



Published in final edited form as:

J Adolesc Health. 2007 March ; 40(3): 245–251.

Body Image and Self-Esteem among Adolescents undergoing an Intervention Targeting Dietary and Physical Activity Behaviors

Jeannie S. Huang, MD, MPH, Gregory J. Norman, PhD^{*}, Marion F. Zabinski, PhD, MPH^{**}, Karen Calfas, PhD^{**†}, and Kevin Patrick, MD, MS^{**}

^{*} *Department of Pediatrics, University of California, San Diego, CA*

^{**} *Department of Family and Preventive Medicine, University of California, San Diego, CA*

[†] *Department of Psychology, San Diego State University, San Diego, CA*

Abstract

Background—Health promotion interventions can lead to awareness of health risk and subsequent adoption of beneficial changes in behavior. However, it is possible that interventions targeting behaviors associated with childhood obesity may also increase the likelihood of unhealthy eating and physical activity obsessions and behaviors.

Objective—To determine the effect of a one-year intervention targeting physical activity, sedentary and diet behaviors among adolescents on self-reported body image and self-esteem.

Methods—Body image and self-esteem were assessed for adolescents participating in the PACE+ study, a randomized controlled trial of a one-year behavioral intervention targeting physical activity, sedentary, and dietary behaviors. The Body Dissatisfaction subscale of the Eating Disorder Inventory and Rosenberg Self-Esteem scale were used to assess body image and self-esteem respectively, and measurements were performed at baseline, 6 and 12 months. Demographic characteristics and weight status of participants were also ascertained. Analysis of responses was performed via both between-group and within-group repeated measure analyses.

Results—657 adolescents completed all measurements. Body image differences were found for age, sex and weight status at baseline, while self-esteem differences were demonstrated for sex, ethnicity and weight status. There were no intervention effects on body image or self-esteem for either girls or boys. Self-esteem and body satisfaction did not worsen as a result of participating in the PACE+ intervention for either boys or girls whether or not they lost or maintained their weight or gained weight. Girls assigned to the PACE intervention who experienced weight reduction or weight maintenance at either 6 or 12-months reported improvements in body image satisfaction ($p=0.02$) over time compared to subjects who had experienced weight gain during the 12-month study period.

Conclusions—Adverse effects on body satisfaction and self-esteem were not observed among adolescents undergoing this behavioral intervention. These results suggest that a behavioral intervention directed at improving physical activity and diet habits may be safely undertaken by adolescents, including those who are at risk for overweight and overweight, without adverse

Corresponding Author: Jeannie Huang, MD, MPH, 200 W. Arbor Drive, MC 8450, San Diego, CA 92103, Office: (619) 543-7544/ Fax: (619) 543-7537, Email: jshuang@ucsd.edu.

This project was supported by the National Institutes of Health National Cancer Institute, Bethesda, MD (R01 CA081495).

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psychological consequences. Inclusion of specific elements in the intervention that directly addressed body image and self-esteem issues may have reduced the risk for negative psychological effects.

INTRODUCTION

Body image encompasses an individual's body-related self-perceptions and self-attitudes, and is linked to self-esteem, interpersonal confidence, eating and exercise behaviors, sexual experiences and emotional stability. Among adults, body satisfaction has been associated with fulfillment with personal interactions [1] and overall life happiness [2], healthy dietary choices and physical activity performance [3], and increased sexual pleasure and activity frequency [4]. Conversely, among adolescent youth, body shape and body weight dissatisfaction have been associated with a plethora of psychological ills from eating disorders [5,6] to major depression [5–7].

Health promotion interventions can lead to early identification of health risk and adoption of beneficial changes in behavior. However, such attention on health risk associated with obesity may also increase sensitivity to weight and cause one to perceive his/her body negatively leading to adverse effects on body image and self-esteem. Adolescents who are overweight are at increased risk for depression, poor body image, and reduced self-esteem [8–10], and concerns have been raised that interventions among this group could contribute to unhealthy eating and physical activity obsessions and behaviors [11,12]. As a result, a recent Expert Committee on obesity evaluation and treatment in children [13] recommends “a supportive, nonjudgmental approach to treatment” in order to reduce risk of psychological or emotional harm.

The Patient-Centered Assessment and Counseling for Exercise Plus Nutrition Project (PACE+) was a randomized controlled trial to determine the effects of a one-year intervention designed to increase physical activity, reduce sedentary behaviors and improve dietary behaviors among adolescent youth. The one-year program was coordinated with participants' primary care providers and included a tailored interactive computer program for assessment and goal setting, physician counseling based on the results of this assessment, and monthly telephone counseling sessions with a trained health counselor (Patrick, et al., 2006). While body image and self-esteem outcomes were not the major focus of the PACE+ intervention, the intervention was developed with sensitivity to these issues. For PACE participants, printed materials on body image and self-esteem were distributed for reading and discussion with personal counselors. Additional tailoring of the intervention regarding specific body image and self-esteem issues was performed during the monthly counseling sessions between the phone counselor and PACE participant.

In this paper, we examine the effect of the PACE+ intervention on adolescent participants' self-esteem and body satisfaction.

METHODS

Setting

The PACE+ study was reviewed and approved by the Institutional Review Boards of San Diego State University and the University of California, San Diego. 878 adolescents were evaluated at baseline and 819 were randomized into the PACE+ intervention (N=424) or control (N=395) study groups. Participants completed assessments at baseline, 6, and 12-months. A total of 657 (80%) adolescents completed all study measurements. Details and main study outcomes of the original trial have been previously published [14].

Measures

Body image—Body image was measured via self-report questionnaires modified for gender-specific issues from the Body Dissatisfaction subscales of the Eating Disorder Inventory as previously validated and described [15]. A total of 9 items were rated on a 5-point Likert scale from 1 (*always*) to 5 (*never*). The scale included 6 gender-specific items and 3 gender-neutral items. Responses for each item were weighted from 1 to 5, in which 1 was assigned to the most symptomatic response (either *never* or *always*, depending on whether the question was positively or negatively phrased) and 5 was assigned to the most asymptomatic response. The total body image scale maximum score was 45, with higher scores indicating higher body satisfaction. Internal consistency and reliability have been previously demonstrated for female and male scales among college students [15]. For between-sex analyses, only gender-neutral items were used, with a maximum score of 15, with higher scores indicating higher body satisfaction.

Self-Esteem—Self-esteem was measured via the Rosenberg Self-Esteem Scale [16]. This scale is the most widely used measure of global self-esteem and has been determined to be valid and reliable among students in grades 7 to 12 (McCarthy & Hoge, 1982). Responses to the 10 items were rated on a 4-point scale (Strongly Disagree to Strongly Agree) yielding scores between 10 and 40 with higher scores indicating higher self-esteem.

Other Measures—At each measurement visit, standing height was measured using a fixed, wall stadiometer to the nearest 0.1 inch. Weight was measured with a calibrated digital scale to the nearest 0.1 pound. Each measure was taken twice and the average of the 2 readings calculated. Body mass index (BMI) was calculated as weight in kilograms divided by the square of height in meters. BMI for age and sex was determined from Centers for Disease Control and Prevention national norms using age to the nearest month and sex-specific median, standard deviation, and power of the Box-Cox transformation [17]. BMI-for-age and sex percentiles were split at the 95th percentile, which is defined as overweight.

Analyses

Preliminary cross-sectional analyses included the initial cohort of 878 adolescents who completed the baseline assessment. Prospective analyses included only the 657 participants who completed all assessments during the 1-year intervention period.

Preliminary analyses—Baseline data were initially analyzed to examine effects of demographic variables on body image and self-esteem measures using Wilcoxon rank sum test. Variables demonstrating differential effect on body image or self-esteem measures were included in subsequent analyses.

Intervention effects—Body image and self-esteem were analyzed as dependent variables using 2×3 repeated measures analysis of covariance. The between-participants factor was treatment group (intervention, control) and the within-participants factor was time (baseline, 6, and 12 months). Overweight status (BMI for age $\geq 95\%$ or $< 95\%$), and weight change over the 12-month intervention period (weight maintenance or loss, weight gain) were the covariates for repeated measure ANOVA models involving the entire cohort. In addition, ethnicity (coded as white or nonwhite) was included as a covariate for the self-esteem models, and age was added as a covariate for body image models based on preliminary analyses of potential interactions. 2×3 repeated measures subanalyses were also performed among PACE subjects only, analyzing body image and self-esteem as dependent variables with weight change over the 12-month intervention period as the between-participants factor and time as the within-participants factor (baseline, 6, and 12 months). Boys and girls were analyzed separately.

RESULTS

Study Population

878 adolescents were evaluated at baseline, and 657 completed all study measurements. Baseline sample demographic characteristics have been previously presented [18]. The characteristics of the prospective cohort with complete data were similar to the full baseline sample. Baseline participants who did not complete all study measurements were heavier (26 vs. 34% overweight, completed vs. not-completed, $p=0.02$) and older than (12.5 (1.5) vs. 13 (1.5) years, mean (S.D.), completed vs. not-completed, $p=0.03$) subjects who completed all study visits. Study completers and non-completers did not differ by race or sex. For this study, the sample was 53% female and 41% reported non-white racial backgrounds. The median age was 13 years (interquartile range (12, 14 years)). Of the 287 adolescents (43.6% of studied cohort) who met criteria for being at risk for overweight (i.e. $BMI \geq 85\%$ and $< 95\%$ for age and sex), 165 (57.5%) were overweight (i.e. $BMI \geq 95\%$ for age and sex). A total of 45 (33% overweight at baseline) girls and 19 (53% overweight at baseline) boys in the PACE intervention group were able to reduce or maintain their weight over the 12-month intervention period.

Preliminary Analyses

Preliminary analyses among adolescents studied at the baseline visit ($N=878$) revealed significant differences in body image and self-esteem measures between groups categorized according sex and weight status. Ethnic disparities were also seen in self-esteem (21.3 (5.1) vs. 20.6 (5.3), white vs. nonwhite, $p=0.04$), and a correlation with age was observed with the body image measure ($r = -0.16$, $p<0.0001$). Results are presented in Table 1. Correlation analyses between body image and self-esteem measures demonstrated significant associations as an entire cohort ($p<0.0001$) and according to sex ($p<0.0001$).

Repeated Measures Analyses

Mean scores for the body image and self-esteem measures across the measurement visits are presented for girls and boys, respectively, according to intervention group assignment (Table 2), and according to weight maintenance or loss status (Table 3 - among PACE participants only).

Comparison according to Intervention Group—There were no intervention effects on body image for either girls or boys. Among girls, there were no significant main effects for time or group on self-esteem. In contrast, boys reported improved self-esteem over time across the 12-month intervention period regardless of group assignment.

Comparison according to weight maintenance or loss status among PACE participants—We limited the analysis of the impact of weight change on body image and self-esteem to participants in the PACE intervention condition in order to answer the specific “real-life” question as to whether children receiving counseling regarding physical activity and dietary issues (as would be expected in any weight maintenance program, and as performed in the PACE intervention condition) would experience body image and/or self-esteem changes based on weight change over the intervention period. Among those randomized to the PACE Intervention, significant differences in baseline body image scores were seen in both boys and girls according to weight change status. These differences persisted across all measurement visits for boys. Girls assigned to the PACE intervention who lost or maintained their weight over the study period had notable improvements in their body image compared to girls who had gained weight over the study period but this was not found for boys. Importantly, for this group of adolescents participating in the PACE+ intervention, no significant reduction was

found in body image scores for either boys or girls whether or not they lost or maintained their weight or gained weight.

No changes were seen on self-esteem scores among girls assigned to the PACE intervention according to weight change status, time or weight change status over time. In contrast, boys in the PACE intervention demonstrated notable differences in self-esteem scores according to weight change status and improvement in self-esteem scores over time independent of weight change status. As with body image, no significant reduction in self-esteem was found for either boys or girls whether or not they were among those who lost or maintained their weight or those who gained weight while participating in the PACE intervention.

It would seem that inclusion of both intervention conditions in the data analysis would add to our understanding of relationship between self-esteem and body image, and weight loss or maintenance.

DISCUSSION

This study demonstrated a lack of adverse effects on self-esteem and body satisfaction among all study participants regardless of study group assignment. Among adolescent girls assigned to the PACE intervention who maintained or lost weight over the intervention period, we demonstrated improvements in body image over time. This is reassuring given that the PACE + study is the largest randomized controlled trial to date to evaluate a primary care-based behavioral intervention to improve physical activity, sedentary and diet behaviors among adolescents [14].

In our study cohort, there were differences in body image and self-esteem among adolescents at the baseline evaluation. In particular, girls and overweight adolescents reported lower body image and self-esteem compared to boys and normal weight adolescents across all measurement visits. We also demonstrated significant correlations between body image and self-esteem measures among both boys and girls. These findings concur with several previous studies. In a recent review of body image studies among community samples of overweight children and adolescents [19]. Prior work indicates that children with poorer body image report lower global self-worth and poorer self-esteem [20–23].

Adolescents participating in the PACE+ study demonstrated no differences in body image or self-esteem measures over the intervention period as compared to the control group. Among males, modest improvements in self-esteem independent of study group assignment or weight change status over the 12-month intervention period were observed. These findings are encouraging and suggest that adolescent-directed health promotion programs focused on improved physical activity and dietary habits are not likely to have negative psychological consequences. Although the PACE+ intervention did not specifically target weight loss as an outcome, PACE+ did focus on increasing healthy behaviors such as reducing fat intake and sedentary behavior and increasing fruit and vegetable intake and physical activity, which have been associated with successful weight maintenance and loss [24–26].

We previously demonstrated that a behavioral intervention (GRAD: Graduate Ready for Activity Daily) among university seniors targeting physical activity behaviors can induce adverse psychological effects (increased drive for thinness) among female intervention participants [15]. In contrast, our PACE intervention did not adversely affect either body image or self-esteem among both boys and girls. The PACE intervention targeted adolescent youth, while the GRAD intervention was performed among college students. Therefore, one potential factor that may explain the differences in secondary effects of these behavioral programs is the targeted age of intervention. The lack of adverse psychological effect demonstrated in our

PACE cohort may support early interventions targeting adolescent youth instead of young adults.

Among adolescent girls assigned to the PACE condition who were able to maintain or reduce weight over the intervention period, we found improvements in body image over the intervention period compared to adolescent girls whose body weight increased. This is an encouraging, albeit secondary outcome from the intervention. However, the same positive effect on body image was not found for PACE-assigned boys who maintained or reduced their weight. This disparity between boys and girls may be explained by gender differences in weight identity [27] where weight status is more closely tied to judgments of relationship desirability among women versus men [28,29].

It is interesting that adolescents randomized to the PACE intervention who lost or maintained their weight over the 12-month study period demonstrated lower baseline body image and self-esteem scores than those who went on to gain weight. These findings suggest that personal efforts to manage weight may be initially prompted by body dissatisfaction. Our finding in girls of an association between improvement in body image and weight management has been shown in previous studies [30–32], which highlights the importance of psychological change in effective weight management treatment. Taken together, our results suggest that cognitive behavioral therapy programs that encourage patients to change the way they think about themselves and their bodies in a more positive, realistic manner [33] may achieve the crucial lifestyle changes needed for long-term weight maintenance.

The findings of this study are subject to a number of limitations. First, generalizability of this study is limited to generally healthy adolescents seen in primary care settings. These findings might not apply to overweight adolescents who seek medical advice for weight control and who may be at increased risk for psychological morbidity [34]. In addition, our notable attrition rate in participation among heavier and older adolescents may have resulted in a selection bias favoring thinner and younger children with fewer body image and self-esteem issues. Potential response bias in regards to demonstrated improvement in self-esteem measures over time among boys must be considered in this study given the reliance on self-report measures. The observed increases in self-esteem scores may reflect a methodological artifact of repeated assessment with participants becoming more comfortable with the assessment procedures and more inclined to provide socially desirable responses with repeated testing [35–37]. Alternatively, this pattern may reflect age-related differences in children's cognitive development and response biases [38,39] although such findings have mainly been found in children younger than the current study cohort.

In conclusion, we demonstrated a lack of adverse effects on body satisfaction and self-esteem among adolescents undergoing a behavioral intervention study targeting healthy dietary and physical activity behaviors. Given the increasing prevalence of childhood obesity, similar interventions that are sensitive to body concept and self-esteem issues must be promoted among at-risk for overweight and overweight youth in order to reduce the prevalence of obesity-associated morbidities. While weight management programs must be vigilant regarding the potential development of eating disorders, our results from a large intervention program among adolescent youth suggest that behavioral interventions focused on health outcomes rather than actual weight loss and promoting healthy behaviors as part of a weight management program may be safely undertaken in otherwise healthy at risk for overweight and overweight adolescents without adverse psychological consequences.

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Table 1
Baseline Data Univariate Analyses between demographic variables and Body Image and Self-Esteem

Variable	Body Image		Self-Esteem	
	values (mean, SD)	p-value	values (mean, SD)	p-value
Gender	10.0 (3.4)*	p<0.0001	21.5 (5.0)	0.007
Boys	8.8 (3.7)*		20.5 (5.4),	
Girls				
Weight Status	26.5 (8.7):	<0.0001	19.6 (5.6)	<0.0001
Overweight	33.0 (7.8),		21.5 (5.0)	
Not				
Intervention Group	31.2 (8.7)	0.89	21.0 (5.0)	0.79
PACE+	31.2 (8.6)		21.0 (5.5)	
SUN				

All shown univariate analyses utilized the Wilcoxon sum rank test. Body image and self-esteem scores are presented as mean (standard deviation). Higher body image scores indicate higher body satisfaction. Higher self-esteem scores indicate higher self-esteem.

* Only the 3 gender-neutral questions totaled for comparison.

** Correlation estimate.

Table 2
Results of Repeated Measure ANOVA analyses of PACE+ intervention effect on Body Image and Self-esteem

	PACE+ Mean (SD) (Girls n = 175; Boys n = 166)	Control Mean (SD) (Girls n = 174; Boys n = 142)	Group		Time		Group x Time	
			F	p-value	F	p-value	F	p-value
GIRLS								
Body Image*			0.14	0.71	0.66	0.52	0.09	0.92
Baseline	27.3 (9.1)	27.0 (9.2)						
6 Month	27.9 (8.9)	27.7 (9.3)						
12 Month	28.5 (5.6)	28.1 (5.7)						
Self-Esteem**			1.20	0.27	1.03	0.36	1.25	0.29
Baseline	20.6 (5.1)	20.1 (5.5)						
6 Month	21.0 (5.5)	20.7 (5.7)						
12 Month	21.2 (5.7)	20.2 (6.1)						
BOYS								
Body Image*			0.04	0.84	1.03	0.36	1.09	0.34
Baseline	32.6 (6.8)	32.5 (6.2)						
6 Month	32.6 (6.1)	33.1 (5.8)						
12 Month	33.4 (6.3)	33.4 (6.6)						
Self-Esteem**			0.12	0.72	5.15	0.006	0.01	0.99
Baseline	20.1 (4.7)	20.2 (5.3)						
6 Month	21.3 (5.3)	21.4 (5.4)						
12 Month	21.2 (5.8)	21.4 (5.4)						

* Co-variates: weight status, weight change status, age.

** Co-variates: weight status, weight change status, ethnicity.

Table 3

Results of Repeated Measure ANOVA analyses of Weight maintenance or loss success vs. weight gain group effect on Body Image and Self-esteem among PACE participants (n = 336)

	Weight Maintenance or Loss (Girls n = 45; Boys n = 19)	Weight gain (Girls n = 130; Boys n = 147)	Group		Time		Group x Time	
			F	p-value	F	p-value	F	p-value
GIRLS								
Body Image			0.34	0.56	1.93	0.15	4.01	0.02
Baseline	28.0 (8.6)*	30.0 (9.0)*						
6 Month	28.1 (9.4)	30.4 (8.6)						
12 Month	30.8 (9.1)	29.6 (9.5)						
Self-Esteem			0.24	0.63	1.19	0.31	1.45	0.24
Baseline	20.9 (4.9)	21.3 (4.9)						
6 Month	22.0 (5.6)	21.1 (5.4)						
12 Month	21.7 (5.5)	21.5 (6.0)						
BOYS								
Body Image			6.35	0.01	0.26	0.77	0.13	0.88
Baseline	31.3 (4.7)*	34.7 (6.8)*						
6 Month	31.1 (4.7)	34.7 (6.1)						
12 Month	31.6 (7.0)	34.9 (6.1)						
Self-Esteem			7.87	0.005	4.52	0.01	1.35	0.26
Baseline	18.9 (5.7)	21.7 (4.4)						
6 Month	19.4 (4.0)	22.2 (5.2)						
12 Month	19.7 (6.1)	22.7 (5.7)						

* p < 0.001 for comparisons of body image scores at baseline between gender-specific weight change groups.