

Body esteem in Chinese adolescents: Effect of gender, age, and weight

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Abstract

This study examined the associations of body esteem with gender, age, and Body Mass Index (BMI) among 905 Hong Kong adolescents using the Body-Esteem Scale (BES). Older age, male gender and lower BMI were associated with better body esteem. Multiple regression analyses indicated significant main effects of gender, age and weight on BES-Total. Significant interaction effects of gender \times BMI and gender \times age \times BMI were also found on BES-Weight (beta = -0.149 , $p = .028$) and BES-Total (beta = -0.139 , $p = .044$). Improvement of body esteem with age may be associated with age-related BMI differences.

Keywords

body esteem, weight, adolescents

Body esteem is a concept of self-appraisal of one's own body (Mendelson and White, 1985), relating to different aspects of self-esteem directly (Franzoi and Shields, 1984; Mendelson and White, 1985) or indirectly via self-perceptions and well-being (Harter, 1990). A variety of international studies suggest that poor body esteem is associated with restraint and emotional eating (Hoare and Cosgrove, 1998), dieting and bulimia (Filaire et al., 2007), as well as other psychological problems (Smolak and Levine, 2001).

Adolescence is a stage with dramatic physical and cognitive changes (Elkind, 1967; Lapsley et al., 1986), differentially affecting body esteem according to gender, age (Mendelson and White, 1985; Mendelson et al., 1995), and weight status (e.g. French et al., 1995; Kertesz et al., 1992; Mendelson and White, 1982). Body esteem was also found to explain a high proportion of

variance in self-esteem in both normal weight and obese primary (Mendelson and White, 1982) and secondary school students (Hoare and Cosgrove, 1998).

Mixed information about body esteem has been generated with different assessment questions (Franzoi and Shields, 1984), figure ratings (Collins, 1991), methods of observations and interviews (Allon, 1979). The Body-Esteem

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Scale (BES) developed by Mendelson and White (1982) for assessing perceptions about weight and appearance, has exhibited satisfactory reliability and validity in children and adults (Mendelson and White, 1982, 1985). The modified version of BES has also presented good psychometric validity in adolescent boys (Mendelson et al., 2001) and girls (Clark and Tiggemann, 2007; Davison et al., 2007; Kornblau et al., 2007).

Sociocultural differences may contribute to the perplexing results of body esteem (Cafri et al., 2005). In western adolescents, poorer body esteem has been consistently reported in girls when compared with boys (Duncan et al., 2004; Franko and Striegel-Moore, 2002; Neumark-Sztainer et al., 2002). Rosenblum and Lewis (1999) also found a significant main effect of gender, and interaction of gender and age on body image. Asian children in the UK tended to have poorer body esteem than their Caucasian peers (Hill and Bhatti, 1995). With a low prevalence of underweight status, comparisons of body esteem in western adolescent populations were mostly limited between the normal weight and overweight groups (Banitt et al., 2008; Mirza et al., 2005). Furthermore, interactions of age, gender and Body Mass Index (BMI) were not investigated (French et al., 1995; Kertesz et al., 1992; Mirza et al., 2005). Information on the relations between self-esteem and physical health outcomes in Hong Kong adolescents is limited (Li et al., 2010). We hypothesized that the differences of body esteem across age groups may be attributed to age-related BMI differences in adolescents. This study aimed to examine the relations of body esteem to gender, age, and weight status.

Methods

A total of 905 Chinese adolescents (55.2% boys) aged 12–18 ($M = 14.7$, $SD = 1.9$) from a secondary school were invited to participate in this study in the year 2007 with a response rate of 98%. Their body height was measured in bare feet with a tape fixed on a vertical wall, and taken to the

nearest 0.1 cm during the physical education lessons. Moreover, body weight was measured with light clothing to the nearest 0.1 kg using an electronic scale. Each participant was measured once by trained teachers or researchers using validated equipment, following a modified protocol (Norton and Olds, 1996). All participations were voluntary and ethical approval was obtained from the University Research Ethics Committee.

BMI was computed (weight (kg)/height squared (m^2)) and used to classify the participants into normal, underweight, and overweight/obese groups according to the gender-and-age-specific cut-offs of the International Obesity Task Force (IOTF) standard (BMI values of 25 and 30 kg/m^2 at the age of 18) (Cole et al., 2000), and the underweight cut-offs for adolescents derived from the World Health Organisation (WHO) thinness cutoffs (BMI value of 17 kg/m^2 at the age of 18) (Cole et al., 2007).

Moreover, participants' body esteem was assessed by the 23-item BES (Mendelson et al., 2001) constituting three subscales: (a) Appearance (BES-Appearance) with 10 items for assessing individuals' general feelings about appearance; (b) Attribution (BES-Attribution) with five items for assessing individuals' evaluations of others' attribution about one's body and appearance; and (c) Weight Concern (BES-Weight) with eight items for assessing one's satisfaction with one's own weight. All responses are in five-point Likert scale from 'never' (score = 0) to 'always' (score = 4). The summary scores for each subscale and the total are computed by simple addition. A higher BES score indicates a higher level of body esteem.

To examine the associations of body esteem with gender, age, and BMI, hierarchical multiple regression analyses were conducted using both individual domains and overall body-esteem score as the dependent variables. The main effects of age, gender, and BMI were entered as a set into the regression models, followed by the three two-way (age \times gender, age \times BMI, gender \times BMI) and one three-way (age \times gender \times BMI) interaction terms. All the BE scores, predictors and interaction terms were standardized in the regression equations.

Table 1. Basic and anthropometric characteristics of the participants

Mean (SD)	Boys (n = 500)	Girls (n = 405)	p
Age (year)	14.6 (1.9)	14.8 (1.9)	.33
Height (cm)	164.4 (10.4)	156.9 (7.0)	<.001
Weight (kg)	56.5 (13.4)	50.7 (10.3)	<.001
BMI (kg/m ²)	20.7 (3.9)	20.5 (3.6)	.38
Weight status (n, %)			
Underweight	59 (11.8)	57 (14.1)	.04
Normal	335 (67.0)	290 (71.6)	
Overweight/obese	106 (21.2)	58 (14.3)	
BES			
BES-Appearance	21.5 (4.7)	21.1 (5.2)	.21
BES-Weight	15.4 (5.0)	13.3 (5.7)	<.001
BES-Attribution	5.4 (4.3)	5.6 (4.0)	.38
BES-Total	42.3 (10.2)	40.1 (11.1)	.001

Note: Chi-square test for categorical variables and t-test for continuous variables.

Results

In Table 1, a total of 11.8% of boys and 14.1% of girls were underweight, and 21.2% of boys and 14.3% of girls were overweight/obese. The internal consistency estimate for BES-Appearance, BES-Attribution, BES-Weight and the overall BES is 0.53, 0.85, 0.74 and 0.78, respectively.

In general, the BES-Total score increased with age in both boys and girls (Fig. 1). Furthermore, age, gender, and BMI were all significantly related to BES-Weight and BES-Total (Table 2). Older age, $\beta = 0.20$, $p < .001$, male gender, $\beta = -0.2384$, $p < 0.001$, lower BMI, $\beta = -0.21$, $p < .001$, were all associated with higher level of overall body esteem. However, for BES-Appearance and BES-Attribution, only the main effect of age (BES-Appearance: $\beta = 0.093$, $p = .005$; BES-Attribution: $\beta = 0.24$, $p < .001$), and BMI was significant (BES-Appearance: $\beta = -0.087$, $p = .009$; BES-Attribution: $\beta = -0.10$, $p = .002$). Among the interaction terms tested, only gender \times BMI, $\beta = -0.127$, $p = .048$, and age \times gender \times BMI, $\beta = -0.149$, $p = .028$, were significantly related to BES-Weight (Figs. 2 and 3). This indicates that the inverse impact of higher BMI on BES-Weight was more prominent in girls. Moreover, partial correlations between BMI and BES-Weight with age controlled were calculated in both sexes. The partial correlations

between BMI and BES-Weight with age controlled were -0.23 ($p < .001$) in boys and -0.31 ($p < .001$) in girls. After controlling for BMI, age significantly correlated with BES-Weight in boys, $r = 0.17$, $p < .001$, but not in girls, $r = 0.07$, $p = .17$ (data not shown in tables). In other words, BMI explained an additional 5.29% and 9.30% of variance of BES-Weight in addition to the effects of age. In addition to the effects of BMI, age explained a further 2.89% and 0.49% of variance of BES-Weight in boys and girls, respectively.

The regression model encompassing gender, age and BMI explained well all domains of body esteem; and the proportion of variance explained was the largest for BES-Weight, 12.4%, $p < .001$, and the least for BES-Appearance, 2.3%, $p = .004$. The proportion of variance explained by the three factors (gender, age, and BMI) for the BES-Total was 9.5% ($p < .001$). Furthermore, significant three-way interaction (age \times gender \times BMI) effects on BES-Weight ($p = 0.028$) and BES-Total ($p = 0.044$) were found in the models.

Discussion

We have found a low body esteem in Hong Kong adolescents. Previous findings have also shown that a relatively higher proportion of Hong Kong

Table 2. Regression of Body-Esteem Scale (BES) scores on main effects and interactions of gender, age, and Body Mass Index (BMI)

Subscale, step, and variable	<i>r</i>	B	SE	<i>p</i>	ΔR ²	R ²
BES-Appearance						
Block 1					0.017**	0.017
Gender	-0.041	-0.094	0.066	.157		
Age	0.086	0.093	0.033	.005		
BMI	-0.08	-0.087	0.033	.009		
Block 2					0.005	0.021
Age × BMI	0.049	0.045	0.034	.184		
Age × Gender	0.086	0.022	0.067	.747		
BMI × Gender	-0.06	0.11	0.068	.104		
Block 3					0.001	0.023
Age × BMI × Gender	0.031	-0.077	0.072	.285		
BES-Weight						
Block 1					0.114***	0.114
Gender	-0.194	-0.413	0.063	<.001		
Age	0.1	0.12	0.031	<.001		
BMI	-0.242	-0.26	0.031	<.001		
Block 2					0.006	0.12
Age × BMI	0.042	<0.001	0.032	.977		
Age × Gender	0.085	-0.089	0.0664	.164		
BMI × Gender	-0.251	-0.127	0.064	.048		
Block 3					0.005*	0.124
Age × BMI × Gender	0.022	-0.149	0.068	.028		
BES-Attribution						
Block 1					0.068***	0.068
Gender	0.029	0.037	0.065	.567		
Age	0.238	0.24	0.32	<.001		
BMI	0.088	-0.10	0.032	.002		
Block 2					0.005	0.073
Age × BMI	-0.056	-0.062	0.033	.058		
Age × Gender	0.228	-0.004	0.065	.953		
BMI × Gender	-0.101	-0.083	0.066	.207		
Block 3					0.001	0.074
Age × BMI × Gender	-0.065	-0.071	0.7	.307		
BES-Total						
Block 1					0.090***	0.090
Gender	-0.106	-0.238	0.064	<.001		
Age	0.184	0.20	0.032	<.001		
BMI	-0.194	-0.21	0.032	<.001		
Block 2					0.001	0.091
Age × BMI	0.022	-0.004	0.033	.900		
Age × Gender	0.172	-0.036	0.065	.573		
BMI × Gender	-0.195	-0.046	0.065	.479		
Block 3					0.004*	0.095
Age × BMI × Gender	<.001	-0.139	0.069	.044		

Note: Male is coded as 0; female is coded as 1.

p* < .05; *p* < .01; ****p* < .001.

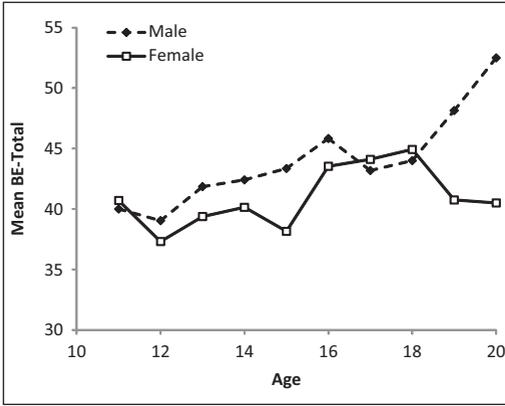


Figure 1. BES-Total score by age in boys and girls.

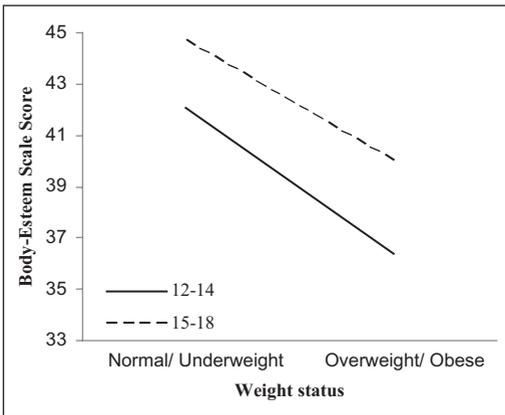


Figure 2. Interaction graph showing the relations of BES-Total with weight status and age in boys.

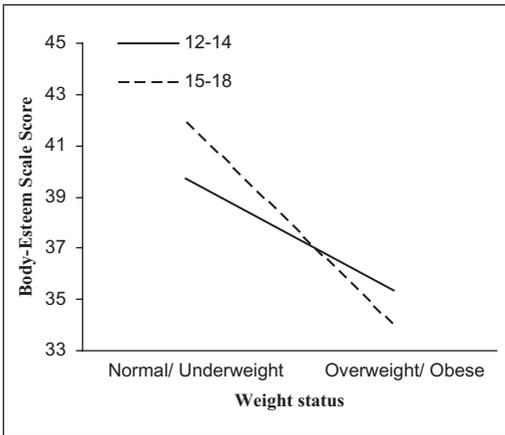


Figure 3. Interaction graph showing the relations of BES-Total with weight status and age in girls.

girls desired to have slimmer bodies than those from Shenzhen and Hunan (Lee and Lee, 2000). Our findings are not surprising given the higher socioeconomic status of Hong Kong students than other Chinese cities and the influences of mass media on body dissatisfaction and dietary habits in the local community (Lam et al., 2009). Specifically, as other research has shown (Lam et al., 2009; Lee and Lee, 2000), young Chinese females in Mainland China and Hong Kong collectively value slimness, but the degree of preference for a slim body image is proportionally related to the degree of economic liberalization and the extent of media de-regulation. Besides media influences, rapid industrialization has also brought about more educational opportunities and financial independence for Hong Kong women. Consequently, the ideal of a slim body type as a symbol of attractiveness competence would be even more pronounced in Hong Kong than in Mainland China. In addition, the unique historical background of Hong Kong, the fusion of eastern and western cultures, may also contribute to this observation.

In our study, the finding that boys tend to have higher body esteem than girls is consistent with most of the western findings (Mendelson et al., 1996, 2001). This evidence may suggest that the development of body esteem in adolescents probably depends on gender socialization. Unlike those reported in western studies (Cattarin and Thompson, 1994; Mendelson et al., 2001), we further found a trend for better body esteem in older age groups that has also been reported in Mainland China (Chen and Jackson, 2008). A hypothetical explanation of these age differences could be the reflection of a developmental window for establishing one's body esteem during adolescence. Furthermore, the relation between poorer body esteem and higher BMI in girls from this study was also consistent with the results in Australian adolescent girls (O'Dea, 2006). Extremely obese girls were found to have more deficits in body esteem when compared with the overweight or underweight peers, and these deficits are either maintained or worsen during this developmental period. Such observations may be a result of social stigmatization (Raustorp, 2010;

Raustorp et al., 2009). As body dissatisfaction may incur more adverse mental health outcomes such as bulimic and depressive symptoms in girls than in boys (Fung et al., 2010), sex differences in body esteem should not be neglected. Results in female undergraduate students also revealed that body dissatisfaction leads to a lower motivation to exercise (Vartanian and Shaprow, 2008). Future educational and intervention efforts would benefit from targeting pre-college female students since they already seem to experience deficits in self-esteem due to weight stigma.

Our further examinations suggested that the relations of body esteem with gender and body weight may not be a constant. The significant interaction terms of gender and BMI on BES-Weight indicated that girls are more vulnerable to negative evaluation of weight than boys. A similar significant interaction effect was also observed in western populations (Mendelson et al., 2001). Moreover, no significant two-way interactions of age with gender and weight were found for the other domains of body esteem in this study. One reason that the gender difference in self-esteem based on one's weight depends on one's BMI is that early adolescence is the period in which self- and other-evaluations of weight and appearance become very important to one's general self-esteem. This is also the period in which gender-specific messages about ideal weight become more salient (Mendelson et al., 2001). Indeed, gender has been found to moderate the association between BMI and body dissatisfaction in adolescents (Lawler and Nixon, 2011). However, self-esteem based on appearance and others' attributions might not be very much related to one's BMI since the positive evaluation and the perception of having a good appearance may be dependent on diverse factors besides weight.

In addition, the significant three-way interaction of gender \times age \times BMI revealed that the gender differences in the association between body weight and body esteem were more relevant to the older than the younger age groups. In other words, the older girls were most likely to suffer deficits in body esteem if they were overweight, compared with boys who were overweight or younger girls who were overweight.

In future, it would be interesting to examine the potential effects of tracking a high BMI value from adolescence to adulthood on one's body esteem. Earlier study in adults suggested that being overweight for a long period of time has a cumulative negative impact on one's body esteem (McLaren and Gauvin, 2002). Clinical evidence also reported improvement of body esteem in obese adults after undergoing bariatric surgery (Madan et al., 2008). As for young women, the relationship between low body esteem and disordered eating has been reported in university students (O'Brien and Hunter, 2006) and female athletic swimmers (Ferrand et al., 2005). From a psychiatric perspective, fear of fat and low body esteem may lead to the development of an eating disorder or disregulated restrained eating (Shapiro et al., 1997).

There are strengths and limitations in this study. To our knowledge, this study is the first one examining the BES-determined body esteem in Hong Kong Chinese adolescents. We believe that the results are relevant and important, not only to Chinese but also other populations in the world. Objectively measured body weight has also avoided the possible biases in self-reported data. Moreover, a reasonable sample size with a relatively high prevalence of underweight adolescents has provided a good platform for further investigations of body esteem in adolescents of different weight status. Conceptualizing body esteem as multidimensional rather than as a global entity (Mendelson et al., 1996) also helps us to better understand the different aspects of body esteem in adolescents. However, the low reliability of BES-Appearance ($\alpha = .53$), compared with other subdomains ($\alpha = .85$ for BES-Attribution, and $\alpha = .84$ for BES-Weight) is of concern and warrants further investigations. Moreover, no information about participation in sports in the sample is available. A previous study suggested that student athletes had better body esteem than non-athlete students (Wiggins and Moode, 2000).

Boys, unlike girls who desire a slimmer figure regardless of their actual weight, tend to have a muscular ideal body image (McCabe et al., 2006). The inverse relationship between BMI and body esteem may be attenuated by weight gain due to

increased muscle development of boys, resulting in significant interactions between gender and BMI. Measuring fat-mass and fat-free mass in addition to BMI would allow a better testing of the hypothesis. Previous studies suggested peer influences on thin ideals and appearance comparisons (Shroff and Thompson, 2006); and family functioning (Stradmeijer et al., 2000) are associated with self-esteem in adolescents. Specifically, adolescents, particularly girls, tend to possess a similar level of body image dissatisfaction as their peers. These social environmental factors should also be included in future studies.

Conclusions

In Chinese adolescents, weight-related body esteem is modifiable by age, gender, and weight. As an important clinical implication, improvement of body esteem with older ages may be associated with age-related BMI differences rather than age-related development in Chinese adolescents.

Competing Interests

None declared.

References

- Allon N (1979) Self-perceptions of the stigma of overweight in relationship to weight-losing patterns. *American Journal of Clinical Nutrition* 32(2): 470–480.
- Banitt AA, Kaur H, Pulvers KM, Nollen NL, Ireland M and Fitzgibbon ML (2008) BMI percentiles and body image discrepancy in black and white adolescents. *Obesity* 16(5): 987–991.
- Cafri G, Yamamiya Y, Brannick M and Thompson J (2005) The influence of sociocultural factors on body image: A meta-analysis. *Clinical Psychology: Science and Practice* 12(4): 421–433.
- Cattarin JA and Thompson JK (1994) A three-year longitudinal study of body image, eating disturbance, and general psychological functioning in adolescent females. *Eating Disorders* 2(2): 114–125.
- Chen H and Jackson T (2008) Prevalence and sociodemographic correlates of eating disorder endorsements among adolescents and young adults from China. *European Eating Disorders Review* 16(5): 375–385.
- Clark L and Tiggemann M (2007) Sociocultural influences and body image in 9- to 12-year-old girls: The role of appearance schemas. *Journal of Clinical Child and Adolescent Psychology* 36(1): 76–86.
- Cole TJ, Bellizzi MC, Flegal KM and Dietz WH (2000) Establishing a standard definition for child overweight and obesity worldwide: International survey. *British Medical Journal* 320(7244): 1240–1243.
- Cole TJ, Flegal KM, Nicholls D and Jackson AA (2007) Body Mass Index cut offs to define thinness in children and adolescents: International survey. *British Medical Journal* 335(7612): 194.
- Collins M (1991) Body figure perceptions and preferences among preadolescent children. *International Journal of Eating Disorders* 10(2): 199–208.
- Davison KK, Werder JL, Trost SG, Baker BL and Birch LL (2007) Why are early maturing girls less active? Links between pubertal development, psychological well-being, and physical activity among girls at ages 11 and 13. *Social Science & Medicine* 64(12): 2391–2404.
- Duncan MJ, Al-Nakeeb Y and Nevill AM (2004) Body esteem and body fat in British school children from different ethnic groups. *Body Image* 1(3): 311–315.
- Elkind D (1967) Egocentrism in adolescence. *Child Development* 38(4): 1025–1034.
- Ferrand C, Magnan C and Philippe RA (2005) Body-esteem, Body Mass Index, and risk for disordered eating among adolescents in synchronized swimming. *Perceptual and Motor Skills* 101(3): 877–884.
- Filaire E, Rouveix M, Pannafieux C and Ferrand C (2007) Eating attitudes, perfectionism and body-esteem of elite male judoists and cyclists. *Journal of Sports Science and Medicine* 6(1): 50–57.
- Franko DL and Striegel-Moore RH (2002) The role of body dissatisfaction as a risk factor for depression in adolescent girls: Are the differences Black and White? *Journal of Psychosomatic Research* 53(5): 975–983.
- Franzoi SL and Shields SA (1984) The Body Esteem Scale: Multidimensional structure and sex differences in a college population. *Journal of Personality Assessment* 48(2): 173–178.
- French S, Perry C, Leon G and Fulkerson J (1995) Dieting behaviors and weight change history in female adolescents. *Health Psychology* 14(6): 548–555.
- Fung SS, Stewart SM, Ho SY, Wong JP and Lam TH (2010) Body dissatisfaction, maternal appraisal, and depressive symptoms in Hong

- Kong adolescents. *International Journal of Psychology* 45(6): 453–460.
- Harter S (1990) Developmental differences in the nature of self-representations: Implications for the understanding, assessment, and treatment of maladaptive behavior. *Cognitive Therapy and Research* 14(2): 113–142.
- Hill A and Bhatti R (1995) Body shape perception and dieting in preadolescent British Asian girls: Links with eating disorders. *International Journal of Eating Disorders* 17(2): 175–183.
- Hoare P and Cosgrove L (1998) Eating habits, body-esteem and self-esteem in Scottish children and adolescents. *Journal of Psychosomatic Research* 45(5): 425–431.
- Kertesz M, Pollak Z and Greiner E (1992) Evaluation of self-image of overweight teenagers living in Budapest. *Journal of Adolescent Health* 13(5): 396–397.
- Kornblau IS, Pearson HC and Bretkopf CR (2007) Demographic, behavioral, and physical correlates of body esteem among low-income female adolescents. *Journal of Adolescent Health* 41(6): 566–570.
- Lam TH, Lee SW, Fung S, Ho SY, Lee PW and Stewart SM (2009) Sociocultural influences on body dissatisfaction and dieting in Hong Kong girls. *European Eating Disorders Review* 17(2): 152–160.
- Lapsley D, Milstead M, Quintana S, Flannery D and Buss R (1986) Adolescent egocentrism and formal operations: Tests of a theoretical assumption. *Developmental Psychology* 22(6): 800–807.
- Lawler M and Nixon E (2011) Body dissatisfaction among adolescent boys and girls: The effects of body mass, peer appearance culture and internalization of appearance ideals. *Journal of Youth and Adolescence* 40(1): 59–71.
- Lee S and Lee AM (2000) Disordered eating in three communities of China: A comparative study of female high school students in Hong Kong, Shenzhen, and rural Hunan. *International Journal of Eating Disorders* 27(3): 317–327.
- Li HC, Chan SL, Chung OK and Chui ML (2010) Relationships among mental health, self-esteem and physical health in Chinese adolescents: An exploratory study. *Journal of Health Psychology* 15(1): 96–106.
- Madan AK, Beech BM and Tichansky DS (2008) Body esteem improves after bariatric surgery. *Surgical Innovation* 15(1): 32–37.
- McCabe MP, Ricciardelli LA and Salmon J (2006) Evaluation of a prevention program to address body focus and negative affect among children. *Journal of Health Psychology* 11(4): 589–598.
- McLaren L and Gauvin L (2002) The cumulative impact of being overweight on women's body esteem: A preliminary study. *Eating and Weight Disorders* 7(4): 324–327.
- Mendelson BK and White DR (1982) Relation between body-esteem and self-esteem of obese and normal children. *Perceptual and Motor Skills* 54(3): 899–905.
- Mendelson BK and White DR (1985) Development of self-body-esteem in overweight youngsters. *Developmental Psychology* 21(1): 90–96.
- Mendelson BK, Mendelson MJ and White DR (2001) Body-esteem scale for adolescents and adults. *Journal of Personality Assessment* 76(1): 90–106.
- Mendelson BK, White DR and Mendleson MJ (1995) Children's global self-esteem predicted by body-esteem but not by weight. *Perceptual and Motor Skills* 80(1): 97–98.
- Mendelson BK, White DR and Mendelson MJ (1996) Self-esteem and body esteem: Effects of gender, age, and weight. *Journal of Applied Developmental Psychology* 17(3): 321–346.
- Mirza NM, Davis D and Yanovski JA (2005) Body dissatisfaction, self-esteem, and overweight among inner-city Hispanic children and adolescents. *Journal of Adolescent Health* 36(3): 267.e216–267.e220.
- Neumark-Sztainer D, Croll J, Story M, Hannan PJ, French SA and Perry C (2002) Ethnic/racial differences in weight-related concerns and behaviors among adolescent girls and boys: Findings from Project EAT. *Journal of Psychosomatic Research* 53(5): 963–974.
- Norton K and Olds T (1996) *Anthropometrica*. Sydney: University of New South Wales Press.
- O'Brien K and Hunter J (2006) Body esteem and eating behaviours in female physical education students. *Eating and Weight Disorders* 11(2): e57–60.
- O'Dea JA (2006) Self-concept, self-esteem and body weight in adolescent females: A three-year longitudinal study. *Journal of Health Psychology* 11(4): 599–611.
- Raustorp A (2010) Eight years secular trends of physical self-esteem among Swedish adolescents. *International Journal of Adolescent Medicine and Health* 22(2): 237–247.
- Raustorp A, Archer T, Svensson K, Perlinger T and Alricsson M (2009) Physical self-esteem, a five year follow-up study on Swedish adolescents.

- International Journal of Adolescent Medicine and Health* 21(4): 497–507.
- Rosenblum G and Lewis M (1999) The relations among body image, physical attractiveness, and body mass in adolescence. *Child Development* 70(1): 50–64.
- Shapiro S, Newcomb M and Loeb TB (1997) Fear of fat, disregulated-restrained eating, and body-esteem: Prevalence and gender differences among eight-to ten-year-old children. *Journal of Clinical Child Psychology* 26(4): 358–365.
- Shroff H and Thompson JK (2006) Peer influences, body-image dissatisfaction, eating dysfunction and self-esteem in adolescent girls. *Journal of Health Psychology* 11(4): 533–551.
- Smolak L and Levine M (2001) Body image in children. In: Smolak L and Thompson JK (eds) *Body Image, Eating Disorders, and Obesity in Youth: Assessment, Prevention, and Treatment*. Washington, DC: American Psychological Association, pp. 41–66.
- Stradmeijer M, Bosch J, Koops W and Seidell J (2000) Family functioning and psychosocial adjustment in overweight youngsters. *International Journal of Eating Disorders* 27(1): 110–114.
- Vartanian LR and Shaprow JG (2008) Effects of weight stigma on exercise motivation and behavior: A preliminary investigation among college-aged females. *Journal of Health Psychology* 13(1): 131–138.
- Wiggins MS and Moode FM (2000) Analysis of body esteem in female college athletes and nonathletes. *Perceptual and Motor Skills* 90(3 Pt 1): 851–854.