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Physical Self-concept, Actual–Ideal Body Image Discrepancies and Obesity in Hong Kong School Children: Cultural Differences in the Value of Moderation

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The role of health and physical education should be to instill in students the knowledge and appreciation of healthy lifestyles, but childhood obesity is becoming increasingly prevalent in non-Western as well as Western societies. We evaluated physical self-concepts (Physical Self Description Questionnaire, PSDQ) and body images (Silhouette Matching Task, SMT) for obese (clinical and non-clinical sample) and non-obese Chinese students (N = 763), and compared with Australian students (N = 1084). Psychometric properties were similar for Western and non-Western responses, but gender differences were generally much smaller for Chinese students. In particular, the SMT ideal body image was slightly fatter for Chinese girls than for Chinese boys. For Chinese students, objective and subjective measures of body fat (and corresponding obese/non-obese group differences) were negatively related to many components of physical self-concept, but were unrelated to global self-esteem and slightly positively related to health self-concept. However, consistent with Chinese value of moderation but in marked contrast to Western responses, being too thin relative to personal ideals was almost as detrimental as being too fat. The results reflect Chinese cultural values, in which obesity is more acceptable than in Western culture, and, perhaps, general inadequacies of health education.

The prevalence of obesity is increasing and is a growing area of concern among Chinese mental health policy makers (Sun, 2003). In this study we evaluate relations between obesity, body image and multiple dimensions of physical self-concepts for obese (clinical and non-clinical samples) and non-obese Chinese boys and girls. If physical exercises are perceived as a solution to improve students’ health, reduce obesity, and enhance their physical self-concept, schools have an important role to play.

Obesity and Self-Concept

Seligman and Csikszentmihalyi (2000), Vallerand et al. (2003) and many others have emphasized a positive psychology and focused on how healthy, normal and exceptional individuals can get the most from life. In health and sport/exercise psychology, as is the case in many disciplines, self-concept is frequently posited as a mediating variable that facilitates the attainment of other desired outcomes such as appropriate body composition, health-related physical fitness, physical activity, exercise adherence, and physical skills (Fox & Corbin, 1989; Marsh, 1997, 2002; Sonstroem, 1984, 1997).

In self-concept research, particularly in educational research (Marsh, 1990; 1993a; Marsh & Craven, 1997, in press) the multidimensional, hierarchical models is critically important, in that academic achievement, persistence, and coursework selection are systematically related to academic self-concept, but nearly uncorrelated (or even negatively related) to global self-esteem and nonacademic components of self-concept. In the physical domain, more recently there has been a stronger emphasis on physical self-concept measures designed specifically for physical contexts (Fox & Corbin, 1989; Marsh, 1997, 2002; Sonstroem, 1997; Sonstroem, Harlow & Salisbury, 1993), providing clear evidence for their convergent and discriminant validity in relation to other self-concept domains (e.g., academic) and to physical outcome measures. For example, Marsh and Peart (1988) reported that results of a physical fitness intervention, and physical fitness indicators, were substantially related to physical self-concept but nearly uncorrelated with non-physical components of self-concept and self-esteem.

Particularly in Western countries throughout the world, there are growing concerns about levels of obesity, poor physical fitness, and sedentary life styles (Strauss & Pollack, 2001). Increasingly, these are seen as major health problems. Despite the well-established health benefits of maintaining appropriate body weight, existing medical-oriented interventions have had limited effects on increasing levels of physical activity. The increasing prevalence of childhood obesity throughout the developed world has drawn much public attention, and is usually attributable in large part to reduced physical activity (Maffèis, Zaffanello &
Schutz, 1997; Trost, Kerr, Ward & Pate, 2001). Motivating obese children to participate in regular exercise, and hence to prevent obesity, can however be difficult, for both physical and psychological reasons. While excess body fat adds to the burden of weight-bearing aerobic exercises (Rowland, 1991), low self-concept esteem in physical activities (French, Story & Perry, 1995; Craig, Goldberg & Dietz, 1996; Strauss, 2000; 2002; Strauss, Smith, Frame, Forehand, 1985) may further reduce the likelihood of participation in exercise programs.

Historically, eating disorders have been relatively rare in the Chinese population and it was believed that Chinese regarded plumpness in females as desirable and attractive (Lee, Ho, & Hsu, 1993). Even now parents apparently believe that obese children are healthier and obesity reflects their love for their children (Bush, 2003). However, due to the improvement in diet and nutrition and other socio-psychological changes, overweight has become an emerging problem, particularly for young, high-income and urban adolescents in China (Wang, Popkin, & Zhai, 1998). Though the absolute prevalence rate for obesity is still low as compared with that of developed countries, the increasing trend in China and the associated medical and social costs to the society are worrisome. In a study of pre-school children, Luo and Hu (2002) showed that the overall obesity prevalence increased from 1989 to 1997 (4.2% to 6.4%), but that the increase was greater in urban areas (1.5% to 12.6%). For Hong Kong school children (6-18 year olds) surveyed in 2000/2001, 14.1% were obese (greater than 120% median weight-for-height based on local norms) – an increase of 2% since 1997/1998 (Hui, Nelson, Yu, Li & Fok, 2003). The problem was slightly more serious at primary school (17% boys, 12% girls) than at secondary school level (12% boys, 10% girls). In summary, whereas concerns with obesity have not previously been so prominent in China, childhood obesity prevalence is increasing in China and has become the target of recent policy initiatives (Sun, 2003).

Studies based predominantly on Western research have shown that obesity in childhood may have adverse effects on self-concept development. French et al. (1995) reviewed 35 studies on the relationship between self-esteem and obesity and found that obese children and adolescents had lower self-esteem in half of the 25 cross-sectional studies. Two more recent studies also showed that obese children were more prone to having low self-esteem (Braet, Mervielde & Vandereycken, 1997; Pierce & Wardle, 1997; Johnson, 2002). On the other hand, a few studies showed that self-esteem of obese children did not differ much from that of non-obese children (Klesges, Haddock, Stein, Klesges, Eck, & Hanson, 1992). Crandall (1991) reviewed research showing that individuals are discriminated against on the basis of weight, that this discrimination generalizes over race, gender, age, and socioeconomic status, and that the associated stigmatization influences the individual’s self-perceptions and perceptions by significant others.

In a comparison of Chinese girls in Hong Kong in comparison to Western normative data, Leung, Wang and Tang (2004) found that Chinese girls (12-18 year olds) had higher levels of body dissatisfaction but a lower drive for thinness. Whereas the Chinese girls had lower BMIs and intended to lose on average only 3 to 5 lb (less than 5% of their body weights), their Western counterparts wished to lose about 10 to 15 lb (Leung, Wang, Tang, 2004). Analyses of Miss Hong Kong Pageant data over a 25 year period indicated that the winners have always been taller and thinner than average women in Hong Kong, and that a curvaceous body shape with a narrow waist set against full hips is important, which matches with that depicted in the classical Chinese literature and in contrast to the commonly belief that Chinese value plumpness (Leung, Lam, Sze, 2001). Fuller images are also part of Chinese aesthetics. In many Chinese figure paintings throughout history, the beautiful female is depicted as one who has a fuller rather than a skinny figure, whereas skinny individuals may be viewed as sickly and unhealthy.

However, there is also some evidence that a desire for a more thin body among Chinese girls varies as a function of location. In research in three cities differing substantially in degree of westernization and modernization (Hong Kong, Shenzhen and rural Hunan), Lee and Lee (2000) showed that sizeable proportions of high school girls desired a lower BMI, with higher percentage (74%) in the city with the greatest modernity (Hong Kong) and a lower percentage (47%) in the least modernized city (rural Hunan). Although young urban girls who were more educated and career oriented perceived slimness as desirable, “in the rural context, bodily fullness may symbolize family fertility and wealth, and can affect rural women’s marriageability and ultimate well being” (p., Lee & Lee, 2000, p.325). However, even in Hong Kong, 17.6% preferred to put on weight (versus 4.1% in the United States), suggesting a value of moderation rather than extreme thinness that is more common in Western culture. This value of moderation has a long history in Chinese culture. Thus, for example, Peng and Nisbett (1999) juxtapose fundamental differences in the underlying logic used by Chinese and Westerns in dealing with social contradictions. Westerns are more likely to use a differentiation model that polarizes contradictory perspectives. However, Chinese are more likely to seek a dialectic approach that results in a compromise that is consistent with the doctrine of the mean that emphasizes moderation and a reasonable middle-of-the-road approach. From this perspective, it is
reasonable that Chinese children are more likely to seek a body image that that is neither too fat nor too skinny.

The majority of studies relating self-concept and obesity have focused on self-esteem rather than relations between obesity and multiple dimensions of self-concept. Thus, an important question with theoretical and practical implications is the extent to which a multidimensional profile of self-concept measures can be summarized adequately by a single measure of self-esteem in this area of research. If obese children’s self-concepts are substantially lower, it may be possible to raise their self-concept through the actual reduction of their body weight, an improvement of their body flexibility or physical fitness, or an enhancement of self-perceived body image. Whereas physical exercise interventions may enhancing global self-esteem (Boyd & Hrycaiko, 1997), it is also possible for such interventions to inadvertently undermine self-concept in a way that is counter-productive to longterm mental and physical health (e.g., Marsh & Peart, 1988). For example, if specifically targeting an obese child makes a child’s weight problem more salient, it may result in a self-fulfilling label or stigma that results in a counter-productive decline in self-concept. However, studies of how interventions affect children’s specific domains of physical self-concept have been scanty, due in part to poor research methodology, unsound theoretical foundations, and psychometrically weak instrumentation (e.g., Fox & Corbin, 1989; Marsh, 2002; Sonstroem, 1984).

**Discrepancy Theory: Actual and Ideal Body Image**

Self-concept researchers are also interested in how self-concepts in specific areas are related to global measures of self. Of particular relevance to the present investigation are the relations between actual self-concept ratings (how one actually is), ideal self-concept ratings (how one ideally would like to be), self-esteem, and other specific components of self-concept. Historically, relations between ideal and actual perceptions and their relations to self-concept stem from heuristic speculations by William James , who noted that “we have the paradox of a man shamed to death because he is only the second pugilist or the second oarsman in the world” (1890/1963, p. 310), leading him to conclude that objective accomplishments are evaluated in relation to internal frames of reference. Following James, the relations between global esteem and self-perceptions in a specific domain (e.g., physical, social, academic) are typically posited to be modified in relation to individual standards of excellence or ideals for the specific domain.

Whereas James did not actually operationalize these constructs and pursue empirical tests of his hypotheses, such tests have been widely pursued in more recent research. For example, Wells and Marwell (1976; also see Wylie, 1974) reviewed discrepancy approaches in which “self-esteem is dependent upon the discrepancy between how a person perceives herself and how she thinks she should be” (p. 67) and is typically operationalized as the sum of the discrepancies between actual and ideal self-concept ratings. Favorable self-perceptions in a specific domain should contribute positively to esteem, but high or unrealistic ideals (i.e., ideals that are difficult to achieve) in the specific domain should contribute negatively. However, these early reviews of the discrepancy approach to the definition of self-esteem were also very critical of the many problems associated with the use of simple difference scores, and more recent reviews (e.g., Hattie, 1992; Marsh, 1993c; Pelham & Swann, 1989) continue to provide limited support for the usefulness of discrepancy scores based on actual and ideal self-concept ratings. A resurgence of cognitive models has led to renewed interest in discrepancy theories (e.g., Markus, Hamill, & Sentis, 1987; Higgins, 1987; Marsh, 1999; Marsh & Roche, 1996; Michalos, 1991). For example, Markus et al. showed that persons with self-schemas pertaining to body weight differed in their processing of fat and thin trait adjectives and body silhouettes. Discrepancy models based on actual and ideal body images have also been considered in sport and exercise research (e.g., Jacobi & Cash, 1994; Marsh, 2002; Silberstein, Striegel-Moore, Timke, & Rodin, 1988). Whereas most researchers measure actual-self, ideal-self, and perceived discrepancies in relation to relativistic verbal labels on traditional paper-and-pencil tests, other researchers (e.g., Hallinan, Pierce, Evans, DeGrenier & Andres, 1991; Marsh, 1999; Marsh & Roche, 1996; Silberstein, et al., 1988; Tiggemann, 1992) have used a silhouette matching task (SMT) to relate body image to gender, eating disorders, physical fitness, and a variety of other outcomes. In this task, individuals are presented with a set of silhouette drawings varying from very thin to very obese and asked to choose, for example, the silhouette that is most like them (actual self), the one they would most like to look like (ideal self), or any of a variety of other questions that can be keyed to this pictorial response scale. SMT studies have typically focused on gender differences or differences between “normals” and participants with eating disorders. Thus, for example, compared to males, females tend to have larger actual-ideal discrepancies and to have ideal-self scores that are thinner than their actual-self scores (Tiggemann, 1992; also see Feingold & Mazzella, 1998; Cash, Morrow, Hrabosky & Perry, in press).
The SMT, however, may also have other advantages. First, the “pictorial” response scale on the SMT is better anchored to the underlying thin-fat continuum than the potentially ambiguous verbal labels in typical Likert response scales. Second, the SMT ratings—and the underlying thin-fat continuum—have several distinctive features that may explain why they provide apparently good support for actual-ideal discrepancy models: (a) ideal ratings do not correspond to one of the endpoints of the continuum, (b) there is reasonable variation in ideal ratings as well as the actual ratings, and (c) discrepancies are positive for some individuals and negative for others. In many tasks where the ideal logically corresponds to one of the endpoints, it is not clear why subjects would choose an ideal score that did not correspond to the most desirable endpoint of the implicit continuum. Indeed, Wylie (1974, p. 92) noted that when subjects form their actual-self ratings they, in effect, use the favorable end of the response scale as an implicit ideal-self reference point so that the actual rating amounts to a discrepancy between the actual-self rating and this common ideal-self rating. From this perspective, it is not surprising that there is so little variability in ideal ratings and that much of the variance that does exist may be error variance associated with the apparent ambiguity of the task. In such situations, there is unlikely to be much support for actual-ideal discrepancy models.

Marsh and Roche (1996) devised new tests of discrepancy theory based on silhouette ratings. Students selected one of a number of silhouettes varied on a thin-obese continuum to represent their actual body image (what I actually look like today) and ideal body image (what I would ideally like to look like). Actual silhouette ratings were substantially correlated \( r = .62 \) with objective body composition (BMIs, girths, and skinfolds). Whereas body fat self-concept was substantially correlated to actual SMT ratings \( r = .66 \), it was even more highly correlated with actual-ideal discrepancies \( r = .76 \). There were similar (but smaller) patterns of relations for global physical self-concept and self-esteem. Actual-ideal discrepancy scores were more strongly related to self-concept than actual scores alone, thus supporting the traditional discrepancy model. Even stronger support for the actual-ideal discrepancy model was found when multiple regression was used to optimally weight the effects of actual and ideal body image in predicting different components of self-concept such as body fat, appearance, global physical, and global esteem self-concept.

In the present investigation we evaluate responses to the Physical Self Description Questionnaire (PSDQ; Marsh, Richards, Johnson, Roche, & Tremayne, 1994) and the SMT by three groups (normal, undiagnosed overweight, obese, see definition in the Method section) of Hong Kong children The PSDQ had not previously been translated into Chinese and used with Chinese students. Previous PSDQ studies have been based on responses by adolescents or adults, whereas most of the participants in this study were under the age of 12. Importantly, the PSDQ has not previously been used in research focusing specifically on obesity. Also of interest is the difference in self-concepts of undiagnosed obese students selected from a general population on the basis of BMIs and the diagnosed group of children specifically labeled as obese by virtue of their selection into an intervention program. In this study we also evaluate responses by these students to the SMT and relate their responses to the PSDQ.

**Methods**

**Instruments**

In the present investigation we evaluate responses to the Physical Self Description Questionnaire (PSDQ, see below) and the SMT by three groups (non-obese, overweight, and clinically obese) of Hong Kong children:

**Body Composition**

Body weight was measured using an electronic body weight scale. Height was measured using a stadiometer. Body mass index (BMI) was computed as the ratio of weight to height \( (kg/m^2) \). Percentage body fat assessed by the bio-impedance method was used to assess objective body fat.

**Physical Self Description Questionnaire (PSDQ)**

Physical self-concept was measured with the PSDQ (Marsh et al., 1994; Byrne, 1996), which consisted of 70 items designed to measure nine specific components of physical self-concept, global physical self-concept and global esteem (see Appendix for a summary of the scale). These subscales used in the PSDQ have been adapted from (i) the general self-concept constructs of the SDQ, (ii) the earlier version of the PSDQ, and (iii) other components parallel to those identified in physical fitness studies (e.g., the Australian...
Health and Fitness Survey; Marsh et al., 1994). Each item is a simple declarative statement in which responses vary along a 6-point true-false response scale. The PSDQ is designed for adolescents of age 12 years or older, but is also suitable for adults. Confirmatory factor analysis models of PSDQ responses have provided clear evidence for the 11 distinct physical self-concept components that the PSDQ is designed to measure, and have also demonstrated the replicability of the factor structure across gender (Marsh, 1993b; Marsh, Hey, Roche & Perry, 1997; Marsh et al., 1994). In sum, the PSDQ is a psychometrically strong instrument for measuring multiple dimensions of physical self-concept.

Because most PSDQ studies are based on responses to an English-language version of the instrument completed by Australian high school students, it is important to evaluate systematically the psychometric properties of responses to these instruments when applied in different countries—particularly when an instrument is translated into a different language. Hence, Marsh, Tomas & Asci (2002) used confirmatory factor analysis to evaluate the cross-national generalizability of the factor structure of the PSDQ. They found support for the invariance of factor loadings across all responses by Australian adolescents, Spanish adolescents, and Turkish university students and reported that the median coefficient alpha estimates of reliability were nearly identical in each of the three countries.

Using data considered in the present investigation, Hau, Sung, Yu, and Lau (2002) evaluated the appropriateness of the a priori factorial structure of the PSDQ for this sample of younger Chinese children aged 7-15. Results showed that the factor solution based on Chinese responses was well defined, with parameters (factor loadings and correlations) consistent with the a priori model. The subjective fit indexes as recommended by Marsh, Balla and Hau (1996) were good (e.g., root mean square error of approximation = RMSEA = .058), indicating that the Chinese PSDQ had well defined factors similar to those found in previous Western studies. Hau et al. then conducted a series of confirmatory factor analysis across responses by various subgroups, representing gender (boys vs. girls) and obesity status (obese vs. non-obese)—initially testing the goodness of fit for each group separately and then evaluating the extent to which increasing restrictive constraints (e.g., factor loadings the same in each group) led to significant decrements in fit. Because the change in RMSEA associated with invariance constraints for factor loadings, factor correlations, and factor variances was small (less than .01) in both sets of analysis, there was good support for the invariance of the PSDQ factor structure over gender and obesity groups. The results supported the applicability of the PSDQ in Chinese culture and suggested its potential usefulness in studies of childhood obesity.

Based on responses from the present investigation, each of the PSDQ scales has acceptable levels of reliability (coefficient alphas) for the total sample of Chinese students as well as for subsamples differing in relation to gender, age, and obesity status. Reliability estimates for the total sample (s = .66 to .93; Md = .74) are reasonably similar to those based on subsamples of boys (s = .67 to .93; Md = .77) and girls (s = .63 to .92; Md = .74), and those of obese (s = .62 to .87; Md = .87) and non-obese (s = .67 to .88; Md = .75) students. However, consistent with self-concept research more generally (e.g., Marsh, 1989), reliability estimates are somewhat lower for younger students aged 7-9 (s = .61 to .83; Md = .69) than those based on responses by older children aged 10-11 (s = .69 to .94; Md = .81) and aged 12-15 (s = .66 to .96; Md = .81).

**Silhouette Matching Task (SMT)**

The original SMT (Marsh & Roche, 1996; Stunkard, Sorenson & Schulsinger, 1983) consisted of nine body silhouette images that varied from very thin to very fat. Marsh (1999) suggested that a more differentiated scale was needed and expanded the SMT to include a set of 12 silhouette body images rather than the nine images on the original scale. For purposes of the present investigation, the two sets of 12 images—one for boys and one for girls—were redrawn to be more appropriate to participants of the present investigation in terms of their age and Chinese origin. Body self-image is assessed by self-matching to one of a set of outline silhouette pictures in relation to different questions considered in the present investigation (see Appendix). However, the main focus of the present investigation is on actual and ideal body image ratings, and discrepancies between the two that are the basis of the actual-ideal discrepancy model.

**Participants**

Three samples of primary school students are considered. The total sample consisted of 763 Hong Kong children (347 girls, 416 boys) aged 8 to 15 from mostly middle-class families. Sample 1 was a sample of 586 non-obese students from a cross-section of Hong Kong students. Sample 2 consisted of 95
(undiagnosed) obese students from this cross-section whose body mass indices (BMI) were above the age- and sex-specific international cut-off standards on the percentile curves (Cole, Bellizzi, Flegal & Dietz, 2000); this selection criterion is almost identical to using 120% of median weight for height as the cut-off standard (also see WHO Expert Consultation, 2004, for evaluation of BMI for Asian populations). Sample 3 consisted of 82 students who had previously been clinically diagnosed as obese and subsequently would take part in a clinical intervention. Mean BMIs in the three groups were 16.8 (non-obese), 22.8 (undiagnosed obese) and 25.0 (diagnosed obese).

**Statistical Analyses**

The statistical analyses consisted of correlations and multiple regression analyses. A major focus of the study was on the differences between three groups of students (non-obese, undiagnosed obese, and diagnosed obese). In order to facilitate comparisons, two orthogonal contrasts were constructed comparing non-obese students with the combined set of (diagnosed and undiagnosed) obese students, and comparing the diagnosed and undiagnosed obese students.

Although a large number of different items can be assessed in relation to the silhouettes, the focus of the present investigation is on actual and ideal body image ratings, and discrepancies between the two that are the basis of the actual-ideal discrepancy model. As described by Marsh and Roche (1996), support for the actual-ideal discrepancy model requires that the combination of actual and ideal ratings predicts self-concept better than actual ratings alone. Implicit in this rationale is the assumption that ideal ratings are thinner than actual ratings, so that actual ratings contribute negatively to self-concept (the more obese I am, the lower my self-concept), and ideal ratings contribute positively (the more obese my ideal standards, the higher my self-concept and the easier it is to obtain my ideal). Thus, actual-ideal discrepancies are positive and the larger these positive discrepancies, the more negative self-concepts are expected to be. This rationale may be reasonable for many areas where the ideal logically corresponds to one or the other endpoints. However, Marsh and Roche (1996) argue that it is dubious in areas like body image, in which ideal values take on intermediate values so that it is possible for discrepancies to be positive (actual > ideal) or negative (actual < ideal). In order to address this issue about the direction of actual-ideal discrepancies, we distinguish between raw and absolute actual-ideal discrepancies. Raw discrepancies (Act – Ideal) can take on positive values if actual ratings are larger than ideal ratings, and negative values if actual ratings are smaller than ideal ratings. Absolute discrepancies (|Act – Ideal|) are the unsigned (or absolute) value of raw discrepancies and, thus, can only take on positive values.

This juxtaposition of absolute and raw discrepancies complicates the predictions based on the actual-ideal discrepancy model. Whereas large positive discrepancies (actual > ideal, suggesting a desire to be more thin) should detract from self-concept, the critical issue is whether negative discrepancies (actual < ideal, suggesting desire to be fatter) contribute positively or negatively to self-concept. If negative discrepancies also detract from a favorable self-concept, then absolute discrepancies should contribute significantly to the prediction of self-concept beyond the contribution of actual, ideal, and raw discrepancy ratings. Support for either raw or absolute discrepancy scores would support an actual-ideal discrepancy model (i.e., some combination of actual and ideal ratings would predict self-concept more accurately than actual ratings alone), but the two scores have very different implications. In the present investigation we evaluate raw and absolute discrepancies separately and also consider two multiple regression models that optimally combine various components of actual and ideal SMT ratings. Whereas we expect the sizes of these effects to vary depending upon the specific component of self-concept (e.g., actual SMT ratings in particular are most highly related to body fat self-concept), a critical question is whether there are components of physical self-concept that are unrelated—or even positively related—to fatter body images and larger actual-ideal discrepancies.

**Results**

**Age and Gender Effects**

Consistent with self-concept research more generally (e.g., Marsh, 1989), there are small declines in self-concept responses with age. Interestingly, the one exception to this trend is for health self-concept, which is significantly positively related to age.

Boys have higher physical self-concepts in four of the PSDQ scales (strength, sport, endurance, and global physical). However, even these statistically significant gender differences are small and there are no significant differences in the remaining seven PSDQ scales. These gender differences in the 11 areas of physical self-concept are reasonably consistent across the preadolescent to early adolescent age range.
considered in the present investigation. There is a statistically significant age x gender interaction for only one scale; gender differences favoring boys in coordination self-concept became larger with age.

There were few age differences in the SMT responses, even though there were moderate increases in objective indicators of body fat (BMI, \( r = .26 \); and \%fat, \( r = .24 \); see Table 1). However, there were statistically significant increases with age for past SMT ratings (how students perceived themselves 6 months ago; \( r = .13 \)). SMT responses tended to be somewhat higher for girls than boys, although these differences were statistically significant for only five of the nine SMT items. Boys, more so than girls, felt that their body image would be thinner if they exercised, dieted, or did both. Although boys expected that they would be thinner than girls in future (what I will look like six months from now), they did not rate their body images as significantly different from those of girls in terms of actual body images (what I look like today) or past (what I looked like six months ago). In contrast, boys had slightly larger BMIs than girls, but did not differ from girls in percentage body fat.

Of particular relevance to the present investigation, boys had somewhat thinner ideal body images than did girls. Although the size of this gender difference is small, the direction of the difference is in contrast to most research, in which girls typically have much thinner ideal body images than do boys (Marsh, 2002; Tiggemann, 1992; also see Feingold & Mazzella, 1998; Cash, Morrow, Hrabosky & Perry, in press). In no cases did the effects of gender on any SMT responses tend to be somewhat higher for girls than boys, although these differences were not statistically significant increases with age.

**Obesity Effects**

Four indicators of obesity are summarized in Table 1. The two continuous measures, BMI and \%fat, are highly correlated (\( r = .85 \)). The non-obese vs. obese dichotomy represents a simple contrast between non-obese students and obese students (both “undiagnosed” obese students from the cross-section of students and the diagnosed obese students from the clinical sample). Not surprisingly, the obese vs. non-obese dichotomy is substantially related to both BMI (\( r = .80 \)) and \%fat (\( r = .77 \)). Hence, much—but certainly not all—of the variance in the continuous measure is captured in this simple dichotomy. Results of the second contrast (undiagnosed obese vs. diagnosed obese) indicate that whereas the undiagnosed group is somewhat less obese than the diagnosed group in terms of BMI (\( r = .09 \)) and \%fat (\( r = .21 \)), the differences are not large.

**Physical self-concept scales**

Correlations between both BMI and \%fat and the set of 11 physical self-concept (PSDQ) scales vary from close to zero to substantially negative (less favorable self-concepts associated with higher levels of BMI and \%fat). Not surprisingly, the largest correlations are with body fat self-concept (\( r = -.69 \) for BMI, \( r = -.71 \) for \%fat). The very large size of these correlations between this self-concept scale and objective measures, provides clear support for the construct validity of the self-concept responses. Interestingly, whereas appearance self-concept is also negatively related to these objective measures, the sizes of these correlations are much smaller (\( rs \) of -.21 and -.17). This substantial difference in the sizes of the two sets of correlations supports the contention by Marsh et al. (1994) that these two components of physical self-concept are sufficiently distinct that it is important to measure them separately. Obviously, this distinction is particularly relevant in a study of obesity. Other than body fat self-concept, the strongest relations with objective measures are for the global physical self-concept scale and the specific sport, flexibility, coordination, and endurance self-concept scales. All of these relations are negative—higher levels of obesity are associated with less favorable self-concepts.

Whereas global self-esteem is negatively related to BMI, the relation is small (\( r = -.11 \)) and the corresponding relation with \%fat is not even statistically significant. This suggests that obesity is not a particularly important concern for these Hong Kong students in how they feel about themselves overall. Even more interesting, perhaps, are the small positive relations between objective measures and health and strength self-concepts. The positive relation between BMI and strength self-concept is realistic in that other research (e.g., Marsh, 2002) shows that BMI does have a small positive relation with many objective measures of strength as well as strength self-concept. More surprising, however, is the positive correlation between \%fat and health self-concept (\( r = .16 \)), although the corresponding positive correlation with BMI (\( r = .06 \)) is not statistically significant. The positive direction of these relations indicates that Hong Kong student may perceive obesity—rather than a lack of obesity—as being positively related to physical health. The pattern of differences between the combined obese group and the normal group reflects the same pattern of results as the continuous measures. However, as is typical when a continuous measure is dichotomized, the relations are somewhat weaker. Again, clearly the largest difference is for body fat self-concept,
Table 1
Physical Self-concept and Silhouette Matching Scores: Relations with Age, Gender, and Obesity (OB)

<table>
<thead>
<tr>
<th>Age X</th>
<th>BMI</th>
<th>%fat</th>
<th>Non-OB</th>
<th>Undiag OB vs.</th>
<th>Diagnosed OB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Sex</td>
<td>Sex</td>
<td></td>
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</tbody>
</table>

Self-concept Ratings

<table>
<thead>
<tr>
<th>Rating</th>
<th>Age X</th>
<th>BMI</th>
<th>%fat</th>
<th>Non-OB</th>
<th>Undiag OB vs.</th>
<th>Diagnosed OB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
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<td>.05</td>
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<td>-.21*</td>
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<td>.15*</td>
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<td>Body Fat</td>
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<td>-.71*</td>
<td>.64*</td>
</tr>
<tr>
<td>Coordination</td>
<td>-.11*</td>
<td>.06</td>
<td>-.08*</td>
<td>-.24*</td>
<td>-.21*</td>
<td>.18*</td>
</tr>
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<td>-.18*</td>
<td>-.24*</td>
<td>.11*</td>
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<td>-.34*</td>
<td>.18*</td>
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<td>.18*</td>
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<td>.02</td>
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<td>.05</td>
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Silhouette Ratings

<table>
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<th>Rating</th>
<th>Age X</th>
<th>BMI</th>
<th>%fat</th>
<th>Non-OB</th>
<th>Undiag OB vs.</th>
<th>Diagnosed OB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self Actual (ACT)</td>
<td>.07</td>
<td>-.06</td>
<td>-.06</td>
<td>.60*</td>
<td>.61*</td>
<td>-.53*</td>
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<td>-.04</td>
<td>-.02</td>
<td>.56*</td>
<td>.57*</td>
<td>-.50*</td>
</tr>
<tr>
<td>Self Future</td>
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<td>-.10*</td>
<td>-.04</td>
<td>.32*</td>
<td>.29*</td>
<td>-.27*</td>
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<td>If exercised</td>
<td>.03</td>
<td>-.14*</td>
<td>-.02</td>
<td>.12*</td>
<td>.10</td>
<td>-.08</td>
</tr>
<tr>
<td>If dieted</td>
<td>-.06</td>
<td>-.14*</td>
<td>-.01</td>
<td>.05</td>
<td>-.03</td>
<td>-.02</td>
</tr>
<tr>
<td>If exercise &amp; diet</td>
<td>-.13*</td>
<td>-.14*</td>
<td>-.03</td>
<td>-.09*</td>
<td>-.13*</td>
<td>.09*</td>
</tr>
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<td>-.01</td>
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<td>-.01</td>
<td>-.02</td>
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<td>-.07</td>
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<td>.43*</td>
<td>-.38*</td>
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Demographics

<table>
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<tr>
<th>Rating</th>
<th>Age X</th>
<th>BMI</th>
<th>%fat</th>
<th>Non-OB</th>
<th>Undiag OB vs.</th>
<th>Diagnosed OB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.00</td>
<td>.08*</td>
<td>.03</td>
<td>.26*</td>
<td>.24*</td>
<td>-.11*</td>
</tr>
<tr>
<td>Sex (M=1, F=0)</td>
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<td>1.00</td>
<td>-.01</td>
<td>.12*</td>
<td>.06</td>
<td>-.12*</td>
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<tr>
<td>Age x Sex</td>
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<td>1.00</td>
<td>.03</td>
<td>-.04</td>
<td>.00</td>
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</table>

Body Composition

<table>
<thead>
<tr>
<th>Rating</th>
<th>Age X</th>
<th>BMI</th>
<th>%fat</th>
<th>Non-OB</th>
<th>Undiag OB vs.</th>
<th>Diagnosed OB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body Mass Index (BMI)</td>
<td>.26*</td>
<td>.12*</td>
<td>.03</td>
<td>1.00</td>
<td>.85*</td>
<td>-.80*</td>
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<tr>
<td>%fat</td>
<td>.24*</td>
<td>.06</td>
<td>-.04</td>
<td>.85*</td>
<td>1.00</td>
<td>-.77*</td>
</tr>
<tr>
<td>Non-OB vs. OB</td>
<td>-.11*</td>
<td>-.12*</td>
<td>.00</td>
<td>-.80*</td>
<td>-.77*</td>
<td>1.00</td>
</tr>
<tr>
<td>Undiag OB vs. Diag OB</td>
<td>-.13*</td>
<td>-.00</td>
<td>-.02</td>
<td>-.09*</td>
<td>-.21*</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Note. Non-OB vs. OB: Non-obese = 1, obese = 0. Undiag OB vs. Diag: Undiagnosed obese students from general population = 1, diagnosed obese students from clinical sample = -1.
although there are significant differences in favor of the non-obese group for global physical, sport, flexibility, coordination, endurance, and appearance self-concepts. There are no significant differences between the two groups in terms of global self-esteem, whereas the obese group has significantly more positive strength and health self-concepts.

There are almost no significant differences between the two (diagnosed and undiagnosed) obese groups, even though the diagnosed clinical group has slightly larger BMIs ($r = -0.09$) and %fat ($r = -0.21$). In fact, the only statistically significant relation with any physical self-concept scale is for body fat self-concept. Hence, the results suggest that there is apparently no stigma associated with being in the clinical treatment group when compared to values in the undiagnosed obese group.

Silhouette ratings

Correlations between the set of nine SMT items and both continuous measures of body composition (BMI and %fat) vary from close to zero to substantially negative. Of particular relevance, the highest correlation with each objective measure is for actual SMT ratings (what I look like today), $r$s of .60 and .61 respectively. However, correlations are nearly as high for SMT past ratings (what I looked like 6 months ago) and SMT other actual ratings (what others think I look like). Reflecting an apparent optimism, SMT future ratings (what I will look like six months from now) are substantially less correlated with the objective measures of body fat (.32 and .29 respectively), whereas the three SMT items asking what participants would look like if they dieted or exercised regularly are nearly unrelated to continuous measures of body composition. Of particular relevance, SMT ideal ratings (what I would ideally like to look like) are uncorrelated with BMI and %fat. Hence, ideal standards do not vary with actual body composition. Students differing substantially in terms of actual levels of obesity have similar ideal standards of how they ideally would like to look.

Again, the pattern of results for the continuous body composition measures is also reflected in the differences between the combined obese group and non-obese group. In particular, the group differences are largest for actual, past actual, and other actual SMT ratings, whereas there are no significant differences between groups in terms of ideal SMT ratings. Also, with the exception of body image if exercised regularly, there are no significant differences between diagnosed and undiagnosed obese groups.

Relations Between SMT and PSDQ Ratings: Actual-Ideal Discrepancy Models

In this section we evaluate relations between SMT ratings and physical self-concept ratings, with particular emphasis on various combinations of actual and ideal SMT ratings. As noted earlier, it is important to distinguish between raw and absolute actual-ideal discrepancies. Raw discrepancies, labeled (Act – Ideal) in Table 2, can take on positive values if actual ratings are larger than ideal ratings, and negative values if actual ratings are smaller than ideal ratings. Absolute discrepancies, labeled |Act – Ideal| in Table 2, are the unsigned (or absolute) value of discrepancies and, thus, can only take on positive values.

For most of the PSDQ scales, actual body image ratings are negatively related to self-concept and more negatively related than any of the other SMT ratings. The largest relation is the negative correlation between body fat self-concept and actual SMT ratings, although correlations with past SMT (what I looked like six months ago) and other actual SMT ratings (what others think I actually look like) are almost as negative. These results support the construct validity of the PSDQ responses in relation to the SMT body image ratings. As observed with the objective body composition and obesity groups, important exceptions to this trend occur for strength and health self-concepts that are positively related to SMT actual ratings, and for global esteem self-concept that is unrelated to SMT actual ratings. Also of particular relevance, SMT ideal body image ratings are not significantly related to any of the self-concept ratings.

We now move to evaluation of the raw (signed) actual-ideal discrepancy ratings. These provide only modest support for the actual-ideal discrepancy model. Whereas the raw discrepancy scores are more highly correlated with some self-concept scores than the actual SMT ratings alone, the differences tend to be small. Support is somewhat stronger for the corresponding multiple regression Model 1 (Table 2), which provides the optimally weighted combination of the SMT actual and ideal ratings. However, the contribution of the ideal ratings is statistically significant for only 3 of 11 self-concept factors (body fat, flexibility, and global physical self-concept). Nevertheless, for each of these three self-concept scores, the pattern of results is consistent with predictions based on the actual-ideal discrepancy model (i.e., negative effects of actual body image, positive effects of ideal body image). Again, however, it is important to note that actual ratings contribute positively—not negatively—to health and strength self-concept ratings, whereas not even the combination of actual and ideal SMT ratings contributed significantly to the prediction of global self-esteem.
Table 2
Relations Between Physical Self-concept and Silhouette Matching Scores

<table>
<thead>
<tr>
<th>Physical Self-concept Factors</th>
<th>APPR</th>
<th>BFAT</th>
<th>CORD</th>
<th>ENDR</th>
<th>FLEX</th>
<th>HEAL</th>
<th>SPRT</th>
<th>STRG</th>
<th>PACT</th>
<th>GPSC</th>
<th>ESTM</th>
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</thead>
<tbody>
<tr>
<td>Self Actual (ACT) r</td>
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<td>-.69*</td>
<td>-.13*</td>
<td>-.10*</td>
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<td>-.13*</td>
<td>.19*</td>
<td>.00</td>
<td>-.20*</td>
<td>-.06</td>
</tr>
<tr>
<td>Self Past</td>
<td>-.10*</td>
<td>-.64*</td>
<td>-.06</td>
<td>-.07</td>
<td>-.09*</td>
<td>.11*</td>
<td>-.10*</td>
<td>.18*</td>
<td>-.02</td>
<td>-.17*</td>
<td>-.08*</td>
</tr>
<tr>
<td>Self Future</td>
<td>-.10*</td>
<td>-.42*</td>
<td>-.04</td>
<td>-.08*</td>
<td>-.07</td>
<td>.06</td>
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<td>-.09*</td>
<td>-.03</td>
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<td>If exercised</td>
<td>r</td>
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<td>-.03</td>
<td>-.02</td>
<td>-.03</td>
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<td>-.05</td>
<td>.08*</td>
<td>-.03</td>
<td>-.02</td>
</tr>
<tr>
<td>If dieted</td>
<td>r</td>
<td>-.02</td>
<td>-.16*</td>
<td>-.02</td>
<td>-.02</td>
<td>-.03</td>
<td>.02</td>
<td>-.05</td>
<td>.04</td>
<td>-.04</td>
<td>-.00</td>
</tr>
<tr>
<td>If exercise &amp; diet</td>
<td>r</td>
<td>-.02</td>
<td>.06</td>
<td>-.01</td>
<td>.01</td>
<td>.04</td>
<td>-.09*</td>
<td>-.02</td>
<td>-.02</td>
<td>-.03</td>
<td>.05</td>
</tr>
<tr>
<td>Self Ideal</td>
<td>r</td>
<td>-.01</td>
<td>-.01</td>
<td>.03</td>
<td>.02</td>
<td>.07</td>
<td>-.02</td>
<td>-.03</td>
<td>-.01</td>
<td>.03</td>
<td>.06</td>
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<td>Other actual</td>
<td>r</td>
<td>-.07</td>
<td>-.63*</td>
<td>-.09*</td>
<td>-.07</td>
<td>-.10*</td>
<td>.12*</td>
<td>-.11*</td>
<td>.18*</td>
<td>-.00</td>
<td>-.17*</td>
</tr>
<tr>
<td>Other should</td>
<td>r</td>
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<td>-.47*</td>
<td>-.08*</td>
<td>-.04</td>
<td>-.04</td>
<td>.06</td>
<td>-.09*</td>
<td>.12*</td>
<td>-.01</td>
<td>-.10*</td>
</tr>
</tbody>
</table>

Composite Scores

(Act – Ideal) r = -.11* -.67* -.15* -.11* -.20* .12* -.11* .18* -.02 -.23* -.07
| Act – Ideal | r = -.21* -.46* -.22* -.20* -.28* -.04 -.20* -.05 -.08* -.35* -.16*

Mult Regression Model 1

Actual beta = -.13* -.75* -.15* -.12* -.20* .13* -.13* .20* -.01 -.24* -.07
Ideal beta = .03 .22* .08 .06 .13* .06 .01 -.07 .03 .13* .00
Multi R = .12* .72* .14* .12* .20* .13* .13* .20* .03 .23* .07

Mult Regression Model 2

Actual beta = -.06 -.66* -.07 -.05 -.10* .17* -.06 .26* .02 -.12* -.01
Ideal beta = -.02 .16* .02 .01 .06 -.09* .01 -.11* .01 .04 .00
|Act – Ideal| beta = -.20* -.24* -.19* -.19* -.24* -.10* -.19* .15* -.09* -.30* -.16*
Multi R = .22* .75* .23* .21* .30* .16* .22* .24* .09 .36* .16*

Note. Self-concept Ratings: APPR = Appearance; BFAT = Body Fat; CORD = Coordination; ENDR = Endurance; FLEX = Flexibility; HEAL = Health; SPRT = Sport; STRG = Strength; PACT = Physical Activity; GPSC = Global physical; ESTM = Self-esteem. ( Act – Ideal ) = raw (signed) actual-ideal discrepancy; | Act – Ideal | = absolute value (signed) of actual-ideal discrepancy. r = correlation; beta = standardized beta weight.

Finally, we consider the absolute (signed) discrepancy scores. For most of the self-concept scores, the absolute discrepancies are more highly correlated with self-concept than either the actual SMT rating alone or the raw actual-ideal discrepancy score. However, stronger support for the actual-ideal discrepancy model comes from multiple regression Model 2 (Table 2), which provides the optimal combination of the actual, ideal, and absolute discrepancy scores. In this multiple regression model, absolute discrepancies contribute significantly to all 11 physical self-concept factors. In contrast, ideal SMT ratings contribute significantly to only three self-concept ratings. Furthermore, even for these three, the contributions of the absolute discrepancy score are greater than those of the ideal SMT. Whereas the actual body image continues to contribute significantly to five of the self-concept scores, its contribution is largest for only three self-concepts. Body fat self-concept is still largely a negative function of actual body image, although ideal and absolute discrepancies each contribute significantly.
Discussion and Conclusion

The results provide clear support for the convergent and discriminant validity of PSDQ responses in terms of objective measures of body composition (BMI and %fat) and SMT body image ratings, as well as for the psychometric properties of the PSDQ instrument for this sample of young Hong Kong students. Of particular relevance, the results demonstrated the need to separate body fat self-concept from other aspects of physical self-concept, including physical appearance. Whereas there is a growing research literature in support of the PSDQ in various cross-national comparisons (e.g., Marsh, Tomas & Asci, 2002), our research supported the construct validity of PSDQ responses in a non-Western (Chinese) country, and for participants younger than those considered previously. There was also support for the appropriateness of the PSDQ responses for boys and for girls, and for the obese and non-obese students who were a specific focus of the present investigation.

We began by considering age and gender differences in physical self-concept, SMT, and body composition measures. Consistent with other self-concept research, there was a modest decline in self-concept with age. However, the results of the present investigation are important in that the age range considered here—covering the preadolescent to early adolescent period—is broader and includes younger participants than are typically considered in physical self-concept research (e.g., Marsh, 2002). In contrast, gender differences were smaller for these results than is typically reported in physical self-concept research generally, and particularly in the two Australian studies considered here. Thus, whereas boys did have somewhat higher physical self-concepts in the predicted areas (strength, sport, endurance, global physical), the sizes of these differences were small, no other significant gender differences were statistically significant, and the small sizes of these gender differences were reasonably consistent over age. Even more surprising was the finding that girls had SMT ideal body images that were somewhat fatter than those expressed by boys, even though there were no significant gender differences in SMT actual body images. These results apparently reflect traditional Chinese value of fuller figures for women than is found in most Western societies.

A major focus of the present investigation was on the differences between the three obesity groups. Comparisons between obese and non-obese students largely mirrored relations between corresponding continuous measures of body composition (BMI and %fat). Not surprisingly, given that the obesity groups were essentially a dichotomized version of the corresponding continuous measures, less variance was explained by the group differences than the continuous measures. This suggests that it is important for obesity research to focus on actual measures of body composition instead of—or in addition to—crude grouping measures that classify participants into a small number of discrete groups. More important, perhaps, was the nature of group differences. As expected, the largest difference between obese and non-obese students was for the PSDQ body fat self-concept measure and, to a lesser extent, the SMT actual, past, and other actual ratings. Whereas obese students had significantly lower self-concepts than non-obese students in most other areas of physical self-concept, there were no significant differences between the two groups in terms of global self-esteem, and obese students had marginally higher levels of health self-concept. Consistent with a priori predictions, these results demonstrate that being overweight has much smaller negative consequences for self-perceptions of Hong Kong students than the two Australian studies considered here.

An ongoing issue in self-concept research is the issue whether self-concept can be adequately captured in terms of a single self-esteem score (unidimensional model) or whether it is better described by a multidimensional profile of self-concept scores (multidimensional model). The results of the present investigation provide clear and unambiguous support for the multidimensional perspective. In particular, relations between obesity and different self-concept factors varied from substantially negative to slightly positive, whereas self-esteem was almost unrelated to all the measures of obesity. In summary, our Hong Kong results provide important new evidence in support of the growing body of research pointing to the inadequacy of a unidimensional model of self-concept.

We were also interested in differences between the diagnosed and undiagnosed obese groups. Particularly because the potential success of an obesity intervention depends on ongoing motivation to maintain weight loss following the intervention, such negative effects on self-concept are important. Thus, a well-established set of results in other areas of research has found that there are reciprocal effects between specific areas of self-concept and corresponding areas of accomplishment (e.g., academic self-concept and academic achievement; Marsh & Craven, in press; Marsh, Hau & Kong, 2002; Valentine, DuBois & Cooper, 2004), so that changes in either one are likely to affect the other. Hence, the best way to improve either self-concept or accomplishments is to simultaneously target both self-concept and accomplishments.
From this perspective, we were concerned that that being specifically targeted as being obese as part of a clinical diagnosis would intensify the negative effects of obesity on self-concept. However, even though the diagnosed obese group was slightly more obese than the undiagnosed obese group in terms of objective body composition measures (BMI and %fat), the two groups had remarkably similar profiles of scores across the PSDQ and SMT ratings. Hence, the diagnosed group apparently suffered no additional debilitating stigma associated with being diagnosed as being overweight.

Based on SMT responses there is a growing body of research in support of the actual-ideal discrepancy model. This support may reflect the particularly tangible nature of the SMT response scale, which is anchored to silhouette body images rather than the verbal labels typically used on Likert response scales. However, the support also apparently reflects the nature of the thin-fat continuum in this body image research, where “ideal” ratings are more relevant than on many continua where the ideal category logically corresponds to one end of the continuum. Whereas the results of the present investigation clearly provide support for the actual-ideal discrepancy model, the nature of this support is more complex than in the typical tests of the model. In particular, the calculated actual-ideal discrepancy scores were not substantially more highly correlated with many components of self-concept than the actual rating alone. Furthermore, even when multiple regression was used to weight the actual and ideal SMT ratings optimally, the contribution of the ideal rating was typically nonsignificant. There was, however, much stronger support for the absolute discrepancy score in which deviations from the ideal SMT rating in either direction (i.e., being too thin relative to one’s ideal, as well as being too fat) were associated with lower self-concept. Consistent with a priori predictions based on the traditional value of moderation in Chinese society, these results again suggest that for Hong Kong students there is not such a preoccupation with being overweight, and its negative consequences for self-concept.

**Limitations, and Directions For Further Research**

Implicit in interpretations of the present investigation is the assumption that obesity, body composition, and body image influence multiple dimensions of physical self-concept. Although plausible, it is clearly inappropriate to draw conclusions about the direction of the causal ordering of variables based on correlational data. Although causal inferences should always be made cautiously, stronger tests of the direction of causality are possible when longitudinal data are available. Thus, for example, a growing body of educational research shows reciprocal effects between prior measures of academic self-concept and achievement on subsequent measures of these same constructs; self-concept is both a cause of subsequent accomplishments and an effect of prior accomplishments. These results have important implications for intervention, implying that optimal effects can be achieved by simultaneously targeting both self-concept and performance outcomes. Whereas it is premature to suggest that this pattern of results would generalize to physical self-concept and obesity (Marsh, 1999), this is an important direction for future research.

Particularly when a group of individuals is specifically targeted as a consequence of some socially undesirable characteristic, there is a danger of stigmatization and of negative consequences associated with the negative label. In the present investigation, for example, we were concerned that children in the clinically obese group targeted for intervention would suffer negative self-concepts that might undermine any positive effects of a subsequent intervention. However, the profiles of physical self-concept and SMT ratings for the diagnosed and undiagnosed obese groups were remarkably similar, even though the clinically obese group was slightly more obese. This suggests that there was no substantial undesirable stigma associated with being targeted to be in the obesity intervention. We caution, however, that this apparent lack of stigmatization may not generalize to other settings. In particular, one of the most interesting findings in the present investigation was that obesity apparently does not have the socially undesirable connotations for Hong Kong children that it has for children in Western countries. Hence, perhaps, it is not surprising that being targeted to be in an obesity intervention apparently has no associated negative stigma. However, this result may not generalize to other cultures where there is a substantial negative stigma associated with obesity. More generally, we note that grouping participants together who are similar in relation to some salient characteristic can alter the frame of reference that they use to form self-evaluations, in ways that either increase or decrease corresponding areas of self-concept (e.g., Marsh and Craven, 2002; Marsh, Kong and Hau, 2000). Hence, whereas this is an important issue, further research is needed to evaluate the generalizability of results and interpretations based on the present investigation.

In conclusion, our results support the usefulness of responses to the PSDQ and SMT ratings in obesity research, and the multidimensional perspective to self-concept that underpins our research. The results also support the generalizability of psychometric properties of these measures for Hong Kong pre-
and early-adolescents, and for the construct validity of these psychological measures in relation to objective measures of body composition.

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Appendix

Summary of the Content of Scales on the Physical Self Description Questionnaire (PSDQ) and Silhouette Matching Task (SMT)

<table>
<thead>
<tr>
<th>Scale Summary</th>
<th>Physical Self Description Questionnaire (PSDQ)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appearance:</strong></td>
<td>Being good looking, having a nice face</td>
</tr>
<tr>
<td><strong>Strength:</strong></td>
<td>Being strong, a powerful body, lots of muscles</td>
</tr>
<tr>
<td><strong>Condition/Endurance:</strong></td>
<td>Being able to run a long way without stopping, not tiring easily when exercising hard</td>
</tr>
<tr>
<td><strong>Flexibility:</strong></td>
<td>Being able to bend and turn your body easily in different directions</td>
</tr>
<tr>
<td><strong>Health:</strong></td>
<td>Not getting sick often, getting well quickly</td>
</tr>
<tr>
<td><strong>Coordination:</strong></td>
<td>Being good at coordinated movements, being able to do physical movements smoothly</td>
</tr>
<tr>
<td><strong>Activity:</strong></td>
<td>Being physically active, doing lots of physical activities regularly</td>
</tr>
<tr>
<td><strong>Body Fat:</strong></td>
<td>Not being overweight, not being too fat</td>
</tr>
<tr>
<td><strong>Sport:</strong></td>
<td>Being good at sports, being athletic, having good sports skills</td>
</tr>
<tr>
<td><strong>Global Physical:</strong></td>
<td>Feeling positive about one’s physical self</td>
</tr>
<tr>
<td><strong>Global Esteem:</strong></td>
<td>Overall positive feelings about self</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scale Summary</th>
<th>Silhouette Matching Task (SMT)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self Actual</strong></td>
<td>What do you look like today?</td>
</tr>
<tr>
<td><strong>Self Past</strong></td>
<td>What did you look like 6 months ago?</td>
</tr>
<tr>
<td><strong>Self Future</strong></td>
<td>What will you look like 6 months in the future?</td>
</tr>
<tr>
<td><strong>If exercised</strong></td>
<td>What would you look like if you exercised regularly?</td>
</tr>
<tr>
<td><strong>If dieted</strong></td>
<td>What would you look like if you followed a healthy diet?</td>
</tr>
<tr>
<td><strong>If exercised &amp; dieted</strong></td>
<td>What would you look like if you exercised regularly and followed a healthy diet?</td>
</tr>
<tr>
<td><strong>Self Ideal</strong></td>
<td>If you were completely free to choose, how would you ideally like to look?</td>
</tr>
<tr>
<td><strong>Other actual</strong></td>
<td>What do other people think you look like?</td>
</tr>
<tr>
<td><strong>Other should</strong></td>
<td>What do other people who are important to you think you really should look like?</td>
</tr>
</tbody>
</table>

*Note:* In the SMT, participants select one of a set of outline silhouette pictures that vary on a very fat to very thin continuum in relation to each of the nine different questions presented here (although different studies have considered a wide variety of different items).