

FACTORS ASSOCIATED WITH BODY WEIGHT MISPERCEPTION AMONG ADOLESCENTS: FINDINGS FROM ADOLESCENT NUTRITION SURVEY 2017

Nur Shahida Abd Aziz¹, Ruhaya Salleh¹, Syafinaz Mohd Sallehuddin¹, Mohd Hasnan Ahmad¹, Azli Baharudin¹.

¹Institute for Public Health, Ministry of Health Malaysia

**Corresponding author: Nur Shahida Abdul Aziz, BSc (Dietetic) USM, Centre of Nutrition Epidemiology Research, Institute for Public Health, Institutes National of Health, Ministry of Health, 40170 Shah Alam, Selangor. Email: nshahida5781@gmail.com*

<https://doi.org/10.32827/ijphcs.7.2.71>

ABSTRACT

Background: Body weight misperception refers to a perception of either underestimation or overestimation of own body weight irrespective of actual body mass index. This study aimed to determine body weight misperception and its associated factors among Malaysian adolescents.

Materials and Methods: A cross sectional study with two-stage stratified cluster sampling data was obtained from Adolescents Nutrition Survey 2017 which involved 40087 adolescents aged 10 to 17 years old. Socio-demography and body weight perception data were obtained using a self-administered questionnaire. Descriptive and logistic regression analysis using complex sample was performed for data analysis.

Result: Findings showed that among adolescents who were actually in overweight categories but misperceived themselves to be thin and normal was 49.3%. Logistic regression revealed that boys [aOR: 1.16 (95% CI: 1.089, 1.228)], primary school [aOR: 1.51 (95% CI: 1.393, 1.644)] and taking dietary supplement [aOR: 1.11 (95% CI: 1.048, 1.183)] were significantly associated with body weight misperception.

Conclusion: This findings should be utilised by relevant programme managers in developing school-based health promotion program through education or curriculum syllabus to inculcate healthy body image among the adolescent.

Keywords: Misperception, body weight, adolescents, youth, factors associated.

1.0 Introduction

Adolescence is a crucial age where individuals in this age range experience rapid physical and psychological growth. During youth, the body is going through a dramatic change, moving towards establishing an ideal body image as well as the formation of lifestyle (Lim & Wang, 2013, Sawyer & Cooke, 2004). Furthermore, cultural beliefs also contributed to the changes, thus resulting to the ever-increasing peer pressure on adolescents especially the female (Chisuwa & O'Dea, 2010, Lee & Lee 2000].

Misperception of the ideal body shape refers to the discordance between an individual's exact weight status and the perception of his/her weight status (Shagar et.al 2014, Ter Borgt et.al 2006,Combs M.M, 2009) and it often threatens the physical and mental health of adolescents during growth. Thin body shape is recognized as the standard of beauty and this attitude distorts the perception of and increases dissatisfaction with their body shape (Kim & So, 2014, Moon & Lee, 2009)

An Asian study from Korea stated 49.3% of Korean youth misperceived their weight status, both similar prevalence for under and over-estimation (Yan H et.al, 2018). Another study done in United State reported that overall 42.1% of adolescents misperceived their weight status with 35.3% underestimated and 6.8% overestimated their weight status (Ashlesha & Paul, 2015). In fact there are different perception by gender which misperception of body shape among girls was higher compared than boys and men (Sirirassamee et.al , 2018 , Saleem et.al, 2013). Greatest misperception of body weight was found among those who were in overweight and obese category most of them underestimated their body weight (Nada et.al,2017, Byeon H, 2015).

There are several factors that significantly associated with socio-demographics characteristics of the adolescents including ethnicity, gender, household income, eating habit, mother's and father's level of education factors and also self esteem (Shagar et.al 2014). Body weight misperception has been associated with body image dissatisfaction, unhealthy weight control practice, depression and low self esteem (Lim & Wang,2013 , Ali et.al ,2010). It has also been indicated that both over or under estimation of body weight is associated with health issues among adolescents and may affect adolescents' weight management behaviours (Yan et.al, 2018). Thus, dissatisfaction of an individual's body image often leads to misperception of own body weight, and lead to higher risk of eating disorder. This study aimed to determine the weight misperception and factors associated among adolescents in Malaysia.

2.0 Materials and Methods

2.1 Study design and sample size

This was a cross-sectional study with a multistage stratified cluster sampling design involving school-going adolescents aged 10 to 17 years old to ensure nationally representative. A list of primary and secondary schools from the Ministry of Education was taken as sampling frame for this study. Adolescent' enrolment data of 2016 from Standard 4 until Standard 6 (primary

school) and Form 1 until Form 5 (secondary school) were used. There were 7926 primary schools and 2688 secondary schools in 2016. Both public and private schools were included in the sampling frame. A total of 311 selected school were final include in this survey. From the selected school all classes were included in the sampling frame. To select classes from each selected school, a systematic random sampling was used and all students in selected classes were eligible to involve in the survey.

This study was approved by the Ministry of Health, Research and Ethics Committee and Ministry of Education Ethics Committee and also from relevant Ministry of Education at state and districts levels. Consent form was obtained from parents and the adolescents.

2.2 Data collection

Validated self-administered questionnaires were translated into the Malay language and back translated to English were used. This was to ensure the quality of the translation and the final version were approved by the NHMS 2011 Questionnaire Review Committee (Yusoff et.al, 2012). Socio-demography details of adolescent, which include information on physical activity/exercise, dietary intake, were assessed using self-report questionnaires. All explanation regarding questionnaire and anthropometry measurement was done by our trained research assistants and dietary practices questionnaires were done by selected Nutritionist in all states. A self-administered questionnaire of Body weight perception was consists of 6 questionnaires including body weight perception, action taken and factors motivate them to lose weight and to increase weight. Adolescent' confidentiality was ensured as the answer sheet was anonymous. The majority of the adolescent completed the questionnaires within 1 hour.

2.3 Measures

2.3.1 Body weight perception

Information on weight perception was obtained by asking adolescent how they describe their current body weight, whether underweight, normal, overweight or obese. This perception was then compared with their measured current BMI for age. Adolescent who rated themselves as underweight, normal, overweight and obese were scored as perceived underweight, normal, overweight and obese respectively. Misperception is defined as when the student perceived themselves different than their current body weight status, for example student who perceived their body weight was normal but current body weight situation actually was in overweight categories. These body weight categories were based on the referring from World Health Organization Growth reference 2007 (WHO 2007) [17]. Body Mass Index cut-off interpretation were Thinness: $<-2SD$, Normal: $\geq -2SD \leq 2SD$, Overweight : $>+1SD$ and Obesity : $>+2SD$.

2.4 Supplement intake

Information on supplement intake was obtained by asking adolescent whether they have taken any vitamin or mineral supplement daily.

2.5 Physical activity

A validated Self-administered Physical Activity Questionnaire for Older Children (PAQ-C) was used (Zaki et.al, 2016). This nine items questionnaire asked as to how many days during

the previous 7 days, they had to spent time on physical activity/sport in school and at home. Mean scored will categorized into 2 categories inactive and active. A mean score of 1 indicates low physical activity, whereas a mean score of 5 indicates high physical activity.

2.6 Data Analysis

Data analysis was done using SPSS version 21. The analysis was done according to the objectives, and dummy tables prepared. Complex samples analysis procedures were used in the analysis and was carried out at 95% confidence interval. For descriptive analysis, complex samples and frequency were used to identify the percentage of student for every socio-demography characteristic. Complex samples and crosstab were used to identify self perception based on current Body Mass Index (BMI) for age. Multiple logistic regression analysis was used to determine the factors associated with body weight misperception outcome variable as gender, age, supplement intake, and physical activity.

3.0 Result

3.1 Socio-demography characteristics

A total of 40,087 adolescents were involved in this study and 21451 (53.7%) of the adolescents had misperceived their current body weight. Characteristics of study population were summarized in Table 3.1. Based on demographic characteristics, adolescents who had body weight misperception were higher in urban (56.7%), among boys (52.1%) and secondary school (57.0%). Majority adolescent were among Malay 64.4% who had body weight misperception. Adolescents who had body weight misperception were 54.4% physically inactive and 53.0% was not taking any supplement.

Table 3.1: Socio-demographic characteristic of misperception among Malaysian adolescents (N:21451)

Socio-demography Characteristic	Total		95% CI	
	n	%	lower	upper
Locality of school				
- Urban	12475	56.7	49.6	63.5
- Rural	8976	43.3	36.5	50.4
Sex				
- Male	11015	52.1	50.0	54.1
- Female	10436	47.9	45.9	50.0

School category				
- Primary	7789	43.0	35.3	51.0
- Secondary	13662	57.0	49.0	64.7
Ethnicity				
- Malay	14914	64.4	59.5	69.0
- Non Malay	6537	35.6	31.0	40.5
Physically active				
- Active	9160	45.3	43.3	47.3
- Not active	10795	54.7	52.7	56.7
Taking supplement				
- Yes	9948	47.0	44.8	49.3
- No	11468	53.0	50.7	55.2

3.2 Self perception based on current Body Mass Index(BMI)

Table 3.2: Self perception of body weight and current Body Mass Index (unit: %)

Perceived body weight	Total			
	Current Body Mass Index			
	Thin (n=2545)	Normal (n=25198)	Overweight (n=6295)	Obese (n=5912)
Thin	69.6	32.2	15.1	14.4
Normal	26.4	50.2	34.2	18.6
Overweight	3.0	15.8	44.3	53.5
Obese	1.0	1.8	6.5	13.5

(Comparison between perception of body weight with current Body Mass Index status among adolescents)



Misperceived of their body

Table 3.2 show the result of self perception based on current Body Mass Index (BMI) for age. Results showed 30.4% among thin adolescents had wrong perception on their current body weight. About 49.8% adolescents in normal category were wrongly perceived their current body weight. While more than half, adolescents in overweight and obese category had wrong perception on their current body weight which 55.8% and 86.5% respectively.

3.3 Factors associated with body weight misperception

Table 3: Factors associated with body weight misperception among adolescents

Study characteristic	Total			
	n	Adjusted OR	95%CI	p
Locality of school				
- Urban	12475	-	-	0.298
- Rural	8976	1.038	0.968 - 1.113	
Sex				
-Boys	11015	1.157	1.089 - 1.228	0.001*
- Girls	10436	-	-	
School category				
-Primary	7789	1.513	1.393 – 1.644	0.001*
-Secondary	13662	-	-	
Ethnicity				
- Malay	14914	1.061	0.986 - 1.142	0.158
- Non Malay	6537	-	-	
Taking Supplement				
- Yes	9948	1.113	1.048 - 1.183	0.001*
- No	11468	-	-	
Physical activity				
- Active	9160	0.951	0.898 - 1.013	0.108
- Not active	10795	-	-	

* significant value at p-value = 0.05

Dependent variables; status misperception (reference: correct perception)

Logistic regression analysis was used to determine factors associated with body weight misperception among adolescents. Result in Table 3 show that boys were 1.2 times significantly more likely to misperceive on their current body weight compared to girls

(aOR=1.157, CI=1.089, 1.228). An adolescent who was in primary school was 1.5 times significantly more likely to misperceive their current body weight compared than secondary school adolescents (aOR=1.513, CI=1.393, 1.644). Adolescents who took dietary supplement were significantly more likely to have body weight misperception (aOR=1.113, CI=0.048, 1.183).

4.0 Discussion

This study provides a recent overview on current body weight misperception and factors that contribute to this misperception among adolescents. Results showed that prevalence of body weight misperception among adolescents, was 53.7% which higher than previous Malaysia School Based Nutrition Survey 2012 (48.8%) (Zainuddin et.al, 2014). Similarly, the prevalence was higher than other countries such as in Korea, 49.3% (Kim & So, 2014), Nigeria 33.4% (Ejike et.al,2017) but lower than China, 56.6% with same concept and definition which under or overestimate their bodyweight (Ejike et.al,2017)

This study shows that there were significant differences in socio-demography data which were sex, school category and taking supplement. Boys were 1.2 times significantly more likely to misperceive on their current body weight compared to girls. This probably because boys do not always measure their weight and does not mind their appearances or their body images compared than girls who put appearances or body images more importance (Ejike et.al,2017).However, nowadays both sexes give priority to self-appearance or body image. Naturally boys want to be more masculine while girls want to be slim and beautiful.

Another important finding, this study indicates that adolescents in primary schools were 1.5 times significantly more likely to misperceive their current body weight compared to secondary school adolescents. A possible explanation for these results may be the lack of knowledge regarding on status of their body weight or how to calculate their body mass index compared to those secondary adolescents (Brennan et.al, 2010). There are more expose to mass media information (Brennan et.al, 2010). Similar with other study in Minnesota stated that high grade students were less likely to have misperception of their current body weight (Chung et.al,2013 , Manios et.al, 2015). However, this finding was contrary to a study in Korea where high school girls' students were 1.06 times higher to misperceive compared to middle school students (Kim & So, 2014).

Further, findings showed that students who took supplement were more likely to misperceive their body weight for both sexes. This results was similar with an observation reported by Yan H et.al,2018 which showed that students who misperceived their body weight especially who underestimated their body weight was boys and taking supplement were more prevalent than who did not. However, this finding who were differed with other observation studies reported

where adolescents who misperceived their body weight were associated with unhealthy eating behaviour such as less fruits and vegetables consumption, taking supplements and drinking less milk in daily food intake (Sarafrazi et.al, 2014, Xie & Chou et.al 2006, Chen & Wang, 2012). It could be a trend or peer influence of taking supplement for beauty without knowing their current body weight situation. Therefore we should educate adolescents with the importance of monitoring body weight as this could related to others diseases and emphasize on healthy eating lifestyle.

There was an association between active adolescents and their body weight misperception especially among boys. Adolescents who were active less were likely to have misperception on their current body weight compared to those inactive ones. This result was contra with other study that reported adolescent who misperceived their body weight especially boys was also active in physical activity (Yan H et.al, 2018). A possible explanation related to gender norms where boys are more likely to involve in sport activity compared to girls which more concentrate on dieting.

The strength of our study, is that the fact that this study was based on recent nationally representative data throughout the whole state of Malaysia. Secondly, our study used current body weight measured to accurately classify Body Mass Index indices and not self reported by the adolescents. However, there are several limitations in our study. This study compared self-perception on body weight which is more subjective. Further, our study only examined socio-demographic factors and did not include other behavioural factors.

5.0 Conclusion and recommendation

In conclusion, sex, school category and taking supplement were the factors that associated with body weight misperception in this study. This finding should be utilised by relevant programme managers in developing school-based health promotion program through education or curriculum syllabus to inculcate healthy body image among the adolescents. Information on behaviour towards body image is also important in explaining and monitoring own body weight.

Acknowledgement

Ethical approval for this study was obtained from the Medical Research Ethics Committee, Ministry of Health Malaysia. Written consent form was obtained from all participants whom involved in this study.

The authors would like to thank the Director-General of Health Malaysia for his permission to publish this study. Appreciation to the Deputy Director-General of Health (Research and Technical Support) and the Director of the Institute for Public Health, for their support and technical advice throughout the various stages of the study. We also thank all individuals who directly or indirectly contributed to the success of this study.

Declaration

Author(s) declare that no potential conflicts of interest with respect to the research, authorship, and /or publication of this article.

Authors contribution

Author 1: responsible for the concept, project development and supervision, collated, summarized and reported the results.

Author 2,3,4,5: participated in collated, summarized and reported the results.

References

- Ali MM, Fang H, Rizzo JA.(2010) Body weight, self-perception and mental health outcomes among adolescents. *J Ment Health Policy Econ.*, 13:53–63.
- Ashlesha Datar, Paul J. Chung.(2016) Accuracy of Weight Perceptions in a Nationally Representative Cohort of US 8th Grade Adolescents. *Acad Pediatr.* , 16(3): 267–274. Published online 2015 Jul 22.
- Brennan MA, Lalonde CE, Bain JL.(2010) Body image perceptions: Do gender differences exist. *Psi Chi Journal of Undergraduate Research.*1;15(3):130-8.
- Byeon H.(2015) Association between Weight Misperception Patterns and Depressive Symptoms in Korean Young Adolescents: National Cross-Sectional Study. *PLoS One.* 10(8):e0131322.
- Chen, X.; Wang, Y.(2012) Is ideal body image related to obesity and lifestyle behaviours in African American adolescents? *Child Care Health Dev.*, 38, 219–228
- Chisuwa N, O'Dea JA.(2010) Body image and eating disorders amongst Japanese adolescents. A review of the literature. *Appetite*,1;54(1):5-15.
- Chung AE, Perrin EM, Skinner AC.(2013) Accuracy of child and adolescent weight perceptions and their relationships to dieting and exercise behaviours: a NHANES study. *Acad Pediatr.* 13:371-378
- Combs M.M.(2009) Body Perception among College Students and the Relation to Personal characteristics and health lifestyle behaviours, School of Allied Medical Professions.
- Ejike CECC, Eze KC, Onuoha NO.(2017) Nutritional Status, Weight Misperception and Body Weight Dissatisfaction in a Population of Young Adult Nigerians. *J Obes Weight Loss Therapy*, 7:339. doi:10.4172/2165-7904.1000339

- Kim S, So WY.(2014) Prevalence and socio-demographic trends of weight misperception in Korean adolescents. *BMC Public Health*. 14:452.
- Lee S, Lee AM.(2000) Disordered eating in three communities of China: A comparative study of female high school students in Hong Kong, Shenzhen, and rural Hunan. *International Journal of Eating Disorders*. 27(3):317-27.
- Lim H, Wang Y.(2013) Body weight misperception patterns and their association with health-related factors among adolescents in South Korea. *Obesity (Silver Spring)*. 21(12):2596–2603.
- Manios Y, Moschonis G, Karatzi K, et al. (2015) Large proportions of overweight and obese children, as well as their parents, underestimate children's weight status across Europe. The ENERGY (European Energy balance Research to prevent excessive weight Gain among Youth) project. *Public Health Nutr*. 18: 2183e2190.
- Moon SS, Lee YS.(2009) Comparison of dietary habits, exercise, recognized body shapes and weight control between obesity and underweight of adolescents. *Korean Journal of Human Ecology*. 18(6):1337-48.
- Nada A Alyousefi, Fatimah D Alqarni, Barah S Alqarni, Malak A Almutairi, Shahad I Almazroa, Yasmine M Alshehri, Nora A Alrowais.(2017) Association of weight misperception with weight loss attitudes, behaviors and psychological distress in Saudi adult population. *Biomedical Research* ; 28 (6): 2786-2795.
- Saleem MD, Ahmed G, Mulla J, Haider SS, Abbas M.(2013) Weight misperception amongst youth of a developing country: Pakistan-a cross-sectional study. *BMC Public Health*. 13(1):707.
- Sawyer SM, Cooke R.(2004) Eating disorders in adolescence: An approach to diagnosis and management. *Australian family physician*. 33(1-2):27.
- Shagar P, Shakiba N, Rahmah M.(2014) Factors associated with misperception of own weight status among 18-21 year old university students. *OSR Journal of Nursing and Health Science*. 3(5):25-31.
- Sarafrazi N, Hughes JP, Borrud L, Burt V, Paulose-Ram R (2014). Perception of weight status in U.S. children and adolescents aged 8 to 15 years, 2005-2012. *NCHS Data Brief*. , 158:1-7
- Sirirassamee T, Phoolsawat S, Limkhunthammo S. (2018) Relationship between body weight perception and weight-related behaviours. *J Int Med Res*.;46(9):3796–3808. doi:10.1177/0300060518780138
- Ter Bogt TF, van Dorsselaer SA, Monshouwer K, Verdurmen JE, Engels RC, Vollebbergh WA.(2006) Body mass index and body weight perception as risk factors for internalizing and externalizing problem behavior among adolescents. *Journal of Adolescent Health*. 1;39(1):27-34.

- Xie, B.; Chou, C.P.; Spruijt-Metz, D.; Reynolds, K.; Clark, F.; Palmer, P.H.; Gallaher, P.; Sun, P.; Guo, Q.; Johnson, C.A (2006). Weight perception and weight-related sociocultural and behavioral factors in Chinese adolescents. *Prev. Med.* , 42, 229–234.
- Yan H, Wu Y, Oniffrey T, Brinkley J, Zhang R, Zhang X, Wang Y, Chen G, Li R, Moore J.(2018) Body weight misperception and its association with unhealthy eating behaviors among adolescents in China. *International journal of environmental research and public health*, 15(5):936.
- Yusoff F., Saari R., Naidu B., Ahmad N., Omar A. , Aris T.(2012) Methodology of the National School-Based Health Survey in Malaysia, 2012. *Asia-Pacific Journal of Public Health* , 26:5.
- Zaki NA, Sahril N, Omar MA, Ahmad MH, Baharudin A, Nor NS (2016) Reliability and validity of the physical activity questionnaire for older children (PAQ-C) in Malay language. *International Journal of Public Health Research*. 31;6(1):670-6.
- Zainuddin AA, A. Manickam M, Baharudin A, Omar A, Siew Man C, Ambak R, et al.(2014) Self-Perception of Body Weight Status and Weight Control Practices Among Adolescents in Malaysia 2014.