

**A REVIEW ON BODY WEIGHT PERCEPTION AND ITS ASSOCIATED FACTORS  
AMONG ADOLESCENTS IN MALAYSIA AND WORLDWIDE**

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**INTRODUCTION**

Body weight perception differs according to how the individual describe their body figure. Some may underestimate their weight while the other may overestimate it. Wrong body weight perception may lead to various complications. Those who underestimate their body weight may end up with complications such as obesity and obesity related morbidity. Meanwhile, those who overestimate their body weight may engage in unhealthy eating habit such as anorexia nervosa and bulimia. This is a major concern especially among adolescents in which they are in a crucial period of life and may not yet mature enough to make the best decision in particularly with regard to their health and health-related behavior. More importantly, several studies found psychological impact related to body weight perception. Depression and anxiety can be caused by the negative psychological effects of poor body image and distorted perception of body weight. Result from a study done among Chinese adolescents revealed that perceived overweight boys and girls were more likely to experience anxiety and depression as compared to those who perceived their body as normal and underweight.<sup>[1]</sup> A study in United States among high school students concluded that perceiving oneself as very underweight or very overweight was related with greater risk for suicidal attempts.<sup>[2]</sup> Therefore, this review aimed to discuss on the previous studies done investigating the prevalence and associated factors of body weight perception among adolescents in Malaysia, Asia and worldwide. It is hoped that this article will give us a better understanding regarding adolescent's body weight perception and shall help us to plan future healthy lifestyle intervention necessary aiming for our adolescents' population.

**Classification of body weight perception**

The classification of body weight perception is not uniform even though it has been defined numerously in literatures. Hence, it increased the difficulty to analyze findings among those studies. Most of the literary works categorized body weight perception into "very underweight, underweight, about the right weight, overweight, or very overweight,<sup>[2-5]</sup> Some of them described it in different ways as "severely under, mildly under, normal, mildly over, or severely overweight"<sup>[6]</sup> "much overweight, somewhat overweight, normal, somewhat underweight, or much underweight,<sup>[7]</sup> "extremely overweight, overweight, normal, underweight, or extremely underweight,<sup>[8]</sup> and "much too thin, a little too thin, just right, a little too fat, or much too fat".<sup>[9]</sup>

Meanwhile, a few studies divided body weight perception just into three groups which were "underweight, about the right weight, or overweight".<sup>[10]</sup> and "too fat, about the right weight, or too thin".<sup>[11,12]</sup> Most of the studies done in Malaysia used modified version of contour drawing rating scale which

comprised of nine line pictures of one's bodies which were arranged and numbered from 1 = smallest to 9 = largest.<sup>[13]</sup> Despite the fact that body weight perception is determined according to different categories, however, a lack of agreement among categorical classification increases the difficulty to synthesize findings across studies.

**Previous studies on body weight perception**

Numerous studies had been done previously to reflect the relationship between body weight perception and body weight status using BMI. Of these, several studies represented Malaysian adolescent samples.<sup>[14-19]</sup> and some represented adolescent samples from other Asian countries such as South Korea.<sup>[20-22]</sup> China.<sup>[1,6,23]</sup> India.<sup>[24-26]</sup> Saudi Arabia.<sup>[27]</sup> Lebanon.<sup>[8]</sup> Taiwan.<sup>[9]</sup> Australia.<sup>[28]</sup> Bahrain.<sup>[29]</sup> Iran.<sup>[30]</sup> Sri Lanka.<sup>[31]</sup> Globally, most of the studies among adolescents were done in United State of America.<sup>[2,4,5,10,32-34]</sup> Other European countries including Finland.<sup>[35]</sup> Germany.<sup>[36]</sup> and the United Kingdom,<sup>[37]</sup> also contributed their parts.

All mentioned studies used cross-sectional method except two studies which were done in the United States.<sup>[32]</sup> and Western Asia<sup>[35]</sup> which used prospective, longitudinal design. As for the study population, from the six studies in Malaysia, only one study used large national sample size which was National School-based Nutrition Survey 2012.<sup>[19]</sup> Three studies involved university-aged students.<sup>[14,17,18]</sup> while other studies were done among school-based students<sup>[15,16]</sup> Most of the studies from United State of America included nationally representative samples of adolescents drawn from large surveys which included the following; three studies sampled participants from the Youth Risk Behavioural Survey (YRBS) from 1999 to 2001.<sup>[2,5,33]</sup> two from the National Longitudinal Study of Adolescent Health.<sup>[4,32]</sup> one from the National Health and Nutrition Examination Survey (NHANES)<sup>[10]</sup> and one from the National Educational Longitudinal Studies (NELS).<sup>[34]</sup>

Sample size of adolescents from these nationally representative studies ranged from 914 to 17,318 of adolescent males and from 485 to 9,309 of adolescent females. Of other mentioned countries, there were two studies represented nationally representative samples which were studies among adolescents in Bahrain.<sup>[29]</sup> and Finland<sup>[35]</sup> with sample sizes ranged from 504 to 50,046 adolescents.

The sampling methods that were used in all studies can be divided into non-probability (convenience) and probability (simple random, stratified random, and cluster) sampling methods. Three out of six Malaysian studies,<sup>[16-18]</sup> and several from the other countries.<sup>[6,20,28,36]</sup> used convenience sampling, a method that sustains a risk of bias greater than any other sampling method.

The representativeness of samples in the other studies increased due to the use of probability sampling methods.<sup>[2,4,5,8,10,29,32-34]</sup> Two of the mentioned studies used simple random sampling which is the most basic of probability designs.<sup>[8,9]</sup> On the other hand, the appropriate and more rigorous use of stratified sampling by a few studies enhanced the precision and representativeness of their findings.<sup>[10,29,34]</sup> Lastly, cluster sampling was used by a few other studies.<sup>[2,4,5,32,33]</sup> Use of cluster sampling usually has less accuracy than stratified sampling, its use however, was nevertheless appropriate in these studies. It is difficult to determine the sampling strategies used in two studies.<sup>[35,37]</sup> however, given that one of it is a nationally representative sample, it is possible to assume that some degree of random sampling was used to obtain these samples.<sup>[35]</sup>

A positive relationship between body weight perception and actual weight (BMI) among adolescents is obvious among Malaysian and non-Malaysian, but it was difficult to determine consistency across studies.<sup>[6,8,9,34,36]</sup> Strengths within the studies that reflect the direction of

this include that the one Malaysian study and United State study were nationally representative,<sup>[19,34]</sup> the used of probability sampling<sup>[8,9,34,36]</sup> Furthermore, all mention studies have relatively large sample sizes of adolescents ranged from 827 to 40011.

Despite these strengths, several restrictions exist among this limited number of studies, compromising the credibility of their findings. For example, only two studies based their BMI classifications on recommended age and gender centiles.<sup>[6,19]</sup> with three not addressing how BMI was classified.<sup>[9,34,36]</sup> In addition, all stated studies lacked reported validity and reliability of the questionnaire instruments used.

### Body weight perception among adolescents

While most of the studies reported positive correlations between body weight perception and BMI in sample of adolescents in Malaysia<sup>[19]</sup> United State.<sup>[34]</sup> Bahrain<sup>[8]</sup> Taiwan<sup>[9]</sup> and Germany,<sup>[36]</sup> none of these correlations were reported as statistically significant. In addition, a study reported only poor agreement (in females) and fair agreement (in males) between BMI and perceived weight in a convenience sample of Chinese adolescents.<sup>[6]</sup> Although one can conclude that a positive relationship exists between body weight perception and actual body weight (BMI) in adolescents, further rigorous research is required especially to determine if this relationship remains consistent by gender.

Among studies contemplating accuracy of body weight perception based on actual weight in adolescents, all of the possible outcomes were found. These were accurate perceptions, inaccurate perceptions in which they overestimate their actual weight or inaccurate perceptions in which they underestimate their actual weight. Across studies that reported the prevalence of adolescents with such perceptions of their weight, findings suggest that adolescents are most likely to have an accurate perception, followed by inaccurate overestimation, and then inaccurate underestimation of their weight based on BMI.

Results from a local study which involved nationally representing adolescents found that 51.2% correctly judged their own weight while 35.0% overestimated their weight and 3.8% of adolescents underestimated it.<sup>[19]</sup> Significantly, more overweight boys perceived themselves as underweight whereas significantly more normal weight girls felt they were overweight.<sup>[19]</sup> Nationally representative probability sample in United State of America indicated that 56.3% of the country adolescents accurately classified themselves in terms of actual body weight (BMI).<sup>[4]</sup> Similar finding in which 52.0% of adolescents with a normal-weight BMI perceived themselves as normal weight was reported in a study of a convenience sample of Australian adolescents.<sup>[28]</sup> Among females who were classified as overweight based on BMI, 90% of a nationally

representative sample of Finnish females accurately perceived themselves to be overweight.<sup>[35]</sup>

In one of two studies among adolescents of probability samples, 47.0% of those who perceived themselves to be overweight were actually not.<sup>[32]</sup> Meanwhile, a sample from another probability study in which approximately half of the sample inaccurately perceived their weight, 74.4% perceived themselves as heavier and 25.6% perceived their weight lighter than the actual body weight.<sup>[4]</sup> Nevertheless, these studies classified body weight perception differently.

Among other two convenience samples, one of them reported that of "normal" weight females, 43.0% inaccurately overestimated their weight and perceived themselves as overweight.<sup>[28]</sup> Similarly, in a sample of Korean adolescent females, 31.0% perceived themselves as overweight with only 1.5% were actually overweight based on BMI.<sup>[20]</sup> Although both studies used similar body weight perception classification, only one study used age- and gender-specific cut-off points to classify BMI.<sup>[28]</sup>

Previous researchers had described mutual relationship between body weight perception and body weight status. A study involved African-American school-aged adolescents have showed that there was poor kappa agreement among boys (Kappa = 0.32), and were significantly higher in girls group (Kappa = 0.53,  $p < 0.05$ ).<sup>[38]</sup> They had also explored the sensitivity and specificity of self-perceived of overweight status against actual BMI status. The sensitivity was very low (56.4%), although the specificity was high (92.2%). The sensitivity was remarkably lower in boys than in girls (38.7% vs. 69.2%,  $p < 0.05$ ), but the specificity was similar (93.3% vs. 91.3%,  $p > 0.05$ ).<sup>[38]</sup> However, findings from that study contradicted with a study done in Asian region among young to middle adolescents in which they found that body weight perception were not in an agreement with the actual BMI among mentioned group. That discrepancy was more marked in females (Kappa = 0.137) as compared to male respondents; where the strength of the corresponding agreement was fair (Kappa = 0.225).<sup>[6]</sup> Yet, while most of the studies focusing on that dual relation among young and middle adolescent, little have been found regarding how body weight perception actually related to body weight status in late adolescents group especially in the local setting.

#### **Factors associated with body weight perception**

Multiple sociodemographic factors were found to influence the self-perception of weight appropriateness. Based on a study done at East Malaysia among undergraduate students, it was found that a high percentage of the respondents misperceived their body weight status and it differs according to gender.<sup>[17]</sup> Females with BMI in the normal range who perceived themselves as underweight was twice than that for the males. However, more males who were underweight

failed to see themselves as what they were compared to the females.<sup>[17]</sup>

In addition, there were evidences suggesting that body weight perception is socio-culturally related. This is in particularly more obvious in Malaysia as it is a country with racial and ethnic heterogeneity. A study done among adult men and women in Kuala Lumpur revealed Malays, Chinese and Indians may have different body attitudes and preferences.<sup>[39]</sup> In term of body dissatisfaction, Chinese was found to have significant body dissatisfaction especially among their female adolescents. However, there was no difference noted in both Malays and Indian males and females teenagers.<sup>[40]</sup>

The association between marital status and body weight perception had been studied before among adult men and women in United States. Result from that study suggested that majority of the married and formerly married women more often perceived themselves as overweight and desired a lower weight, while men's marital status was generally not related with their weight-related perceptions.<sup>[41]</sup>

The socio-economic status of the family which is reflected by parental income is one of the major factors associated to the perception of the body weight. The data from a study done among school-going children in South India suggested that children with low socio-economic status family were more likely to perceive themselves as underweight and desired higher weight, while majority of higher parental income children recognized themselves as overweight and desired lower weight.<sup>[25]</sup>

Smoking among adolescents is a serious problem and can give rise to various complications especially cardiovascular and respiratory systems. Little had been mentioned in the literature regarding relationship between smoking status and body weight perception. In one study involved 3990 Canadian school students, it was found that weight perceptions were positively associated with smoking among female. The one who believed themselves to be overweight had more than 50% greater odds of being smokers compared to those who believed themselves to be of average weight or too thin.<sup>[42]</sup> Weight perceptions were not associated with smoking among males respondents.<sup>[42]</sup>

#### **CONCLUSION**

There have been numerous studies assessing the body weight perception among adolescents locally and worldwide. Despite this, the results were inconsistent. One consistent finding from our reviews was that adolescents were most likely to accurately perceive their weight based on their actual weight. The available literature however consisted of a limited number of studies in which statistical significance was not determined. In addition, the inconsistency of the methods used and the differences in classification of body weight perception as well as classification of BMI between

studies contributed to the limitation of the findings. The agreement between body weight perception and actual body mass index was relatively poor. These findings highlighted the importance of further intervention as both inaccurate overestimation and underestimation of body weight perception hold major impact on our adolescents.

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