ORIGINAL ARTICLE

Investigating the Association Between Body Mass Index (BMI) and Body Image Perceptions Among High School Students

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ABSTRACT

Background: Adolescence is a critical period for physical growth and psychological development, during which body mass index (BMI) and body image perceptions play an important role in health and well-being. Concerns about overweight, obesity, and body dissatisfaction are increasingly common among Malaysian adolescents. Therefore, this study aimed to determine the association between BMI status and body image perceptions among high school students in Kuantan, Pahang. **Methods:** A cross-sectional study was conducted among 140 students aged 13 to 15 years in Kuantan, Pahang. Participants were selected using convenience sampling, and only those with parental consent and valid responses were included. Anthropometric measurements were used to calculate BMI, while body image perceptions were assessed using a validated questionnaire, Body Self-Image Questionnaire Short-Form (BSIQ-SF), across four domains: Negative Affect, Attractiveness Evaluation, Physical Functionality Awareness, and Height Dissatisfaction. Statistical analyses included descriptive statistics, independent t-tests, and Pearson correlation. **Results:** The majority of students (75.0%) had a normal BMI, while 10.0% were overweight, 7.1% were obese, 4.3% were thin, and 3.6% were severely thin. Female students reported significantly greater dissatisfaction in the Height Dissatisfaction domain (p = 0.031). No significant gender differences were found in the Negative Affect, Attractiveness Evaluation, and Physical Functionality Awareness domains. BMI was significantly correlated with Negative Affect (r = 0.338, p < 0.001) and Physical Functionality Awareness (r = 0.218, p = 0.010), suggesting that students with higher BMI were more likely to experience body dissatisfaction and greater awareness of physical functionality. **Conclusion:** Our findings reveal that BMI and gender significantly influence body image perceptions among adolescents, reflecting both overweight/obesity and underweight concerns. Despite the growing importance of adolescent body image in public health, there remains a need for further research on sociocultural and environmental factors shaping these perceptions.

INTRODUCTION

Adolescence is a critical developmental stage characterized by rapid physical, psychological, and social changes that shape self-identity and self-perception (National Academies of Sciences, Engineering, and Medicine [NASEM], 2019) During this period, body changes associated with puberty often interact with sociocultural pressures to achieve idealised standards, contributing to heightened body image concerns (Khor et al., 2009; McCabe et al., 2003). In Malaysia, these concerns are widespread, with nearly 80% of adolescents reporting dissatisfaction with their body size or shape (Farah Wahida et al., 2011; Khor et al., 2009).

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Body weight status, usually measured with BMI, is closely connected to body image perceptions. Malaysia faces a double burden of malnutrition, with adolescents experiencing both undernutrition and rising rates of overweight and obesity. In Pahang, 31% of adolescents were classified as overweight or obese, while others fell into thinness categories (Jamani et al., 2020; NHMS, 2022). Misperceptions about body weight are common, especially among those aiming to be thinner, and are linked to unhealthy behaviors like dieting, binge eating, and physical inactivity (Pon et al., 2004; Toselli et al., 2023). Gender differences also influence body image, with females more dissatisfied with slimness and males aiming for muscularity (Avci & Keven Akliman, 2018), while social media and peer influence increase these pressures (Holland & Tiggemann, 2016).

Despite these concerns, limited recent evidence exists on the relationship between BMI and body image perceptions among Malaysian adolescents, particularly at

the high school level. Existing studies are either outdated or conducted among older populations, leaving a gap in understanding the current status of younger adolescents in Kuantan, Pahang. To address this gap, the present study examined the association between BMI status and body image perception among high school students in Kuantan, Pahang.

MATERIALS AND METHODS

Study Design and Setting

This cross-sectional study was conducted among high school students aged 13–16 years in Kuantan, Pahang. The school was purposively selected due to its large and diverse student population, considered representative of adolescents in the district.

Sample Size and Sampling

The sample size was calculated using a single proportion f formula, based on a previously reported prevalence of body dissatisfaction (Farah Wahida et al., 2011). The participants were recruited using convenience sampling. The inclusion criteria were: (i) male and female students aged 13–16 years, (ii) proficiency in Bahasa Melayu and English, and (iii) enrolment in the selected school. Students with chronic illnesses such as diabetes, heart disease, and cancer, or living in boarding facilities, were excluded.

Ethical Considerations

Ethical approval was obtained from the IIUM Research Ethics Committee (IREC No.: IREC 2025-KAHS/DNS16), the Ministry of Education, the Pahang State Education Department, and the school principal. Written informed consent was obtained from parents or legal guardians before participation.

Data Collection

Data collection was conducted during school hours using a structured questionnaire administered face-to-face. The instrument consisted of three parts: (i) sociodemographic information, (ii) anthropometric measurements, and (iii) body image perceptions. Height and weight were measured using standardised procedures with portable stadiometers and digital scales. BMI was calculated and classified according to the WHO's BMI-for-Age (z-score) classification for both genders (WHO, 2007). Body image perception was assessed using the validated Malay version of the Body Self-Image Questionnaire-Short Form (BSIQ-SF), comprising four domains: Negative Affect, Attractiveness Evaluation, Physical Functionality Awareness, and Height Dissatisfaction. Negative Affect captured negative emotions related to body image, while Attractiveness Evaluation reflected satisfaction with appearance and fitness. Physical Functionality Awareness assessed attention to one's physical abilities, and Height Dissatisfaction measured unhappiness with height. Higher scores indicate greater intensity in each aspect.

Data Analysis

All data were analysed using IBM SPSS Statistics Version 20. Descriptive statistics (means, standard deviations, frequencies, percentages) were used to summarise BMI status and body image perceptions. Independent *t*-tests were applied to examine gender differences. Pearson's correlation test was used to assess the association between BMI and body image perception, with statistical significance set at $p < 0.05$.

RESULTS

Table 1 shows the sociodemographic characteristics of the participants. About 140 students participated, of which the majority were female (63.6%), and most were in Form 1 (36.4%) or Form 2 (39.3%). The sample was predominantly Chinese (81.4%), followed by Malay (11.4%) and Indian (5.0%). More than half of the participants (56.4%) reported knowing the ideal BMI value. While only 16.4% reported recent dieting or supplement use for weight loss, most did not engage in such practices. Regarding exercise, 30.0% reported exercising twice a week, and 11.4% reported daily exercise, whereas 7.1% reported never exercising.

Table 1: Descriptive analyses of participants' sociodemographic data

Characteristics	Mean (SD) (%)
Gender	
Male	51 (36.4)
Female	89 (63.6)
Age (year)	
13	51 (36.4)
14	55 (39.3)
15	34 (24.3)
Race	
Malay	16 (11.4)
Chinese	114 (81.4)
Indian	7 (5.0)

Others	3 (2.1)
BMI knowledge	
Know the ideal BMI value	79 (56.4)
Do not know the ideal BMI value	61 (43.6)
Weight loss strategy	
Has recently dieted or taken supplements to lose weight	23 (16.4)
Has not recently dieted nor taken supplements to lose weight	117 (83.6)
Exercise frequency	
Once a week	37 (26.4)
Twice a week	42 (30.0)
More than twice a week	35 (25.0)
Every day	16 (11.4)
Never	10 (7.1)

Table 2 summarises the anthropometric and body composition data. The mean height and weight of participants were 156.6 ± 7.5 cm and 48.5 ± 11.8 kg, respectively, with an average BMI of 19.8 ± 4.2 kg/m². Most students (75.0%) fell within the normal BMI range. However, 10.0% were overweight and 7.1% obese, while 4.3% were classified as thin and 3.6% as severely thin. These findings indicate that while most students maintained a normal BMI, both undernutrition and excess weight coexisted in this population. Female students had a higher mean body fat percentage (23.3 ± 3.8) compared to males (14.9 ± 5.4), while males recorded greater skeletal muscle mass (37.2 ± 5.7 kg vs. 27.6 ± 2.2 kg).

Table 2: Mean of participants' anthropometric data

Anthropometric characteristics	Mean (±SD)
Height (cm)	156.6 (±7.5)
Weight (kg)	48.5 (±11.8)
BMI (kg/m^2)	19.8 (±4.1)
Fat percentage (%)	
Male	14.9 (±5.4)
Female	23.3 (±3.8)
Skeletal muscle mass (kg)	
Male	37.2 (±5.7)
Female	27.6 (±2.2)
BMI classification	**n (%)**
Severe thinness	5 (3.6)
Thinness	6 (4.3)
Normal	105 (75.0)
Overweight	14 (10.0)
Obese	10 (7.1)

Table 3 highlights how participants perceived their body image, presenting mean scores for each of the four domains. Attractiveness Evaluation had the highest mean score (18.98 ± 4.68), suggesting students generally viewed themselves positively in terms of appearance. Negative Affect followed (17.69 ± 6.90), indicating that many still experienced emotional vulnerabilities regarding body image. Physical Functionality Awareness had a moderate mean score (12.56 ± 3.44), reflecting some awareness of physical health and ability, while Height Dissatisfaction was lowest (10.00 ± 3.13), suggesting that participants were generally accepting of their height.

Besides, the mean scores of body image perception domains across different BMI classifications are also shown in Table 3. In the Negative Affect domain, students who were obese or overweight reported the highest levels of dissatisfaction, while those with normal BMI or thinness showed the lowest. This indicates that extreme BMI categories, both high (obese/overweight) and very low (severe thinness), are associated with greater emotional distress regarding body image.

For Attractiveness Evaluation, students in the thinness category reported the highest satisfaction, whereas those in the severe thinness and obese categories recorded the lowest. This suggests that moderate thinness may be perceived positively, but more extreme deviations from normal BMI reduce perceived attractiveness.

In terms of Physical Functionality Awareness, overweight and obese students reported higher awareness of body functionality compared to those with normal or severely thin BMI. This may reflect heightened consciousness about health among students with higher body weight.

Finally, in the Height Dissatisfaction domain, obese and overweight students expressed greater dissatisfaction compared to their normal-weight and severely thin peers, indicating that higher BMI may influence not only weight-related dissatisfaction but also concerns about height.

Table 3: Body image perception according to BMI classification (mean ± SD)

Domain	Total score (mean ± SD)	Severe thinness	Thinness	Normal	Overweight	Obese
Negative Affect	17.69 ± 6.90	19.00 ± 10.20	15.00 ± 4.69	16.45 ± 6.12	21.21 ± 7.12	26.80 ± 5.98)
Attractiveness Evaluation	18.98 ± 4.68	14.80 ± 2.78	21.50 ± 3.15	19.15 ± 4.90	19.14 ± 4.52	17.50 ± 2.17)
Physical Functionality Awareness	12.56 ± 3.44	9.60 ± 3.65	13.33 ± 2.73	12.40 ± 3.46	13.71 ± 3.12	13.60 ± 3.50
Height Dissatisfaction	10.00 ± 3.13	8.80 ± 3.56	10.00 ± 2.97	9.87 ± 3.29	10.50 ± 2.38	11.30 ± 2.11

Based on Table 4, BMI showed a statistically significant moderate positive correlation with Negative Affect (r = 0.338, p < 0.001), indicating that students with higher BMI were more likely to report body dissatisfaction. A weaker but still significant positive correlation was also observed between BMI and Physical Functionality Awareness (r = 0.218, p = 0.010), suggesting that students with higher BMI demonstrated greater awareness of maintaining physical functionality. In contrast, no significant associations were found between BMI and Attractiveness Evaluation (r = 0.015, p = 0.856) or between BMI and Height Dissatisfaction (r = 0.123, p = 0.147).

Table 4: Correlations between BMI and body image perceptions

Characteristics	*r*	*p*-value
BMI and Negative Affect	0.338	0.000*
BMI and Attractiveness Evaluation	0.015	0.856
BMI and Physical Functionality Awareness	0.218	0.010*
BMI and Height Dissatisfaction	0.123	0.147

*p < 0.05, significantly different (2-tailed). Statistical test analysis used: Pearson's Correlation

DISCUSSIONS

Sociodemographic Characteristics of the Participants

Most participants in this study were Chinese (81.4%), followed by Malay (11.4%), Indian (5.0%), and other ethnic groups (2.1%). This ethnic distribution is important, as cultural values and media portrayals influence how adolescents perceive body image. Previous research has shown that Malaysian Chinese adolescents are more likely to internalise thinner body ideals, often leading to dieting and higher dissatisfaction compared to their Malay and Indian peers (Wang et al., 2021; Yeng & Sedek, 2012). Malay adolescents, by contrast, tend to adopt more flexible attitudes shaped by family and cultural expectations (Cheah et al., 2017; Wong & Say, 2013). These findings suggest the need for culturally tailored interventions in Malaysia's diverse adolescent population.

Knowledge of BMI was nearly equally divided between those who reported awareness and those who did not. Although BMI is introduced in school health curricula, comprehension appears limited. Previous studies highlight that Malaysian adolescents often recognise the term "BMI" but lack understanding of its health implications (Musa et al., 2021; UNESCO, 2019). Many rely on peers and social media for health information, which tends to emphasise appearance rather than health outcomes (Muda et al., 2021). This may explain why adolescents misinterpret BMI more as a measure of attractiveness than health.

In addition, some students reported engaging in dieting and supplement use for weight control. This aligns with national data showing widespread use of supplements among Malaysian adolescents (Malaysia School-based Nutrition Survey, 2012). Motivations often stem from parental encouragement, peer influence, or media exposure (Yeo et al., 2014). However, reliance on unregulated weight-loss products raises health concerns, especially as body dissatisfaction and societal pressures drive such practices (Chau et al., 2024).

The majority of students reported engaging in weekly exercise, consistent with NHMS (2017) findings that over half of Malaysian adolescents meet recommended activity levels. Nonetheless, sedentary behaviours remain common, particularly among females, who consistently report lower physical activity participation than males due to sociocultural and environmental barriers (Mohd Salleh et al., 2018). This suggests that interventions promoting physical activity should address both gender-specific barriers and broader lifestyle patterns.

In the present study, most participants were within the normal BMI range, whereas the remaining were classified as underweight or overweight/obese. This reflects the dual burden of malnutrition among Malaysian adolescents, as noted in the NHMS (2022). Despite most students having a normal BMI, the occurrence of overweight and obesity underscores the need for continued attention to adolescent weight management. Excess weight in adolescence is strongly linked to non-communicable diseases and poor mental health later in life (Biswas et al., 2022). The presence of underweight students also highlights that undernutrition persists, underscoring the complexity of adolescent nutrition challenges (Salleh et al., 2024).

Body Image Perceptions According to BSIQ-SF Domains

Overall, adolescents in this study reported moderate satisfaction with their appearance, particularly in the Attractiveness Evaluation domain. However, this was accompanied by higher scores in the Negative Affect domain, indicating emotional distress despite some acceptance of appearance. This duality has been observed in previous studies, where adolescents express both approval and discontent regarding body image, often contributing to poor mental health outcomes (Cash & Smolak, 2011).

Moderate scores in Height Dissatisfaction and Physical Functionality Awareness further suggest that adolescents hold mixed attitudes toward their physical development. Concerns about height, commonly reported during adolescence, often influence self-esteem and peer relationships (Ricciardelli & McCabe, 2004). This finding supports prior research showing that Asian adolescents, including Malaysians, frequently struggle with conflicting feelings about body size and development due to cultural ideals and media pressures (Chen et al., 2019; Liew & Chooi, 2020).

Body Image Perceptions According to BMI Classifications

Body image perceptions varied considerably by BMI classification. Students classified as obese reported the highest levels of Negative Affect, consistent with literature linking higher BMI to body dissatisfaction and psychological distress (Neumark-Sztainer et al., 2006; Puhl & Heuer, 2010). Social stigma and teasing may exacerbate these negative feelings, further impacting well-being (Haines et al., 2006).

By contrast, students in the thin category reported the greatest satisfaction in the Attractiveness Evaluation domain, while those classified as severely thin reported the lowest satisfaction. This aligns with prior findings that, although some underweight adolescents feel content with appearance, others may experience dissatisfaction due to health concerns or social perceptions (Ricciardelli & McCabe, 2001; Smolak, 2011).

In the Physical Functionality Awareness domain, overweight and obese students reported higher scores than those in the normal or severe thinness categories. This may indicate heightened awareness of physical health among adolescents with higher or lower BMI, possibly due to personal experiences or external health advice. Similarly, height dissatisfaction was highest among overweight and obese students, suggesting that concerns about stature may compound weight-related body dissatisfaction. These patterns highlight the layered impact of BMI on body image, where deviations from perceived norms intensify dissatisfaction (Cheah et al., 2017).

Correlation between BMI and Body Image Perception Domains

Correlation analysis confirmed a significant positive association between BMI and Negative Affect, indicating that higher BMI is linked to greater dissatisfaction and negative emotions. This supports prior research that connects BMI with psychological distress and low self-esteem (Neumark-Sztainer et al., 2006; Puhl & Latner, 2007). Experiences of stigma and teasing may reinforce this relationship, perpetuating emotional distress (Haines et al., 2006).

A weaker but significant positive correlation was also observed between BMI and Physical Functionality Awareness. Adolescents with higher BMI may be more

conscious of their physical health, reflecting greater awareness of functionality beyond appearance. Prior studies similarly report that overweight adolescents often recognise the importance of physical fitness, even if participation is limited (Deforche et al., 2015; Lubans et al., 2011).

No significant correlations were found between BMI and Attractiveness Evaluation or Height Dissatisfaction. This suggests that perceptions of attractiveness and height are shaped by cultural and psychological factors beyond weight alone (Grogan, 2016; Nguyen et al., 2020). Thus, while BMI strongly influences negative emotions, it may not directly determine broader aspects of body satisfaction.

However, this study has several limitations. The findings were based on a single school with a predominantly Chinese sample, which may limit generalizability to Malaysia's diverse adolescent population. In addition, the use of self-reported questionnaires may have introduced response bias, particularly due to possible language comprehension issues. Future studies should therefore include larger and more ethnically diverse samples; use validated multilingual tools and explore weight-control behaviours in greater detail to better understand the mechanisms linking BMI and body image.

CONCLUSION

This study demonstrated that BMI status is associated with selected dimensions of body image among high school students, particularly emotional responses toward body appearance and awareness of physical functionality, while no meaningful associations were observed for attractiveness evaluation or height-related perceptions. These findings underscore the relevance of BMI in shaping adolescents' body image experiences and highlight the need for school- and community-level strategies that foster positive body perceptions and encourage healthy lifestyle behaviours. To strengthen the evidence base, future research should incorporate additional determinants such as physical activity, sleep patterns, stress levels, and socioeconomic background, and should involve larger and more diverse samples across multiple schools. Such efforts would enhance the generalisability of findings and better inform targeted interventions aimed at supporting adolescents' overall well-being.

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