

## Development of multi-dimensional body image scale for malaysian female adolescents

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### Abstract

The present study was conducted to develop a Multi-dimensional Body Image Scale for Malaysian female adolescents. Data were collected among 328 female adolescents from a secondary school in Kuantan district, state of Pahang, Malaysia by using a self-administered questionnaire and anthropometric measurements. The self-administered questionnaire comprised multiple measures of body image, Eating Attitude Test (EAT-26; Garner & Garfinkel, 1979) and Rosenberg Self-esteem Inventory (Rosenberg, 1965). The 152 items from selected multiple measures of body image were examined through factor analysis and for internal consistency. Correlations between Multi-dimensional Body Image Scale and body mass index (BMI), risk of eating disorders and self-esteem were assessed for construct validity. A seven factor model of a 62-item Multi-dimensional Body Image Scale for Malaysian female adolescents with construct validity and good internal consistency was developed. The scale encompasses 1) preoccupation with thinness and dieting behavior, 2) appearance and body satisfaction, 3) body importance, 4) muscle increasing behavior, 5) extreme dieting behavior, 6) appearance importance, and 7) perception of size and shape dimensions. Besides, a multidimensional body image composite score was proposed to screen negative body image risk in female adolescents. The result found body image was correlated with BMI, risk of eating disorders and self-esteem in female adolescents. In short, the present study supports a multi-dimensional concept for body image and provides a new insight into its multi-dimensionality in Malaysian female adolescents with preliminary validity and reliability of the scale. The Multi-dimensional Body Image Scale can be used to identify female adolescents who are potentially at risk of developing body image disturbance through future intervention programs.

**Key Words:** Body image, factor analysis, body mass index, eating disorders, self-esteem

### Introduction

In light of the sudden and rapid changes in physical growth and psychosocial development among adolescents (WHO, 1995), body image-related problems have become a critical determinant of nutritional status that place adolescents, particularly girls, as one of the nutritionally vulnerable groups. Evidences have shown that negative body image is significantly linked to various health issues, including a spectrum of disordered eating, low self-esteem, depression, and unhealthy weight-loss practices (Dohnt & Tiggemann, 2006; Field *et al.*, 2001; Littleton & Ollendick, 2003; Neumark-Sztainer *et al.*, 2006; Stice & Bearman, 2001). While preoccupation with thinness and frequent dieting are well-recognized factors associated with eating disorders, unnecessary dieting and repeated weight loss attempts may be risk factors for obesity (Thompson & Smolak, 2001). The triadic problems of negative body image, eating disorders and obesity may compromise the growth and development of adolescents and persist into adulthood. Hence, negative body image is a serious issue during adolescence and should be duly addressed.

Although body image has been increasingly studied over the last half century, no consensus was found in the definition of

the body image concept. However, body image scholars (Banfield & McCabe, 2002; Cash, 2004; Garner *et al.*, 1982) had agreed that body image comprises a multi-dimensional construct with various dimensions. One of the most common dimensions that have been described is body dissatisfaction, which is used interchangeably with negative body image or body image disturbance. For instance, the effectiveness of previous intervention studies on negative body image (Paxton, 2002) were only found to be modest to moderate as most of the studies focused on only one dimension, which was body dissatisfaction. Overlooking of certain dimensions in the body image concept and failure to distinguish the various dimensions of body image may hinder the important role body image plays in population health and well-being. Therefore, a thorough understanding of the body image concept is crucial in determining the etiology, prevention and treatment of negative body image and its related problems, particularly eating disorders and obesity.

As body image encompasses a complex and multi-dimensional construct, Thompson (2004) recommended that multiple scales should be used to assess body image. However, this may raise the issue of whether the items of the scales are overlapping to the point of redundancy. For the present study, factor analysis

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is used to overcome the redundant items and to determine distinctive dimensions of body image construct. Further, studies in Malaysia (Pon *et al.*, 2004; Rasyedah *et al.*, 2002) have only incorporated certain dimensions of body image without reporting on the validity and reliability of the scales used. Indeed, a comprehensive instrument to measure body image is not only imperative to in providing a valid and reliable assessment of body image among subjects, but also in revealing its multi-dimensional construct. Therefore, there is a need to develop and validate a comprehensive multi-dimensional body image construct in Malaysian adolescents' context in order to determine body image of Malaysian adolescents, particularly girls. The present study aimed to explore a comprehensive multi-dimensional body image scale for Malaysian female adolescents. As for construct validity, the multi-dimensional body image scale was correlated with body mass index (BMI), risk of eating disorders and self-esteem among female adolescents. The validated and reliable multi-dimensional body image scale in this study would be useful in identifying adolescent girls who are potentially at risk of developing body image disturbance through targeted intervention programs. Specifically, the multi-dimensionality of the scale should be able to provide different dimensions of body image in adolescent girls and its specific contribution for future intervention programs.

## **Subjects and Methods**

### *Subjects*

Out of 36 secondary schools in Kuantan district, state of Pahang, Malaysia, nine schools met the inclusion criteria where the school has to be a government secondary school and encompasses multi-racial students whose majority are Malays. A simple random sampling (lottery) was used to select a secondary school for the present study. Subjects from non-examination school years, namely Form 1, Form 2 and Form 4 were randomly selected by classes, and all female students from the selected classes were invited to participate in the present study.

### *Construction of the multi-dimensional body image scale*

Multiple scales were used to reveal the multi-dimensional construct of body image. These established scales were chosen if they had been widely used to assess body image especially in the Malaysian setting. The scales included in the present study were:

### *Perception of body weight status*

Items on perception of body weight status were adapted and modified from Simko *et al.* (1989). Examples of the items are perception of the subject's current weight status, current body weight satisfaction, the desire to change body weight (either to

gain or lose weight), the amount of body weight that the subject wishes to change, and subject's current weight changes status.

### *Contour drawing rating scale*

The Contour Drawing Rating Scale was adapted from Thompson and Gray (1995). There are nine sub-figures in the scale with each given a number representing different degrees of body size. The subject was required to choose a sub-figure that represented her current body size, ideal body size and healthy body size.

### *Body esteem scale*

This is a factorial derived measure of male and female body esteem adapted from Franzoi and Shields (1984). For the current study, only thirty two items on individual body parts and functions related to females were included. For example, "How do you feel about the appearance of your buttocks?" Items were rated on a five-point Likert scale, from strong negative feelings to strong positive feelings.

### *McKnight risk factor survey IV (MRFS-IV)*

The MRFS-IV consists of 103 items that are grouped into domains (McKnight Investigators, 2003). Domains that are known to be related to body image were included in the present study, namely the shape and weight preoccupation domain which assesses one's over concern with one's weight and shape, the appearance appraisal domain which evaluates one's own appearance, the emotion eating subscale to assess tendency of eating more or less due to subject's emotion, and the weight control behaviors domain to assess involvement in weight control practices. Items were scored on a five-point scale from never to always.

### *Multidimensional body-self relations questionnaire-appearance scales (Cash, 2000)*

Subscales of the MBSRQ-AS (Cash, 2000), namely the Appearance Evaluation, Appearance Orientation, Body Areas Satisfaction, and Overweight Preoccupation, and Self-Classified Weight were included in the present study. The 19-item appearance evaluation and appearance orientation subscales are used to assess investment in one's own appearance. Items are rated on a five-point scale from definitely disagree to definitely agree. The 9-item body areas satisfaction subscale assesses satisfaction level of nine discrete body areas or aspects, such as face, muscle tone, and upper torso, from very dissatisfied to very satisfied. The 4-item overweight preoccupation subscale that assesses one's concerns with becoming or being overweight are rated on a scale ranging from definitely disagree to definitely agree. Besides, the 2-item self-classified weight subscale asks about

weight perception, rated with five-point scale from "very thin" to very fat".

#### *Weight-reducing behaviors*

It is a 20-item questionnaire adapted and modified from O'Dea *et al.* (1996) that assesses weight-reducing behaviors in the past year. Examples of weight-reducing behaviors are exercise, skipping meals, and vomiting. The subject was required to respond based on a five-point scale from never to always.

#### *Body image questionnaire - body dissatisfaction and body importance subscales*

The Body Image Questionnaire (McCabe & Ricciardelli, 2001) comprised Body Dissatisfaction subscale and Body Importance subscale. In the 10-item Body Dissatisfaction subscale, a subject was required to respond on a five-point Likert scale ranging from "extremely satisfied" to "extremely dissatisfied". As for the Body Importance subscale, it comprised 10 items, with five-point Likert scale ranging from "extremely important" to "not important at all". The scale has shown to be valid and reliable for adolescents (McCabe & Ricciardelli, 2001).

#### *Body change inventory*

The Body Change Inventory (Ricciardelli & McCabe, 2002) consisted of three subscales, namely Strategies to Decrease Body Size, Strategies to Increase Body Size and Strategies to Increase Muscle Size. A subject was required to respond on a five-point Likert scale ranging from "never" to "always" for six items of each subscale. The scale has shown to be valid and reliable for adolescents (Ricciardelli & McCabe, 2002).

#### *Measures*

Besides, the following measures were used to determine the construct validity of the multi-dimensional body image scale in the present study:

Anthropometric measurements including body weight and height were assessed to determine body mass index (BMI) of the subject. Body weight was measured by using a TANITA digital weighing scale to the nearest 0.1 kg; and, height was assessed by using a SECA body meter to the nearest 0.1cm. BMI was then calculated as  $\text{kg}/\text{m}^2$ , and nutritional status of the subject was classified based on WHO (1995) criteria.

The Eating Attitude Test (EAT-26; Garner & Garfinkel, 1979) is a widely used standardized measure of symptoms and concerns characteristics of eating disorder. This measure comprises twenty six items and covers three major dimensions, namely dieting, bulimia and food preoccupation, and oral control. In the current sample, the internal consistency of the EAT-26 was 0.864.

The Rosenberg Self-esteem Inventory is a 10-item measure of

general feelings of self-worth (Rosenberg, 1965). There were five positive statements and five negative statements, with four-point Likert scale ranging from "strongly agree" to "strongly disagree". The instrument has been shown to be reliable and valid for adolescent samples (Keery *et al.*, 2004). The internal consistency for the current sample was 0.728.

#### *Procedure*

This study was approved by the Medical Research Ethical Committee, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, and by the Ministry of Education, Malaysia. The students were gathered in a school laboratory for each session of data collection. An information sheet explaining the study purpose and its protocol was disseminated and explained before informed consent was obtained from the students. Data were collected using a self-administered questionnaire which has been translated into the Malay language.

#### *Data analyses*

Data were analyzed using the SPSS for Windows version 15. Assumptions of conducting factor analysis for the data, including the Bartlett's test of sphericity ( $p<0.0001$ ) and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (0.901) were met. The exploratory principal axis factor analysis using both promax and varimax rotation methods was conducted to group items from multiple established body image scales into meaningful dimensions. The initial criteria for determining the number of factors were based on the Kaiser's criterion (eigenvalue rule) and the Catell's scree test (Hair *et al.*, 2006), whereas the loading criteria for items were at least 0.40. Reliability was determined using the Cronbach's alpha coefficient and item-to-total correlations. An acceptable cut-off for the Cronbach's alpha coefficient is 0.7 (Hair *et al.*, 2006) whereas the item-to-total correlations should exceed 0.2 (Streiner & Norman, 2003). Construct validity was determined by correlation analysis between multi-dimensional construct of body image and BMI, risk of eating disorders and self-esteem using the Pearson product-moment correlations. Based on recommendations from Cohen (1992), the strength of the correlations can be divided to three categories, namely correlation coefficient of 0.20 is considered to be weak, followed by correlation coefficient of 0.40 is moderate and correlation coefficient of 0.60 is strong.

#### **Results**

##### *Socio-demographic characteristics*

A total of 328 female students from a secondary school in Kuantan district, state of Pahang, Malaysia participated in this study. The adolescent girls ranged in age from 13 to 16 years,

with a mean age of  $14.28 \pm 1.04$  years. Half of them (52.2%) were Malays, 39.3% Chinese and 8.5% Indians. Besides, about two thirds of their parents (father: 60.1%; mother: 65.2%) had attained a minimum of secondary school education with a mean monthly parental income of RM  $2128.14 \pm 1505.04$ .

### Factor analysis and reliability

Based on an inspection of eigenvalues and scree plot, a seven-factor model appeared to be the best fit to the data. Both promax and varimax rotation methods yielded a seven-factor model with similar items in every one of the seven factors. However, the seven-factor model from the promax rotation method was chosen as it showed a clearer definition of factor loading matrix for the present data. Out of 152 items, 62 items were retained in the final model and the cumulative variance accounted for was 53.36% (Table 1). The summary results of factor analysis for the 62-item seven-factor model of this newly developed scale, namely the Multidimensional Body Image Scale are presented in Table 1.

Among the seven factors identified, the first factor which appeared in the model consisted of 14 items and accounted for the highest variance of the model, which was 20.13% (Table 1). These items corresponded to fear of weight gain, desire for thinness, and avoidance of food or restriction of food intake to lose weight. Hence, the first factor was termed as "preoccupation with thinness and dieting behavior". As shown in Table 1, 10.43% of the variance in the model was explained by the second factor that contained 15 items. These items described one's

evaluation of one's own appearance and other parts of one's body, particularly the level of satisfaction towards body weight, muscle tone, body shape, appearance, and other body parts. The second factor was therefore labeled as "appearance and body satisfaction". Further, a total of ten items that assessed the level of importance an individual places on body weight, muscle tone, body shape and other body parts in comparison with other things in one's life, appeared as the third dimension termed "body importance", and accounted for 7.80% of variance in the model.

Another vital dimension identified was labeled as "muscle increasing behavior" with 5.26% of variance in the model explained. The factor comprised six items on various ways to increase muscle size. This was followed by the fifth dimension termed "extreme dieting behavior" which accounted for 3.89% of variance in the model. The five extreme dieting behavior items in this dimension were the use of laxatives, trying to vomit, vomiting, smoking, and using slimming pills. The "appearance importance" was found to be the sixth dimension, with six items describing the importance of appearance for an individual. The last dimension was interpreted as "perception of body size and shape". This dimension consisted of six items, which assessed perception of one's current and ideal body size and shape.

As shown in Table 1, the internal consistency of all of the 62 items in the seven-factor model was very high ( $\alpha=0.928$ ). The Cronbach's alpha coefficient for each factor was greater than 0.7 (Hair *et al.*, 2006). The Cronbach's alpha coefficients for Factor I, Factor II, Factor III, and Factor IV were very high ( $\alpha>0.9$ ) and even the lowest alpha coefficient of Factor V in the model was 0.810. Besides, the item-to-total correlations for

**Table 1.** Summary of factor analysis and reliability results for the seven-factor Multidimensional Body Image Scale

	Eigenvalue	Percentage of variance explained	Range of factor loadings	Cronbach's $\alpha$	Range of item-to-total correlations
Factor I: Preoccupation with thinness and dieting behavior	12.482	20.13	0.408 ~ 0.954	0.925	0.418 ~ 0.823
Factor II: Appearance and body satisfaction	6.465	10.43	0.521 ~ 0.794	0.909	0.405 ~ 0.780
Factor III: Body importance	4.836	7.80	0.475 ~ 0.859	0.905	0.499 ~ 0.781
Factor IV: Muscle increasing behavior	3.261	5.26	0.734 ~ 0.855	0.926	0.712 ~ 0.824
Factor V: Extreme dieting behavior	2.410	3.89	0.502 ~ 0.802	0.810	0.460 ~ 0.719
Factor VI: Appearance importance	2.039	3.29	0.445 ~ 0.781	0.840	0.505 ~ 0.701
Factor VII: Perception of body size and shape	1.585	2.56	0.439 ~ 0.905	0.844	0.279 ~ 0.876
Total	-	53.36	-	0.928	

**Table 2.** Inter-correlations between the seven factors

Factors	Factor I: Preoccupation with thinness and dieting behavior	Factor II: Appearance and body satisfaction	Factor III: Body importance	Factor IV: Muscle increasing behavior	Factor V: Extreme dieting behavior	Factor VI: Appearance importance
Factor II: Appearance and body satisfaction	0.375**					
Factor III: Body importance	0.316**	0.085				
Factor IV: Muscle increasing behavior	0.245**	0.068	0.114*			
Factor V: Extreme dieting behavior	0.274**	0.069	0.014	0.239**		
Factor VI: Appearance importance	0.260**	-0.037	0.461**	0.060	0.029	
Factor VII: Perception of body size and shape	0.495**	0.512**	0.127*	0.029	0.061	-0.021

\*  $p<0.05$ ; \*\*  $p<0.01$

each factor presented in Table 1 exceeded 0.2 (Streiner & Norman, 2003). Further, Table 2 shows the inter-correlations between the seven factors, whereby significant relationships between the factors were indicated. The strength of correlations ranged from low to moderate (Cohen, 1992). Although the seven factors were significantly inter-correlated as these factors were all related to body image in general, the strengths of the correlations were not high indicating different factors measured specific dimension of body image. The results of factor analysis and internal consistency reliability supported the multi-dimensional construct of body image by identifying seven dimensions of body image in the present study.

Further, each item was scored using the 5-point scale, and all items were summed up for each factor or dimension. A composite score in percentage for the Multi-dimensional Body Image Scale was computed as follows:

$$\frac{\text{Total score of all seven factors}}{62 \times 5} \times 100\%$$

For the present study, the mean composite score of the Multi-dimensional Body Image Scale was  $52.17 \pm 8.08\%$ , with the lowest score of 30.53% and the highest score of 75.91%.

#### *Correlation between multi-dimensional body image scale and BMI*

The mean body weight and height of the subjects were  $49.9 \pm 11.6$  kg and  $155.3 \pm 6.6$  cm respectively, with a mean BMI of  $20.7 \pm 4.4$  kg/m<sup>2</sup>. Based on WHO (1995) criteria, most subjects were normal-weight (78.0%), 15.4% were overweight, and 6.6% were underweight. As shown in Table 3, the “perception of size and shape” was moderately correlated with BMI, while “preoccupation with thinness and dieting behavior” as well as “appearance and body satisfaction” were weakly correlated with BMI. A very weak correlation was found between “body importance” and BMI. Conversely, “muscle increasing behavior”, “extreme dieting behavior” and “appearance importance” were not correlated with BMI. As a whole, the composite score for the 7-factor model of the Multi-dimensional Body Image Scale was moderately correlated with BMI. In other words, those with higher BMI were more likely to be at risk of negative body image. Particularly, they were more likely to perceive themselves as having bigger sizes, were dissatisfied with their appearance and body, desired to be thinner, were involved in dieting behavior, and placed greater importance on their body compared to other things in their life.

#### *Correlation between multi-dimensional body image scale and risk of eating disorders*

The mean EAT-26 score for the present sample was  $12.40 \pm 10.62$ , with a lowest score of 1 and a highest score of 62. It should be noted that the cut-off point for at-risk of eating

disorders is 20 and above. Although a majority of the subjects were not prone to eating disorders, about one in five (18.3%) were at-risk of eating disorders. As presented in Table 3, the “preoccupation with thinness and dieting behavior”, “appearance and body satisfaction”, “body importance”, “appearance importance” and “extreme dieting behavior” were found to be correlated with total EAT score, with weak strength of correlations. However, no correlations identified between total EAT score and “perception of body size and shape” and “muscle increasing behavior”. As for the composite score for the 7-factor model of Multi-dimensional Body Image Scale, it was weakly correlated with total EAT score. Therefore, female adolescents who were more likely to be at-risk of eating disorders were at-risk of negative body image as well. Specifically, they were more likely to desire to be thinner, involved in dieting behavior, dissatisfied with their appearance and body, placed greater importance on their appearance and body compared to other things in their life, and practiced extreme dieting behavior.

#### *Correlation between multi-dimensional body image scale and self-esteem*

Based on the Rosenberg Self-esteem Inventory (Rosenberg, 1965), the mean self-esteem score of the subjects was  $26.82 \pm 4.19$ , with a lowest score of 16 and a highest score of 38. Of the seven subscales in the Multi-dimensional Body Image Scale, three subscales were found to have weak correlations with self-esteem but in different directions (Table 3). In particular, “appearance and body satisfaction” and “perception of body size and shape” were negatively correlated with self-esteem indicating that those with lower self-esteem were more likely to be dissatisfied with their appearance and body, and perceived themselves to have a bigger body size. On the other hand, there was a positive correlation between “appearance importance” and self-esteem, signifying that those who have higher self-esteem tend to place greater importance on their appearance. Overall, there was a negative and weak correlation between the composite score of Multi-dimensional Body Image Scale and self-esteem.

**Table 3.** Correlations between Multi-dimensional Body Image Scale and BMI, risk of eating disorders and self-esteem

Factor	BMI (r)	Risk of eating disorders (r)	Self-esteem (r)
I : Preoccupation with thinness and dieting behavior	0.476**	0.257**	-0.151
II : Appearance and body satisfaction	0.444**	0.236**	-0.278**
III : Body Importance	0.147**	0.241**	0.093
IV : Muscle increasing behaviors	0.109	0.120	-0.056
V : Extreme dieting behavior	0.097	0.207*	-0.098
VI : Appearance importance	0.048	0.212*	0.214**
VII : Perception of body size and shape	0.762**	0.099	-0.240**
Composite score (%)	0.554**	0.375**	-0.223**

\* p<0.05; \*\* p<0.01

Hence, female adolescents with lower self-esteem were more likely to be at-risk of negative body image.

## Discussion

The present study has proposed a 7-factor model of body image that supports the multi-dimensional concept of body image (Banfield & McCabe, 2002; Garner *et al.*, 1982; Pruzinsky & Cash, 2002; Smolak, 2004; WHO, 2005) and offers a new approach in conceptualization of body image. As noted, the seven dimensions of body image were I) preoccupation with thinness and dieting behavior, II) appearance and body satisfaction, III) body importance, IV) muscle increasing behavior, V) extreme dieting behavior, VI) appearance importance and VII) perception of size and shape.

In this study, female subjects were found to engage in both weight loss and muscle increasing behaviors concurrently. The muscle increasing behavior (Factor IV) was positively correlated with preoccupation with thinness and dieting behavior (Factor I) ( $r = 0.245$ ,  $p < 0.01$ ), extreme dieting behavior (Factor V) ( $r = 0.239$ ,  $p < 0.01$ ), and body importance (Factor III) ( $r = 0.114$ ,  $p < 0.05$ ) (Table 2). These indicated that those female subjects who were frequently involved with muscle increasing behavior desired to be thinner, were dieting to lose weight, placed greater importance on body and were even involved in some forms of extreme dieting behaviors to lose weight. In addition, extreme dieting (Factor V) was found to be positively correlated with preoccupation with thinness and dieting factor (Factor I) ( $r = 0.274$ ,  $p < 0.01$ ) besides the aforementioned factor ( $r = 0.239$ ,  $p < 0.01$ ). Hence, it is likely that subjects who were involved in weight loss and/or muscle increasing practices could have tried to engage in extreme dieting behaviors such as using laxatives, smoking, and using slimming pills that may compromise their growth and development. Similarly, findings from a longitudinal study by McCabe and Ricciardelli (2004) demonstrated that strategies to decrease body weight predict strategies to increase muscle, exercise dependence, use of food supplements, and use of steroids. Also, both weight reducing and muscle increasing strategies predict extreme body change behaviors including use of food supplements and exercise dependence regardless of pubertal timing.

It should be noted that being slim and muscular may indeed be an ideal to be achieved for female subjects in the present study. However, very few research are concerned about muscle increasing behaviors in females, as having a strong and muscular body is always related to the ideal body to be achieved by males while an overall slim body is the standard beauty for females (Muris *et al.*, 2005). Hence, further research is needed to explore the female standard of beauty and physical attractiveness where the emphasis is not only on slimness but also on physical fitness.

As current research findings support the multi-dimensional concept of body image, the present study proceeded to calculate

a composite score incorporating all seven dimensions of body image. The body image composite score has long been proposed by Garner *et al.* (1982) who studied the psychometric and clinical correlates of the Eating Attitude Test (EAT). They found that a body image composite score, as compared to individual body image variables, was a better predictor of total EAT score as well as its individual factors (dieting factor and bulimia and food preoccupation factor) scores. A composite score for the Multi-dimensional Body Image Scale can play a role as a screening tool to identify adolescent girls who are potentially at risk of developing body image disturbance for targeted intervention programs. In addition, the seven sub-scores of the Multi-dimensional Body Image Scale can be useful to further study the specific dimensions of body image. Indeed, a clear definition of body image dimensions is imperative to compare body image research findings and to identify negative body image in adolescent girls for future intervention programs. Instead of focusing only on one specific dimension as in previous studies (Paxton, 2002), the Multi-dimensional Body Image Scale may provide a clearer picture of body image in adolescent girls and produce a better outcome for future intervention programs.

Further, the construct validity of the present scale was determined where body mass index, risk of eating disorders, and self-esteem were correlated with individual subscales and the overall Multi-dimensional Body Image Scale. Indeed, there is a wealth of studies, including local studies, supporting that BMI was significantly associated with body image, possibly as a predictor of body image (Khor *et al.*, 2002; Kim & Kim, 2001; Kim, 2007; McCabe & Ricciardelli, 2001; Muris *et al.*, 2005; Neumark-Sztainer *et al.*, 2007; Pon *et al.*, 2004; Rasyedah *et al.*, 2002). For example, a local study comparing overweight and normal-weight female adolescents (Pon *et al.*, 2004) found that more normal-weight female adolescents than overweight counterparts perceived their weight status incorrectly. Besides, body image disturbance is known to be related to a spectrum of disordered eating behaviors (Field *et al.*, 2001; Kim, 2007; McKnight Investigators, 2003; WHO, 2005). As for self-esteem, previous studies (O'Dea, 2002; Ricciardelli & McCabe, 2001) identified low self-esteem contributes to negative body image. Consistently, the present study found that high body mass index, being at-risk of eating disorders and low self-esteem were correlated to negative body image in female adolescents.

Although the present results support the Multi-dimensional Body Image Scale as a valid and reliable scale to measure body image in female adolescents, several limitations should be taken into consideration. First of all, as the study involved only adolescent girls, the findings cannot be generalized to adolescent boys. Also, the findings are limited by sampling location, whereby all subjects were from a secondary school in a selected district in Malaysia. Further studies should be conducted in adolescent boys as well as among the clinical population, for example, eating disorders patients, in different settings.

In conclusion, this study has developed a Multi-dimensional

Body Image Scale for Malaysian female adolescents. Generally, the scale was valid and reliable as evidenced by factor analysis, internal consistency, and construct validity. Besides supporting that body image consisted of multi-dimensional constructs, the current findings provide a new insight into each of the constructs of body image.

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