a buying choice.

Individual-Based Intervention Program

This review of scientific literature, conducted to identify the effective individual-based intervention programs that were designed to reduce problems of overweight in children were accumulated from January 2002 to August 2012 by using a computer-assisted search such as Medline (PubMed), CINAHL, Cochrane Controlled Trials Register (CCTR), ScienceDirect, and ProQuest search resources. The search was conducted using the key words overweight, children and individual, intervention, nutrition, eating behavior. The designs of any studies were reviewed (randomized control trials and non-randomized studies).

Individual-Based Intervention Programs for Overweight Children

Individual-based interventions are interventions that are customized to individual characteristics such as dietary intake behaviors and levels of physical activity. Individual-based interventions have limited supporting evidence (ADA, 2006). The components of these types of intervention included dietary counseling and behavioral counseling. These interventions are concerned with the change of knowledge, attitude, belief, and behavior of an individual. Moreover, individual-based interventions have higher efficacy and provide support to make behavioral change possible (Chen et al., 2008). Usually, interventions had some success in improving dietary intake and increasing physical activity level in children when delivered by mail and phone (Chen et al., 2008). Furthermore, the benefits of a mailing or phone program and/or individual consultations can enhance the individual specific needs because this type of intervention develops a nurse-patient, or researcher-participant,

alliance (Davis & James, 2007; Sherwood et al., 2006). In summary, individual-level programs result in more effective intervention than family, school, and community in health outcomes such as weight loss and improvement of health behaviors, have higher efficacy and provide strong enough support to change behavior (Woolfolk et al., 2006).

A small number of studies focus on individual-based in Thailand had conducted in clinical unit. Most strategies to prevent childhood overweight have been conducted in the United States, the United Kingdom, and Norway. The grade range of these interventions has been from grade 4 to 12, exclusively targeting elementary school children. The development of healthy eating behavior is particularly important in elementary school because it is here that children often develop their first unhealthy behaviors such as eating junk food, skipping meals, drinking carbonated and sweetened beverages, eating small amounts of fruit and vegetables, and eating unhealthy snacks.

Most interventions consist of programs to deliver nutritional education, promote physical fitness, provide school food services, promote sales of healthy snacks, and to reduce time spent watching television (Araújo-Soares et al., 2009; Chen et al., 2008; Gratton et al., 2007; Jansen et al., 2010). At this level, individual-based intervention programs can be successful in changing children's behavior because personal information can be updated continuously (Woolfolk et al, 2006) and individual-based intervention can help children attain their full educational potential and provide them with skills, and social support (Chen et al., 2008).

Most of the interventions have been conducted to help overweight children reduce their fat mass and maintain a more healthy weight. Each intervention was

based on different health behavior theories, for example Social Cognitive Theory (SCT) (Chen et al., 2010; Davis & James, 2007; Foster et al., 2008; Jamelske et al., 2008). Another theory which has been widely applied to many health behavior interventions is the Theory of Planned Behavior (TPB) (Araújo-Soares et al., 2009; Blanchard et al., 2009; Gratton et al., 2007; Jansen et al., 2010; Prelip et al., 2011, Smith, 2011). TPB is based on an individual's intention to perform a behavior or a person's level of motivation to determine their own behavior (Ajzen, 1991, McCormack, 1999). According to this theory, intention is determined by attitude which is determined by the individual's beliefs, subjective norms and perceived behavioral control. Several studies have shown that the TPB successfully predicts food choice intentions and healthy dietary behavior among children (Choyhirun et al., 2006, Fila & Smith, 2006; Hewitt & Stephens, 2007).

The successful strategies of individual-based intervention are: 1) reinforcement of motivation, self-monitoring, and goal setting; 2) enhancement self efficacy, by promoting healthy eating behaviors and increasing physical activity; 3) encouragement of behavioral modification, by increasing energy expenditure and healthy dietary intake, promoting moderate-to-high amounts of physical activity in each child, and extending practice of health-related physical activity during and after school; and, finally, 4) modification of attitude, subjective norms, and perceived behavior control.

Barriers to the success of these interventions include the difficulty of establishing regular healthy eating habits, difficulty to increase intention to develop other healthy eating behaviors not restricted to fruit and vegetable consumption in overweight children, and difficulty to influence attitude and behavior intention tailored to the individual (Araújo-Soares et al., 2009; Blanchard et al., 2009; Gratton

et al., 2007; Jansen et al., 2010; Kellar & Abraham, 2005; Prelip et al., 2011). In conclusion, the outcomes of the intervention programs were successful in terms of increasing healthy food, fruit and vegetable intake, and maintaining or decreasing the child's body weight.

In addition, some findings of this review are 1) individual-based intervention can reduce obesity in overweight children; 2) individual-based interventions can improve the fitness, nutrition intake, and self-efficacy of overweight children; 3) intervention lengths among studies reviews ranged from three months to three years, and intervention of all lengths successfully reduced obesity in overweight or obese children; 4) some evidence suggests that shorter treatment periods may be associated with larger treatment effects.

Individual-Based Intervention Programs on Intention to Perform Eating Behavior with Application of Theory of Planned Behavior

The literature regarding an individual-based intervention, which was reviewed above, provides the rationale for this study. Individual-based intervention can help children understand their situations, increase awareness, and also encourage children to modify their attitude and behavior in order to maintain appropriate eating behaviors by proposing their own objectives, self-monitoring, stimulus control, dietary restraint, cognitive restructuring, and setting behavioral goals rewards (Chen et al., 2010). Moreover, other studies suggest that attitudes, subjective norms, and perceived behavioral control have a direct affect on overweight children's intention to perform eating behaviors for weight control. Barrier of previous studies was difficult

to employed subjective norms as a basis for the intervention in children, difficult to increase intention to have healthy eating behaviors, and difficult to influence attitude and behavioral intention in an individually tailored manner to the overweight children (Araújo-Soares et al., 2009; Blanchard et al., 2009; Fila & Smith, 2006; Gratton et al., 2007; Jansen et al., 2010).

Opportunities for future study include the testing of effective interventions to promote healthy eating behaviors for weight control by addressing the TPB framework as an important factor. TPB is the theory which contended attitude toward behavior, subjective norm regarding behavior, and perceived behavior control to a person's intention to perform behavior (Ajzen, 1991). Individual-based intervention programs have been strongly recommended as the major strategy for obesity prevention and reduction program (Blanchard et al., 2009; Choyhirun et al., 2006; Hewitt & Stephens, 2007).

Hence, TPB framework was adapt as an individual-based intervention among overweight children in Thailand by allowing them to set their own goals about eating behavior for weight control. The present study will extend the scope of the TPB framework by applying them to overweight children in an individual-based intervention. The intervention will be conducted to modify attitudes toward eating behaviors for weight control; modify subjective norms regarding eating behaviors for weight control; and to modify perceived behavioral control toward eating behaviors; and influence children to increase intention to perform eating behavior for weight control. The strategies will include motivation, self awareness, self- regulation, self-monitoring, cognitive restructuring and stimulus control.

Theoretical Framework

The Theory of Planned Behavior (TPB) (Ajzen, 1988, 1991) is used as a framework to guide this study. According to Ajzen and Manstead (2007), behaviors such as eating behavior are influenced by one's attitude towards the behavior, subjective norms and perceived behavioral control. Attitude toward the behavior, defined as an individual's positive or negative evaluation of performing the behavior, is determined by behavioral beliefs, the subjective probability that the behavior will produce a given outcome. Similarly, subjective norms, the individual's perception of social pressure to engage or not to engage in a behavior, are determined by normative beliefs, the perceived behavioral expectations of important referent individuals or groups. Perceived behavioral control, the perceived easy or difficulty of performing the behavior, is determined by control beliefs, the perceived presence of factors which may facilitate or impede performance of behavior. The direct path from perceived behavioral control to definite behavior is expected to emerge only when there is agreement between perceived behavioral control and the person's actual behavioral control. These three factors determine one's intention to perform the behavior, or the indication of how hard one is willing to work, or the effort one plans to give in order to perform the behavior (Ajzen, 1991). Actual behavior occurs when individuals recognize that they have sufficient control over the behavior in question, and thus are expected to carry out their intentions (Ajzen & Manstead, 2007). This theory suggests that behavioral intention and perceived behavioral control are direct antecedents to the behavior, given that the individual has actual control over the behavior, which

includes having the necessary skills, resources and other prerequisites necessary to perform the behavior (Ajzen, 1991).

In TPB, the behavioral intention is determined by attitude toward the behavior, subjective norms, and perceived behavioral control. An individual's behavioral beliefs regarding the consequences of eating behavior, weighted by the value the individual places on the behavioral outcomes, determine one's attitude towards the behavior (Ajzen & Manstead, 2007). Normative beliefs, which are the perceived expectations and social pressures of important persons such as family members and friends, determine the influence of subjective norms (Ajzen, 1991). Ajzen and Manstead (2007) posit that subjective norms, both injunctive (perceived expectations or social pressures of important persons such as family members and close friends) and descriptive (the influence the important person has if they actually perform the behavior in question), are influential to the child as these normative beliefs, as well as the motivation to comply with these important persons' expectation.

According to Ajzen and Manstead (2007), there are two control beliefs regarding perceived behavior control: the first is the belief strength and the second is the belief of power. The belief strength is the belief in the availability of objects that will help or prevent the behavior, whereas the belief of power is how much that item will help or hinder the behavior if present (Ajzen, 1991). Perceived behavioral control is the perceived ease or difficulty of performing the behavior which is determined by control beliefs. Thus, individuals will intend to perform a behavior when they evaluate it positively and when they believe that significant others approve they should perform it and when they believe that it will be easy to perform.

This study was an individual-based approach to modify eating behaviors of overweight children. It is important to first modify the attitude towards eating behaviors for weight control. This is achieved by modifying perception and belief through various forms of media, and the positive and negative potentials of such adjustments in combination with providing the essential knowledge of problems associated with overweight body conditions. Secondly, modified perception of social norms regarding eating behaviors for weight control must be provided for the children to have a clear understanding of the social norms associated with gaining weight. Thirdly, it is necessary to influence the children's perceived behavioral control towards eating behaviors by allowing the individuals to be aware of their potential to achieve the desired eating behavior. Fourthly, goals must be set by the children to change their eating behavior. Once children perceive their behavior and the normative beliefs behind them, it is easy to set goals for eating behaviors with planned objectives for the children to follow. It is also important that the children not only set goals and objectives but that they also monitor those goals themselves so that the individual chooses to follow their plan.

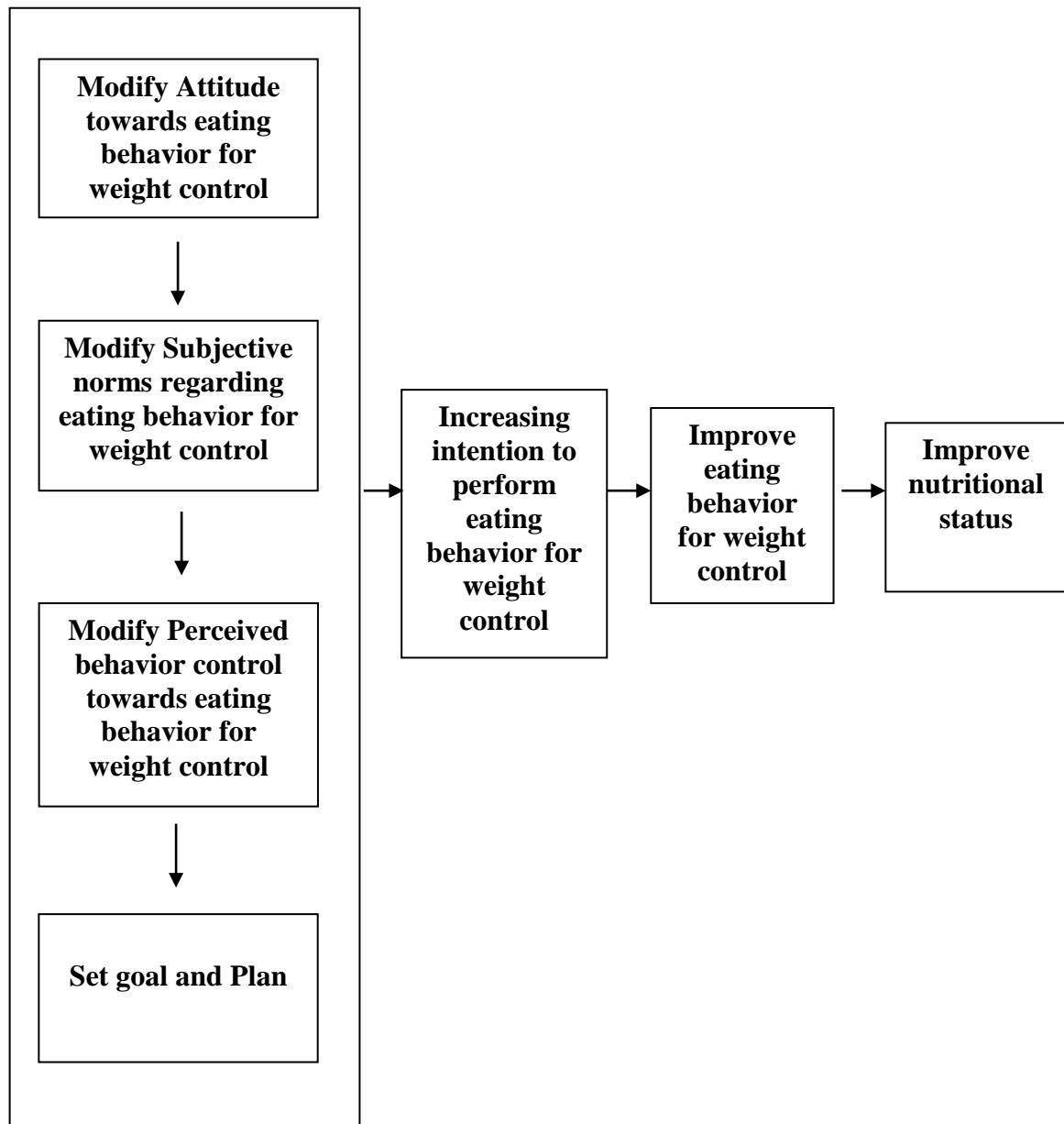


Figure 2-1. The conceptual model of an intervention on Intention to Perform Eating Behavior for Weight Control, Eating Behavior, and Nutritional Status Among Overweight Children