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Body dissatisfaction and body weight status perception among overweight and obese children

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ABSTRACT

Children's perceptions of their weight, body image, and misjudgment of their actual body size can lead to body dissatisfaction, increasing health concerns related to childhood obesity. This cross-sectional study investigated the associations between body dissatisfaction and body weight status (BWS) perception among overweight and obese children aged 10 and 11 years. A total of 398 overweight and obese participants were selected and recruited from eleven primary schools in the state of Kedah, Malaysia. The questionnaire on body image perception was adapted from 'The seven male and female child figure rating scale,' and information on BWS perception was collected through a question on how respondents perceived their current BWS. The majority of children (89.4%) desired a smaller body size, and 55.5% did not perceive their BWS correctly; 50% were categorized as "underestimators," and 5.5% as "overestimators." There was no significant association between body size discrepancy score and age ($p=0.110$). However, a significant association was found between the perception of current body image and body mass index (BMI) ($p<0.001$). The high discrepancies between the perception of current body image and actual weight status need to be addressed, as this misperception could hinder overweight and obese children from successfully achieving a healthy body weight.

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1. INTRODUCTION

Body image perception refers to how an individual views or feels about their body shape and how they believe others perceive it [1]. Misperception of body image, which occurs when individuals either underestimate or overestimate their body weight, can have significant psychological consequences. This results in a perceived weight status that differs from their actual weight status [2]. The direction of weight misperception depends on the individual's weight status. For example, an individual with a healthy weight who perceives themselves as overweight is experiencing weight over-perception, whereas an individual with obesity who perceives themselves as having a healthy weight is experiencing weight under-perception [2]. Accurate body image is crucial for maintaining a healthy body weight.

Children's perceptions of their weight, thinness, and body appearance, as well as misjudgment of their actual body size, can lead to body dissatisfaction and exacerbate health concerns related to childhood obesity [3], [4]. Research shows that body image dissatisfaction among children tends to increase with age. Older children often select larger body figures as their current or ideal body shapes and believe that larger figures are more attractive to the opposite sex [5].

During puberty, both males and females often desire body shapes that align with societal ideals, such as a slim figure for women and a lean, muscular physique for men. Public figures and mass media frequently promote these "ideal" body shapes, which influence children and adolescents to misperceive their actual and ideal body weight [6]. Media-driven pressure to achieve thinness is a strong predictor of negative body image and can contribute to body dissatisfaction and disordered eating behaviors, particularly among females [7].

A cross-sectional nationwide study in Iran on body weight misperception and psychological distress among children and adolescents found that 59.1% of respondents misperceived their body weight status (BWS), which increased the risk of psychological problems, such as insomnia, feelings of worthlessness, and depression [2]. Perceived overweight status among young people, regardless of their actual weight, is associated with unhealthy weight control behaviors such as dieting, fasting, the use of diet pills, laxatives, self-induced vomiting, and binge eating [8]. Local studies in Malaysia have revealed that approximately 50% of boys and 42% of girls either overestimate or underestimate their weight [9]. Furthermore, body shape dissatisfaction and misperception of BWS are closely linked to weight management behaviors among Malaysian adolescents [10].

The National Health and Morbidity Survey Malaysia reported that among adolescents aged 10 to 14 years who accurately perceived themselves as overweight and were classified as overweight (82.4%), the intention to lose weight was higher among girls (85.3%) compared to boys (77.9%). This intention was also more prevalent among rural adolescents (86.1%) than their urban counterparts (80.1%) [11]. Similar trends were observed in the obese group, with 77.2% intending to lose weight, with girls (84.2%) showing higher rates than boys (69.7%), and rural adolescents (80.4%) exhibiting a greater intention compared to urban adolescents (75.4%).

This study focuses on overweight and obese children aged 10-11 years, a critical developmental stage where body image perceptions begin to form, influenced by factors such as social media, peer interactions, and family dynamics. Psychosocial factors, particularly body image perception, play significant roles in the development, prevention, and management of obesity [2], [12]. Understanding the impact of body dissatisfaction on obese children is essential for designing effective weight management programs. Despite the availability of studies examining the relationship between body image dissatisfaction and body mass index (BMI) in Malaysia [9]–[10], [13]–[16], there is a notable gap in research focusing specifically on overweight and obese primary school children (under 12 years old) in Kedah. Therefore, this study aims to assess the association between body dissatisfaction, body image perception, and body mass index among overweight and obese school children aged 10-11 years in Kedah.

2. METHOD

2.1. Design

A cross-sectional study was conducted to examine the associations between (BWS), body dissatisfaction, and body image perception among overweight (OW) and obese children in Kedah, Malaysia. Kedah is one of the states in Malaysia, which comprises 11 states, 2 territories, and 3 federal territories, and is located in the northern part of Peninsular Malaysia. A list of primary schools was obtained from the Kedah State Educational Department [17], and participants were selected using a multistage randomized cluster sampling technique.

2.2. Participants and recruitment

A total of 398 participants (221 boys and 177 girls) aged 10 and 11 years, or studying in standard 4 and 5, were recruited from 11 primary schools in Kedah. Eligibility criteria included being classified as OW (>+1SD to ≤+2SD) or obese (>+2SD) [18], obtaining written parental consent, and the ability of parents to read and understand Malay. Participants were recruited between March and September 2019 during visits to the selected schools for screening sessions. Teachers provided lists of OW and obese children based on National Physical Fitness Standard (SEGAK) test results. To ensure accuracy, a second screening involving anthropometric measurements was conducted before the participants completed the questionnaire. Body weight was assessed using a Seca 803 digital scale with a precision of 0.01 kg, while height was recorded with a Seca 213 portable stadiometer, accurate to 0.1 cm. Each measurement was repeated twice to reduce bias, and the mean values were used for the analysis.

2.3. Research instrument

Participants and their parents, after providing consent, were briefed on the study procedures. The body image perception questionnaire comprised two parts: perception of body size and perception of BWS. The questionnaire was adapted from the 'seven male and female child figure rating scale' [19], which demonstrated reliability coefficients of 0.71 and 0.59 for self and ideal self-figure selections, respectively. Separate figures for boys and girls were used to facilitate easier recognition.

Participants were shown the Contour Drawing Rating Scale, which depicted body sizes ranging from leanest (1) to heaviest (7), and asked to select figures representing their perceived current body size, ideal body size, and healthiest body size. Discrepancy scores were calculated by comparing the perceived actual and ideal body sizes. A positive discrepancy score indicated a desire for a larger body size, a negative score indicated a desire for a smaller body size, and a score of zero indicated satisfaction with the current body size. BWS perception was assessed by asking participants how they perceived their current BWS. These responses were compared to their actual BMI to determine the accuracy of their BWS perception, classifying participants as correct estimators, overestimators, or underestimators.

2.4. Ethical approval and confidentiality

To ensure confidentiality, participant data were anonymized using specific identification numbers. No personal identifiers were used in any publications or presentations resulting from this study. Ethical approval was obtained from the Research and Ethics Committee of the Ministry of Health (NMRR-19-577-45778(IIR)) on July 16, 2019. Additional approvals were granted by the relevant district and state educational departments, as well as the participating schools.

2.5. Statistical analysis

The data were analyzed using SPSS version 25.0 for Windows. Descriptive statistics were utilized to summarize variables including sex, ethnicity, BMI, and perceived body image. The Chi-square test was employed to assess associations between categorical variables, and independent sample t-tests were conducted to compare mean values between the overweight and obese groups. A p-value of less than 0.05 was considered statistically significant.

3. RESULTS

The study sample was multi-ethnic, with the largest population being Malay children (97.7%), followed by Indian (0.3%) and others (2%, Siamese). All participants were between 10 and 11 years old, with a mean age of 10.57±0.50 years, and most (61.6%) were from urban areas. Table 1 shows the distribution of socio-demographic factors and BMI classification of the participants. Chi-square analysis revealed a significant association (χ^2=9.843, p=0.002) between boys and girls in BMI classification. Girls had a higher percentage (58.3%) in the overweight (OW) category, while boys comprised 59.9% of the obese category. The percentage of obese participants was higher among those from urban schools compared to rural schools. Most parents had attained a minimum of secondary education. School locality (χ^2=8.49, p=0.004) and father's education level (χ^2=6.61, p=0.037) were significantly associated with participants' BMI. No significant association was reported between age (10 and 11 years old), school locality, household income, mother's educational level, and participants' BMI.

Table 1. Distribution of respondents based on socio-demographic factors and BMI

Characteristics	OW n (%)	Obese n (%)	p (X^2)
Sex			
Boys	40 (41.6)	181 (59.9)	0.002*
Girls	56 (58.3)	121 (40.1)	(9.843)
Standard (Age)			
4 (10 y/o)	41 (42.7)	132 (43.7) 170 (56.3)	0.863
5 (11 y/o)	55 (57.3)		(0.030)
School locality			
Urban	47 (49.0)	198 (65.6)	0.004*
Rural	49 (51.0)	104 (34.4)	(8.487)
Household Income			
<RM3,860	61 (63.5)	196 (64.9)	0.735
RM3,860–RM8,319	26 (27.1)	85 (28.1)	(0.617)
>RM8,319	9 (9.4)	21 (7.0)	
Mother's educational level			
Not formal	3 (3.1)	1 (0.3)	0.099
Primary	3 (3.1)	6 (2.0)	(6.276)
Secondary	67 (69.8)	215 (71.2)	
Tertiary	23 (24.0)	80 (26.5)	
Father's educational level			
Not formal	1 (1.0)	0 (0.0)	0.049*
Primary	6 (6.3)	6 (2.0)	(7.873)
Secondary	66 (68.8)	225 (74.5)	
Tertiary	23 (24.0)	71 (23.5)	

Chi-square analysis. *p<0.05; 1USD=RM4.2
Classification of income categories B40 (<RM3,860), M40 (RM3,860 – RM8,319), T20 (>RM8,319)

Table 2 shows the mean body weight and height of boys as 53.58±12.40 kg and 1.43±0.07 m, respectively, while the mean body weight and height for girls were 54.19±10.54 kg and 1.45±0.07 m, respectively. The mean BMI of participants was 25.75±4.02 kg/m², with boys having a mean BMI of 25.93±4.25 kg/m² and girls 25.51±3.71 kg/m². From Chi-square analysis, there was a significant association (χ^2=9.843, p=0.002) between boys and girls in BMI. Girls were 31.6% higher in the OW category, while 81.9% of the obese category were boys.

Table 2. Mean ± SD and distribution of respondent's BWS and sex

Characteristics	Boys Mean±SD	Girls Mean±SD	Total Mean ±SD	t-value	p-value
Anthropometry					
Weight (kg)	53.58±12.40	54.19±10.54	53.85±11.60	-0.44	0.663
Height (m)	1.43±0.07	1.45±0.07	1.44±0.07	-2.27	0.024*
BMI (kg/m^2)	25.93±4.25	25.51±3.71	25.75±4.02	0.65	0.513
	n (%)	n (%)	n (%)	x^2	p-value
BMI (kg/m2)					
Over weight	40 (18.1)	56 (31.6)	96 (24.1)	9.843	0.002*
Obese	181 (81.9)	121 (68.4)	302 (75.9)		

Chi-square analysis, independent t-test *p<0.05, ** p<0.001

Table 3 indicates that older participants desired to have a smaller body size; however, there was no significant association between age and body size discrepancy score. Overall, 90% of participants were not happy with their body size, with 89.4% desiring a smaller body size. Almost 10% of participants were satisfied with their body size, while 1% desired a bigger body size. The mean value for the discrepancy score was -1.38±0.88. Participants' perception of their current BWS was compared to their actual BWS (BMI-for-age) and classified into 'correct estimator,' 'over estimator,' and 'under estimator' categories. Approximately 50% and 5.5% of participants were categorized as "under estimators" and "over estimators," respectively, as they did not perceive their BWS correctly as shown in Table 4. Meanwhile, 45% of participants correctly perceived their BWS, categorizing them as "correct estimators."

Table 3. Distribution of respondents by body size discrepancy score

Body size discrepancy score category	10 y/o n (%)	11 y/o n (%)	n (%)	p (x^2)
Positive (discrepancy score > 0)	0 (0.0)	4 (1.8)	4 (1.1)	4.409
Negative (discrepancy score < 0)	153 (88.4)	203 (90.2)	356 (89.4)	(0.110)
No discrepancy (discrepancy score = 0)	20 (11.6)	18 (8.0)	38 (9.5)	Mean ± SD
Total	173 (100)	225 (100)	398 (100)	-1.38 ± 0.88

Chi-square analysis, *p<0.05

Table 4. Comparison of respondent's BWS perception and actual BWS (BMI for age) by 'correct estimator', 'over estimator' and 'under estimator' category

Actual BWS (BMI) n (%)	Perceived current BWS n (%)			
	Underweight	Normal weight	OW	Obese
	23 (5.8)	0 (0.0)	236 (59.3)	139 (34.9)
Overweight 96 (24.1)	12 (3.0%) [UE]	0 (0.0%) [UE]	62 (15.6) [C]	22 (5.5) [OE]
Obese 302 (75.9)	11 (2.8%) [UE]	0 (0.0%) [UE]	174 (43.7) [UE]	117 (29.4) [C]

Crosstab analysis; Categories of body weight perception: C – Correct estimator (179, 45%), OE – Over estimator (22, 5.5%), UE – Under estimator (197, 49.5%)

Table 5 shows the distribution and association between body image perception and BMI. The children mostly chose body image number 5–7 on the Child Figura Rating Scale as their current body image as shown in Figure 1. However, 19% of OW children and 20% of obese children chose image number 1 – 4 on the Child Figura Rating Scale as their current body image. There was a significant association between perception of current body image and BMI (χ^2= 14.29, p<0.001). Image number 1-4 (on the Child Figura Rating Scale) were chosen as the ideal body image by the majority of OW (85.4%) and obese (84.4%) children under BMI. There was no significant association between perception of ideal body image and BMI. The majority of OW and obese children chose image number 1–4 (on the Contour Drawing Rating Scale) as their perceived healthy

body image. However, 15.6% of OW children and 15.2% of obese children considered image number 5–7 (on the Child Figura Rating Scale) as a healthy body image. There was no significant association between different perceptions of healthy body image and BMI (χ^2=0.009, p = 0.926).

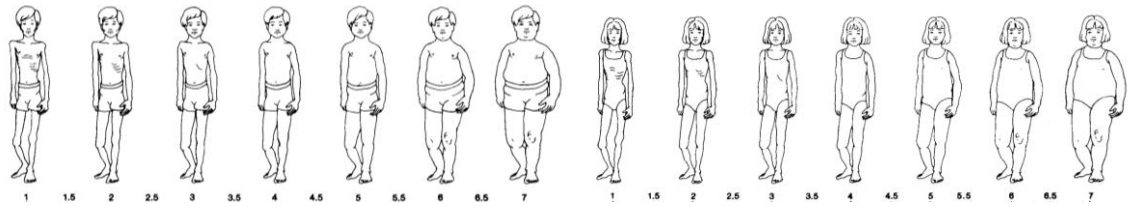

Figure 1. The child figure rating scale adopted from Collin [19]

Table 5. Distribution of respondents according to the perception of current, ideal, healthy body size figure and BMI

Body figure perception	BMI		p
	OW n (%)	Obese n (%)	(x2)
Current body size*			
1 - 4	19 (19.8)	20 (6.6)	<0.001
5 - 7	77 (80.2)	282 (93.4)	(14.29)
Total	96 (100)	302 (100)	
Ideal body size			
1 - 4	82 (85.4)	255 (84.4)	0.816
5 - 7	14 (14.6)	47 (15.6)	(0.054)
Total	96 (100)	302 (100)	
Healthy body size			
1 - 4	81 (84.4)	256 (84.8)	0.926
5 - 7	15 (15.6)	46 (15.2)	(0.009)
Total	96 (100)	302 (100)	

Chi-square analysis, *p<0.001

4. DISCUSSION

The prevalence of overweight (OW) and obesity among adolescents aged 10 to 17 years in Kedah is 15.4% and 15.5%, respectively. When comparing the prevalence of OW between sexes, there is little difference between girls (15.8%) and boys (15.0%). However, boys exhibit a higher prevalence of obesity (18.0%) compared to girls (13.0%) [20]. The study predominantly involved Malay participants, with only one Indian and five Siamese individuals, reflecting the demographic composition of primary school children in Kedah: 85.3% Malays, 9.8% Chinese, 4.9% Indians, and other ethnicities [17].

Our findings indicate that monthly household income is higher in urban families compared to rural families, with a mean difference of RM1,159. The mean difference between T20 and B40 income groups was RM9,074±1,406. This is consistent with data from the Department of Statistics Malaysia [21], which reported a mean monthly income difference of RM9,380 between higher and lower-income groups. However, the estimated mean monthly household income for Kedah is RM4,971, higher than the current study's finding of RM3,521±2,944. The mean household income for the B40 group (RM1,746) and the T20 group (RM10,820) falls below the national averages of RM2,089 for B40 and RM11,469 for T20. However, the M40 category in this study shows a higher mean income of RM5,660, exceeding the national average of RM4,608. Most respondents (64.6%) come from B40 households, 27.9% from M40 households, and 7.5% from T20 households. More than 70% of the respondents' parents had attained secondary education, and 25% had received tertiary education, with a 2.3% higher percentage of mothers achieving tertiary education compared to fathers. This finding is consistent with several local studies that also observed a higher percentage of mothers achieving tertiary education than fathers [22], [23].

Body image dissatisfaction and perception can lead to obesity and associated health problems. In the present study, girls exhibited higher mean weight and height compared to boys, while boys had a higher mean BMI. There was a significant difference in mean height by sex, though no significant difference in mean BMI by sex. This finding is consistent with a local study, which reported a significant difference in mean BMI between boys and girls [24]. Another study in Sarawak, Malaysia, examining blood pressure profiles of teenagers aged 13 to 17 years, found that mean weight, height, and waist circumference were higher among boys, while BMI was higher among girls [25]. These differences may be attributed to the older adolescents

included in the Sarawak study, which encompassed a broader range of BMI categories and individuals undergoing puberty. During puberty, girls experience rapid physical changes such as breast and buttock development, influencing BMI due to growth and maturation processes [26].

Regarding participants' desires for a larger or smaller body size, nearly 90% expressed a desire for a smaller body size, reflecting significant concerns about their BWS. This finding aligns with previous research indicating that children, particularly girls [27], and OW and obese children desire a smaller body size compared to those with a normal BWS [28]. Our results are consistent with Leon's findings, which indicate that older children are more likely to wish to be thinner than their current size [27]. Leon also noted that body image discrepancy or dissatisfaction typically emerges around age 8. This contrasts with the National Health and Morbidity Survey (NHMS), which reported that more primary school children perceive themselves as thin or overweight compared to secondary school children [11]. This discrepancy may be due to differences in the age ranges studied, with older adolescents at higher risk for body image dissatisfaction due to puberty-related changes.

A study by Geraets *et al*. reported an increase in body size underestimation among adolescents over time, suggesting a need for assistance in improving their weight perception [29]. This misperception can prevent individuals from engaging in healthier activities to reduce body weight, highlighting a gap between public health messages and cultural norms. In our study, approximately 50% of participants were categorized as "underestimators," a finding similar to the 59.9% who underestimated their BWS in a previous study [30]. The NHMS reported that 44.3% of adolescents with an actual OW BWS correctly perceived their weight as OW, while 15.1% and 34.2% underestimated their weight as thin or normal, respectively [11]. Accurate weight estimation, particularly among OW and obese adolescents, has been associated with attempts to lose weight [31]. The relationship between OW or obesity and psychological factors was significantly mediated by attractiveness, health state, or life satisfaction [32]. Body satisfaction may protect against the negative behavioral and psychological comorbidities associated with overweight [28].

Our study reveals a significant association between perception of current body size and BMI among overweight and obese children, though no significant association was found between ideal body size or healthy body size and BMI. Interestingly, the trend of correctly perceived current body size among participants in this study is higher than the national trend. According to the NHMS [11], 43% of adolescents in Kedah correctly perceived their weight as overweight, while 6% perceived it as obese. Perceived weight can influence eating habits and overall lifestyle choices [33]. This study offers valuable insights, demonstrating that younger children may have a more accurate perception of their BWS compared to older children. Focusing on primary school students is important, as many weight management intervention programs target this age group.

These results are consistent with findings from China, where over 30% of subjects misjudged their weight status, and a significant association was found between BMI and current body size perception [34]. Similar associations between BMI and body image perception have been observed in children as young as 9 to 11 years old in Turkey [30]. Previous research also indicates that children with a normal BMI experience body dissatisfaction, though to a lesser extent [35]. Hyunju found that various factors, such as school achievement and participation in exercise, lead to appropriate weight control behaviors among adolescents. Early identification of overweight status is a key factor associated with body image issues [36]. However, the motivation for weight loss may depend more on psychological factors than on perceived body image or BWS.

This study has several limitations. We did not include a comparison group of children with normal weight, as the focus was exclusively on overweight and obese children. Additionally, despite using guided group interviews, the data relies on the participants' ability to comprehend the questions and maintain focus. Although the validity of each instrument was established, the potential for over- or under-reporting remains.

Nonetheless, this study has several strengths. It serves as a follow-up to the National Physical Fitness Standard (SEGAK) test conducted in schools. To ensure accurate classification of BWS, weight and height measurements were repeated to assess current BMI status, and a BWS perception survey was conducted. This study provides new and recent data on body dissatisfaction and BWS perception among overweight and obese children in Malaysia, offering valuable information for the development of future weight management intervention programs.

5. CONCLUSION

Our study demonstrates that body dissatisfaction and BWS perception are associated with BMI among OW and obese children. Nearly half of the OW and obese participants underestimated their BWS, while only about half accurately assessed their BWS. The high discrepancies between the perception of current body image and actual weight status need to be addressed, as this misperception could hinder overweight and obese children from successfully achieving a healthy body weight. The primary school level is an ideal time to begin fostering positive psychological beliefs about a healthy lifestyle and body weight, as well as addressing misperceptions

and dissatisfaction related to body image. As an implication of our study, guidelines that mandate the integration of body image education and healthy lifestyle promotion within school curricula can be introduced, ensuring that all students receive consistent and supportive messaging about body weight and self-perception. Additionally, incorporating routine screenings for body dissatisfaction will enable early identification and intervention, providing timely support to children and their families to address these critical issues.

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