

Original article

Does Body Satisfaction Matter? Five-year Longitudinal Associations between Body Satisfaction and Health Behaviors in Adolescent Females and Males

Dianne Neumark-Sztainer, Ph.D.^{a,*}, Susan J. Paxton, Ph.D.^b, Peter J. Hannan, M.Stat.,
Jess Haines, M.H.Sc., and Mary Story, Ph.D.

^aDivision of Epidemiology and Community Health, School of Public Health, University of Minnesota, Minneapolis, Minnesota

^bSchool of Psychological Science, La Trobe University, Melbourne, Australia

Manuscript received September 15, 2005; manuscript accepted November 8, 2005

Abstract:

Purpose: This study addresses the question, “Does body satisfaction matter?” by examining longitudinal associations between body satisfaction and weight-related health-promoting and health-compromising behaviors five years later among adolescents.

Methods: Project EAT-II followed an ethnically and socioeconomically diverse sample of 2516 adolescents from 1999 (Time 1) to 2004 (Time 2). Associations between body satisfaction at Time 1 and health behaviors at Time 2 were examined, adjusting for sociodemographic characteristics and Time 1 health behaviors, with and without adjustment for body mass index (BMI).

Results: In females, lower body satisfaction predicted higher levels of dieting, unhealthy and very unhealthy weight control behaviors and binge eating, and lower levels of physical activity and fruit and vegetable intake. After adjusting for BMI, associations between body satisfaction and dieting, very unhealthy weight control behaviors, and physical activity remained statistically significant. In males, lower body satisfaction predicted higher levels of dieting, healthy, unhealthy, and very unhealthy weight control behaviors, binge eating, and smoking, and lower levels of physical activity. After adjusting for BMI, associations between body satisfaction and dieting, unhealthy weight control behavior, and binge eating remained statistically significant.

Conclusions: The study findings indicate that, in general, lower body satisfaction does not serve as a motivator for engaging in healthy weight management behaviors, but rather predicts the use of behaviors that may place adolescents at risk for weight gain and poorer overall health. Interventions with adolescents should strive to enhance body satisfaction and avoid messages likely to lead to decreases in body satisfaction. © 2006 Society for Adolescent Medicine. All rights reserved.

Keywords:

Body satisfaction; Body image; Adolescence; Obesity; Eating disorders; Dieting; Smoking; Physical activity; Dietary intake

High percentages of adolescents, particularly adolescent females, are dissatisfied with their bodies [1,2]. The high

prevalence of body dissatisfaction during adolescence, a critical period of identity formation, is disturbing in that body image, self-image, and self-esteem tend to be closely intertwined [3]. Longitudinal analyses show that low body satisfaction during early and middle adolescence is predictive of later signs of more global mental distress, including lower self-esteem and depressive symptoms [4–6]. Body dissatisfaction and preoccupation with thinness are strong

*Address correspondence to: Dr. Dianne Neumark-Sztainer, Division of Epidemiology and Community Health School of Public Health, University of Minnesota, 1300 South Second Street, Suite 300, Minneapolis, MN 55454.

E-mail address: neumark@epi.umn.edu

predictors of eating disorders and related disordered eating behaviors [7–9]. Thus, there is concern among adolescent health professionals about the high prevalence of adolescents with low levels of body satisfaction [10].

Given the widespread prevalence of obesity in adolescents [11] and its associated health consequences [12], an important question relates to the impact of body satisfaction on behaviors with implications for weight management [13,14]. Specifically, are adolescents with low levels of body satisfaction less likely to engage in healthy weight management behaviors, such as increased fruit and vegetable intake or regular physical activity, than adolescents who feel good about their bodies? Are they at increased risk for dieting, unhealthy weight control behaviors, or binge eating, which are associated with weight gain over time [15–18]?

Alternatively, are there advantages to not being satisfied with one's body? Can body dissatisfaction serve as a self-motivator to engage in healthier eating and physical activity behaviors? Heinberg and colleagues have argued that some level of body image dissatisfaction may be beneficial for individuals with average or above-average body mass index (BMI) values, because it may lead to healthy weight management behaviors [13,19]. They assert that the relationship between body image dissatisfaction and healthy weight management behaviors may be illustrated by an inverted U-shaped curve. When body image distress is very low, individuals may not engage in healthy eating and exercise behaviors, even if necessary to improve health outcomes. When body image distress is very high, individuals may fail to engage in healthy weight management behaviors because of a perceived inability to make meaningful changes in their bodies, or may engage in unhealthy dieting behaviors in a desperate attempt to lose weight.

The question as to whether body satisfaction predicts health-promoting or health-compromising behaviors has important implications for the design of interventions aimed at obesity prevention and overall health promotion among adolescents. The current study expands upon the growing body of literature exploring associations between body satisfaction and different health behaviors to address the research question, "Does body satisfaction matter, and if so, how?" We examine longitudinal associations between body image and a range of weight-related health-promoting and health-compromising behaviors five years later in an ethnically and socioeconomically diverse population of adolescents. We examine whether associations between body satisfaction and behavioral outcomes are approximately linear or have a U-shaped association in order to address the question raised by Heinberg and colleagues [13,19]. Analyses are done with and without adjustment for BMI, to determine whether associations between body satisfaction and outcome behaviors are a function of differences in weight status, and whether they also exist independently of BMI.

Methods

Study design and population

Project EAT-II is a longitudinal, follow-up study of Project EAT-I, a study of the socio-environmental, personal, and behavioral determinants of dietary intake and weight status in adolescents [1,20–22]. In Project EAT-I, 4746 junior and senior high school students in 31 Minnesota schools completed in-class surveys and anthropometric measures during the 1998–1999 academic year. Project EAT-II aimed to re-survey all original participants by mail to examine changes in their eating patterns and weight status five years later (2003–2004). The University of Minnesota's Institutional Review Board Human Subjects Committee approved all study protocols.

Of the original study population, 1074 (22.6%) were lost to follow-up for various reasons, primarily missing contact information at EAT-I ($n = 411$) and no address found at follow-up ($n = 591$). Of the remaining 3672 participants contacted by mail, 2516 completed surveys, representing 53.0% of the original cohort and 68.4% of participants who could be contacted for Project EAT-II. The final study population consisted of 1130 males (44.9%) and 1386 females (55.1%) who completed surveys for both EAT-I (Time 1) and EAT-II (Time 2). One-third of the participants (32.0%) were in the younger cohort; at Time 1 their mean age was 12.8 years ($SD = .8$) and at Time 2 their mean age was 17.2 years ($SD = .6$). Two-thirds of the participants (68.0%) were in the older cohort; at Time 1 their mean age was 15.8 years ($SD = .8$) and at Time 2 their mean age was 20.4 years ($SD = .8$).

Measures

Body satisfaction. Body satisfaction was assessed with a modified version of the Body Shape Satisfaction Scale [23]. Ten items assessed satisfaction with different body parts (height, weight, body shape, waist, hips, thighs, stomach, face, body build, shoulders). For each item there were five Likert response categories ranging from "very dissatisfied" (1) to "very satisfied" (5) (Cronbach alpha = .92). Responses were summed with higher scores indicative of higher levels of body satisfaction. Participants were divided into quartiles (low, low-middle, high-middle, high) based upon distribution of scores in the total EAT-II sample (gender-combined).

Dieting and weight control behaviors. Dieting was assessed with the question: "How often have you gone on a diet during the last year? By "diet" we mean changing the way you eat so you can lose weight" [1]. Responses were dichotomized: no (never) and yes (any frequency). Specific types of weight control behaviors were assessed with the question: "Have you done any of the following things in order to lose weight or keep from gaining weight during the past year? (yes or no for each method)" [1]. *Healthy weight*

control behaviors included: exercised, ate more fruits and vegetables, ate less high-fat foods, and ate less sweets. *Unhealthy weight control behaviors* included: fasted, ate very little food, used a food substitute (powder or a special drink), skipped meals, and smoked more cigarettes. *Very unhealthy weight control behaviors* included: took diet pills, made myself vomit, used laxatives, and used diuretics.

Binge eating. Binge eating was assessed with the question: “In the past year, have you ever eaten so much food in a short period of time that you would be embarrassed if others saw you (binge eating)?” (yes/no) [1].

Smoking. Participants were asked about the frequency with which they smoked cigarettes over the past year. Response categories included: never, a few times, monthly, weekly, and daily. Responses were dichotomized for analysis; adolescents who reported that they never smoked or had smoked only a few times were compared with adolescents who reported smoking at least monthly.

Physical activity. Moderate-to-vigorous physical activity (MVPA) was assessed with a modified version of the Leisure Time Exercise Questionnaire [24]. Two questions were asked to assess how many hours were spent in strenuous (e.g., biking fast, aerobic dancing, or running) or moderate (e.g., walking quickly, baseball, or gymnastics) physical activity behaviors in a usual week. The responses (0, <.5, .5–2, 2.5–4, 4.5–6, and >6 hours/week) were recoded for analyses (0, .3, 1.3, 3.3, 5.3, and 8 hours/week).

Fruit and vegetable intake. Fruit and vegetable intake was assessed with the Youth and Adolescent Food Frequency Questionnaire (YAQ). The YAQ has been tested for reproducibility and has been compared with averages from three 24-hour dietary recalls, and findings have been within acceptable ranges for dietary assessment tools [25,26]. Mean daily servings of fruits and vegetables were calculated from responses to questions assessing frequencies of intakes of specific fruits and vegetables. French fries were excluded from total servings.

Body mass index (BMI). At Time 1, height and weight measurements were taken by trained research staff in a private area within the participants’ schools, using standardized equipment and procedures [27]. BMI was derived from the formula: weight in kilograms divided by the square of height in meters.

Sociodemographic characteristics. Gender, age, ethnicity/race, and socioeconomic status (SES) were based on self-report at Time 1. The prime determinant of SES was parental educational level, defined by the higher level of educational attainment of either parent. An algorithm was developed that also took into account family eligibility for public assistance, eligibility for free or reduced-cost school meals, and employment status of the mother and father [21].

Age cohort was based on grade in school (middle school vs. high school) at Time 1.

Statistical analysis

Descriptive summaries (percentages and means) for body satisfaction at Time 1 and health behaviors at Time 2 were first examined. We treated two behavioral outcomes (physical activity and fruit and vegetable intake) as continuous measures, whereas the other behavioral outcomes were dichotomized. Within gender, four groups were then identified on the basis of Time 1 body satisfaction quartiles: low, low-middle, high-middle and high body satisfaction. A series of general linear models was conducted in which each health behavior was the outcome variable, body satisfaction group was the independent variable, and age-cohort, race, SES, age-in-years (to accommodate the unequal follow-up times), and Time 1 of the relevant health behavior were entered as covariates. To examine whether differences across body satisfaction groups in Time 2 health behaviors were related to BMI, a second set of analyses was conducted in which BMI was also entered as a covariate. We obtained adjusted mean behavioral outcomes at Time 2 in the four categories of body satisfaction from each model. For the dichotomous outcomes, the adjusted means are direct estimates of the adjusted probabilities of the Time 2 behavior by quartile of body satisfaction. We tested a priori for linear trend across the quartiles. We also examined behavioral outcomes by the four levels of body satisfaction for any nonlinear patterns and tested for quadratic relationships; for this secondary hypothesis, *p* values are provided only when there was evidence of a U-shaped association.

Attrition in the study population was not equal across sociodemographic characteristics. Time 2 participants were more likely to be female, white, and of higher SES than Time 1 participants. Thus, in all analyses, the data were weighted to adjust for differential response rates using the response propensity method [28] by which the inverse of the estimated probability that an individual responded at Time 2 was used as the weight. The weighting method results in estimates representative of the demographic makeup of the original Project EAT-I sample. The weighted ethnic, racial and SES proportions of the study population are as follows: 48.3% white, 18.9% African American, 5.8% Hispanic, 19.6% Asian, 3.6% Native American, and 3.8% mixed or other race, whereas SES was low (17.8%), middle-low (18.9%), middle (26.7%), middle-high (23.3%), and high (13.3%). After weighting, we compared responders to the Project EAT-II survey with nonresponders for the variables being examined in the current analysis. In girls, responders had higher MVPA than nonresponders (5.7 vs. 5.0 h/week, respectively) and in boys, responders reported lower levels of very unhealthy weight control behaviors than nonresponders (5.1% vs. 9.2%, respectively); no response bias

Table 1
Time 1 body satisfaction and Time 2 health behaviors: percentages and mean values in females and males

	Females n = 1341–1377 % or mean (SD)	Males n = 1095–1121 % or mean (SD)
Body satisfaction (Mean score range: 10–50)	31.76 (9.55)	36.93 (8.73)
Dieting (% past year)	56.3%	26.7%
Healthy weight control (% past year)	85.3%	63.1%
Unhealthy weight control (% past year)	62.7%	33.1%
Very unhealthy weight control (% past year)	21.9%	6.7%
Binge eating (% past year)	15.5%	5.1%
Smoking (% monthly)	28.4%	29.3%
Physical activity (MVPA) (Mean hours/week)	3.93 (3.56)	6.11 (4.27)
Fruit and vegetable intake (Mean servings/day)	3.59 (2.48)	3.13 (2.32)

was found for body satisfaction or for any of the other outcomes in either gender.

Results

Prevalence of Time 1 body satisfaction and Time 2 health behaviors

Mean body satisfaction scores at Time 1 are shown in Table 1. Among females, the distribution of body satisfaction based upon quartiles in the total EAT-II sample was as follows: low (33.8%, n = 444), low-middle (25.6%, n = 335), high-middle (22.2%, n = 291), and high (18.4%, n =

241). Among males, the distribution by quartiles was as follows: low (23.7%, n = 312), low-middle (25.9%, n = 340), high-middle (24.1%, n = 316), and high (26.3%, n = 344). At Time 2, high percentages of respondents, particularly females, reported dieting and weight control behaviors. Three times more females than males reported binge eating. Approximately one-quarter of the females and males reported monthly smoking. Females reported about four hours of MVPA a week, whereas males reported about six hours a week. Mean intakes of fruits and vegetables were 3.6 servings a day in females and 3.1 servings a day in males.

Females: associations between Time 1 body satisfaction and Time 2 behaviors

In analyses examining associations between Time 1 body satisfaction and Time 2 health behaviors, adjusted for Time 1 behaviors and race, SES, and age, body satisfaction predicted higher levels of dieting, unhealthy weight control behaviors, very unhealthy weight control behaviors and binge eating, and lower levels of MVPA and fruit/vegetable intake (Table 2). In analyses that also adjusted for BMI, associations remained statistically significant for dieting, unhealthy weight control behaviors, and MVPA. Thus, lower body satisfaction predicted higher levels of dieting and unhealthy weight control behaviors and lower levels of MVPA, independently of BMI (Table 2). An examination of behavioral outcomes by the four levels of body satisfaction for nonlinear patterns revealed U-shaped curves only for healthy weight control behaviors. Among girls with the lowest and highest levels of body satisfaction, 89% and 87%, respectively, reported using healthy weight control behaviors, versus 83% of the girls in the mid-categories of body satisfaction (*p* value for quadratic association = .008);

Table 2
Females: Time 2 health behaviors by Time 1 body satisfaction: adjusted percentages and means

	n	Dieting % past year	Healthy weight control % past year	Unhealthy weight control % past year	Very unhealthy weight control % past year	Binge eating % past year	Smoking % monthly	Physical activity (MVPA) Hours/wk M (SD)	Fruit and vegetable intake Servings/day M (SD)
Body satisfaction ^a									
Low	386–433	65.1	88.8	68.2	32.7	19.8	30.5	3.92 (.16)	3.35 (.10)
Low-middle	292–330	58.4	82.7	66.4	20.0	14.5	29.0	3.78 (.18)	3.36 (.11)
High-middle	253–279	52.6	83.1	57.5	15.7	12.4	27.1	4.22 (.20)	3.51 (.12)
High	201–227	47.1	87.2	53.3	15.7	12.3	26.5	4.42 (.22)	3.69 (.14)
<i>p</i> Value		< .001	.628	< .001	< .001	.012	.190	.028	.037
Body satisfaction ^b									
Low	347–383	59.0	85.8	62.0	27.5	17.5	29.4	3.92 (.18)	3.40 (.11)
Low-middle	273–300	57.4	81.6	65.6	19.9	13.3	28.4	3.79 (.19)	3.31 (.12)
High-middle	239–257	54.2	83.8	60.1	17.2	13.7	27.8	4.25 (.21)	3.49 (.13)
High	191–211	50.4	88.4	57.4	19.8	14.3	25.9	4.45 (.23)	3.69 (.15)
<i>p</i> Value		.041	.317	.164	.029	.385	.338	.034	.079

^a Adjusted for race, SES, age, and Time 1 behaviors.

^b Adjusted for race, SES, age, Time 1 behaviors, and BMI.

Table 3
Males: Time 2 health behaviors by Time 1 body satisfaction: adjusted percentages and means

	n	Dieting % past year	Healthy weight control % past year	Unhealthy weight control % past year	Very unhealthy weight control % past year	Binge eating % past year	Smoking % monthly	Physical activity (MVPA) Hours/wk M (SD)	Fruit and vegetable intake Servings/day M (SD)
Body satisfaction ^a									
Low	116–130	46.2	74.6	50.1	13.9	11.3	40.0	5.72 (.36)	3.32 (.20)
Low-middle	231–262	30.9	64.7	34.0	6.3	4.8	30.5	6.12 (.25)	2.99 (.14)
High-middle	258–293	24.8	62.6	33.6	5.7	3.8	29.9	6.25 (.23)	3.12 (.13)
High	307–347	18.4	55.5	24.0	4.7	3.1	28.4	6.67 (.22)	3.13 (.12)
p-value		< .001	< .001	< .001	< .001	< .001	.011	< .024	.535
Body satisfaction ^b									
Low	106–115	36.4	64.4	40.1	7.1	11.0	35.8	6.15 (.39)	3.44 (.21)
Low-middle	219–238	29.4	64.0	32.1	5.8	3.3	27.0	5.95 (.26)	2.86 (.14)
High-middle	243–270	23.3	62.7	33.2	5.8	3.3	29.6	6.17 (.24)	3.09 (.13)
High	288–324	21.1	58.2	26.7	6.0	3.4	29.2	6.51 (.23)	3.09 (.12)
p Value		< .001	.187	.009	.690	.002	.244	.376	.060

^a Adjusted for race, SES, age, and Time 1 behaviors.

^b Adjusted for race, SES, age, Time 1 behaviors, and BMI.

after adjusting for BMI the pattern persisted (p value for quadratic association = .031).

Males: associations between Time 1 body satisfaction and Time 2 behaviors

In analyses examining associations between Time 1 body satisfaction and Time 2 health behaviors, adjusting for Time 1 behaviors and demographics, lower body satisfaction predicted higher levels of dieting, healthy, unhealthy, and very unhealthy weight control behaviors, binge eating, and smoking and lower levels of MVPA (Table 3). After adjusting for BMI, associations between body satisfaction and dieting, unhealthy weight control behaviors, and binge eating remained statistically significant (Table 3). An examination of behavioral outcomes by the four levels of body satisfaction for nonlinear patterns did not reveal any U-shaped patterns of association.

Discussion

The current study examined five-year longitudinal associations between body satisfaction and an array of health-related behaviors among adolescents in order to address the question, “Does body satisfaction matter?” Our findings indicate that lower levels of body satisfaction are associated with more health-compromising behaviors, such as unhealthy weight control behaviors and binge eating, and fewer health-promoting behaviors, such as physical activity. Having a lower level of body satisfaction did not incur advantages in terms of behavioral outcomes, with the exception of reported healthy weight control behaviors, which occurred in conjunction with unhealthy weight control behaviors. Thus, the picture that emerges suggests that body satisfaction does matter and we need to be concerned about

the high prevalence of adolescents who express body dissatisfaction.

Longitudinal analyses, adjusting for Time 1 behaviors and sociodemographic characteristics, but not adjusted for BMI, revealed strong and consistent patterns between body satisfaction and health-related behaviors five years later. In females, lower body satisfaction predicted higher levels of dieting, unhealthy and very unhealthy weight control behaviors, and binge eating, and lower levels of physical activity and fruit and vegetable intake. The only U-shaped association found among the females was between body satisfaction and healthy weight control behaviors. In males, lower body satisfaction predicted higher levels of dieting, unhealthy and very unhealthy weight control behaviors, binge eating, and smoking, and lower levels of physical activity. There was only one suggestion of a positive impact of low body satisfaction among males; body satisfaction was inversely associated with the reported use of healthy weight control behaviors five years later.

In similar analyses that also adjusted for BMI, a number of associations remained statistically significant. Independent of BMI, among females, lower levels of body satisfaction predicted higher levels of dieting and unhealthy weight control behaviors and lower levels of physical activity. Among males, low levels of body satisfaction predicted higher levels of dieting, unhealthy weight control behaviors, and binge eating. However, patterns of association tended to be weaker and less consistent in these analyses than in analyses that did not adjust for BMI, suggesting that, in part, associations between body satisfaction and health behaviors are a function of BMI.

As in the current study, other longitudinal studies have also shown that lower body satisfaction is associated with higher levels of dieting, dietary restraint, unhealthy weight

control behaviors and binge eating [5,8,18,29–31]. These relationships are disturbing, given findings from longitudinal studies showing that dieting, unhealthy weight control behaviors, and binge eating predict weight gain in adolescents, even after adjustment for baseline differences in weight status [15–18]. In light of the high prevalence of obesity, an important question is how can we help adolescents appreciate their bodies yet recognize the importance of striving for a healthy weight through healthier weight management behaviors?

Associations between body satisfaction and smoking tended to be weaker in the current study than in other cross-sectional [32–34] and longitudinal studies [35], particularly among females. One reason may be that most other studies have measured weight-specific attitudes or behaviors such as drive for thinness or dietary restraint, and not satisfaction with different parts of the body, as was done in the current analysis. Additional contributing factors include the long period between Time 1 assessment of body satisfaction and Time 2 smoking, and age and developmental factors whereby girls who were dissatisfied with their bodies may have already initiated smoking at Time 1. Indeed, in analyses unadjusted for Time 1 behaviors, lower levels of body satisfaction at Time 1 were significantly associated with higher levels of Time 2 smoking in females (data not shown). Our findings should not be interpreted as meaning that adolescents do not smoke for weight control purposes. As previously reported [1], nearly 5% of males and 10% of females in the Project EAT population indicated that they smoked more cigarettes at Time 1 to lose weight or avoid gaining weight.

Fewer studies have examined associations between body satisfaction and healthier weight management strategies, such as eating more fruits and vegetables and increasing physical activity. Longitudinal studies examining associations between body satisfaction and physical activity have not found statistically significant associations; however, these studies examined the independent contribution of body satisfaction, after adjusting for stronger predictor variables such as perceived athletic competence and parental support for physical activity [29,36,37]. Findings from the current study were consistent with other studies in finding that low body satisfaction is not a motivator toward behaviors likely to be effective in long-term weight management. However, because of the potential complexity of these associations, further exploration would be informative. In the current study, we found different patterns of association between body satisfaction and the reported use of healthy behaviors during the past year such as increasing physical activity and fruit and vegetable intake for weight control reasons, than between body satisfaction and these behaviors as assessed using the leisure time exercise questionnaire and the food frequency questionnaire, respectively. In a cross-sectional study of college students, body dissatisfaction was associated with exercise for weight,

tone, and attractiveness reasons, but not with exercising for mood, health, and enjoyment [38]. This raises the question as to how one's reasons for engaging in behaviors such as physical activity or fruit and vegetable intake influence the intensity, consistency, and duration with which behaviors are implemented.

Strengths of the current study include the large and diverse study population in terms of ethnicity and SES; the five-year follow-up during key transitional periods of adolescence; the assessment of BMI using measured values of height and weight; the assessment of body satisfaction using a psychometrically sound tool; and a broader assessment of health-related variables, particularly regarding weight control behaviors and dietary intake, than is typically done in large population-based surveys of youth. We are unaware of any other studies that have examined longitudinal associations between body satisfaction and a broad array of health behaviors in such a large and diverse population of adolescents as was done in the current study.

Although these strengths contribute to the uniqueness and utility of the findings, study limitations also need to be taken into account in interpreting the findings. First, in spite of multiple attempts to reach the original study participants, there was study attrition and participants in EAT-II differed from the original cohort. In order to enhance our ability to make extrapolations to a sample similar to the original study population, nonresponse weighting procedures were used. Second, given the comprehensive nature of our survey, some of the measures of health behaviors were brief and based on self-report on a survey, rather than on actual measurements, observations, or clinical assessment. Finally, although the longitudinal nature of the study allowed us to examine whether body satisfaction predicts health behaviors over time, we cannot establish causality. Interventions aimed at improving body satisfaction should include an assessment of health behaviors in order to determine whether change in body satisfaction leads to change in behavioral patterns. Future research should expand upon the current analysis by exploring associations between body satisfaction and behavioral outcomes within subgroups of the population, e.g., across weight status and ethnicity. It is also of interest to explore the impact of different aspects of body satisfaction (e.g., shoulder width, weight) within different subgroups. For example, dissatisfaction with shoulder width is likely to have a different impact on underweight boys than on overweight girls.

Findings from the present study clearly indicate the importance of body satisfaction for the overall well-being of adolescents. Body satisfaction was predictive of health-related behaviors even after a five-year period. Our findings suggest the importance of avoiding messages or interventions that may, inadvertently, lead to lower levels of body satisfaction in adolescents. Parents, educators, and health care providers should resist utilizing messages aimed at motivating adolescents toward behavioral change via de-

creasing their comfort with their bodies. Instead, it may be more effective to encourage positive change via messages that enhance body satisfaction and a desire to care for one's body. Recommendations regarding the types of messages that might be most effective cannot be made from the current analysis; rather, this research provides a justification for the exploration of suitable messages and an assessment of their effectiveness in both enhancing body satisfaction and the adoption of a healthier lifestyle. Programs aimed at promoting both a healthy weight and a positive body image may offer the most promise for decreasing potentially harmful behaviors, such as unhealthy weight control and binge eating, and in promoting the use of healthier behaviors, such as increased physical activity, which are more likely to be effective for long-term weight management and overall health promotion.

Acknowledgment

This study was supported by Grant R40 MC 00319 from the Maternal and Child Health Bureau (Title V, Social Security Act), Health Resources and Services Administration, Department of Health and Human Services.

References

- [1] Neumark-Sztainer D, Croll J, Story M, et al. Ethnic/racial differences in weight-related concerns and behaviors among adolescent girls and boys: findings from Project EAT. *J Psychosom Res* 2002;53:963–74.
- [2] Ricciardelli LA, McCabe MP. Dietary restraint and negative affect as mediators of body dissatisfaction and bulimic behavior in adolescent girls and boys. *Behav Res Ther* 2001;39:1317–28.
- [3] Keery H, van den Berg P, Thompson JK. An evaluation of the tripartite influence model of body dissatisfaction and eating disturbance with adolescent girls. *Body Image* 2004;1:237–51.
- [4] Holsen I, Kraft P, Roysamb E. The relationship between body image and depressed mood in adolescence: a 5-year longitudinal panel study. *J Health Psychol* 2001;6:613–27.
- [5] Johnson F, Wardle J. Dietary restraint, body dissatisfaction, and psychological distress: a prospective analysis. *J Abnorm Psychol* 2005;114:119–25.
- [6] Stice E, Bearman SK. Body-image and eating disturbances prospectively predict increases in depressive symptoms in adolescent girls: a growth curve analysis. *Dev Psychol* 2001;37:597–607.
- [7] Cooley E, Toray T. Disordered eating in college freshman women: a prospective study. *J Am Coll Health* 1996;44:229–35.
- [8] Stice E. A prospective test of the dual-pathway model of bulimic pathology: mediating effects of dieting and negative affect. *J Abnorm Psychol* 2001;110:124–35.
- [9] The McKnight Investigators. Risk factors for the onset of eating disorders in adolescent girls: results of the McKnight longitudinal risk factor study. *Am J Psychiatry* 2003;160:248–54.
- [10] Smolak L. Body image in children and adolescents: where do we go from here? *Body Image* 2004;1:15–28.
- [11] Hedley AA, Ogden CL, Johnson CL, et al. Prevalence of overweight and obesity among US children, adolescents, and adults, 1999–2002. *JAMA* 2004;291:2847–50.
- [12] U.S. Department of Health and Human Services. The Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity. Rockville, MD: Office of Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, National Institutes of Health, 2001.
- [13] Heinberg LJ, Thompson JK, Matzon JL. Body image dissatisfaction as a motivator for healthy lifestyle change: is some distress beneficial? In: Striegel-Moore RH, Smolak L, eds. *Eating Disorders Innovative Directions in Research and Practice*. Washington, DC: American Psychological Association, 2001:215–32.
- [14] Schwartz MB, Brownell KD. Obesity and body image. *Body Image* 2004;1:43–56.
- [15] Neumark-Sztainer D, Wall M, Guo J, et al. Obesity, disordered eating, and eating disorders in a longitudinal study of adolescents: how do dieters fare five years later? *J Am Diet Assoc* In Press.
- [16] Field AE, Austin SB, Taylor CB, et al. Relation between dieting and weight change among preadolescents and adolescents. *Pediatrics* 2003;112:900–6.
- [17] Stice E, Cameron RP, Killen JD, et al. Naturalistic weight-reduction efforts prospectively predict growth in relative weight and onset of obesity among female adolescents. *J Consult Clin Psychol* 1999;67:967–74.
- [18] Stice E, Presnell K, Spangler D. Risk factors for binge eating onset in adolescent girls: a 2-year prospective investigation. *Health Psychol* 2002;21:131–8.
- [19] Heinberg L. The Role of Body Image Distress in Obesity: Is it Motivating or Malevolent? Academy for Eating Disorders International Conference on Eating Disorders. Montreal, Quebec, Canada: Academy for Eating Disorders, 2005.
- [20] Neumark-Sztainer D, Story M, Perry C, et al. Factors influencing food choices of adolescents: findings from focus-group discussions with adolescents. *J Am Diet Assoc* 1999;99:929–37.
- [21] Neumark-Sztainer D, Story M, Hannan PJ, et al. Overweight status and eating patterns among adolescents: where do youth stand in comparison to the Healthy People 2010 Objectives? *Am J Public Health* 2002;92:844–51.
- [22] Neumark-Sztainer D, Wall MM, Story M, et al. Correlates of unhealthy weight-control behaviors among adolescents: implications for prevention programs. *Health Psychol* 2003;22:88–98.
- [23] Pingitore R, Spring B, Garfield D. Gender differences in body satisfaction. *Obes Res* 1997;5:402–9.
- [24] Godin G, Shephard RJ. A simple method to assess exercise behavior in the community. *Can J Appl Sport Sci* 1985;10:141–6.
- [25] Rockett HRH, Breitenbach MA, Frazier AL, et al. Validation of a youth/adolescent food frequency questionnaire. *Prev Med* 1997;26:808–16.
- [26] Rockett HR, Wolf AM, Colditz GA. Development and reproducibility of a food frequency questionnaire to assess diets of older children and adolescents. *J Am Diet Assoc* 1995;95:336–40.
- [27] Lohman T, Roche AF, Martorell R, eds. *Anthropometric Standardization Reference Manual*. Champaign, IL: Human Kinetics Books, 1988.
- [28] Little RJA. Survey nonresponse adjustments for estimates of means. *Int Stat Rev* 1986;54:137–9.
- [29] Crocker P, Sabiston C, Forrester S, et al. Predicting change in physical activity, dietary restraint, and physique anxiety in adolescent girls. *Can J Public Health* 2003;94:332–7.
- [30] Cooley E, Toray T. Body image and personality predictors of eating disorder symptoms during the college years. *Int J Eat Disord* 2001;30:28–36.
- [31] Stice E, Mazotti L, Krebs M, et al. Predictors of adolescent dieting behaviors: a longitudinal study. *Psychol Addict Behav* 1998;12:195–205.
- [32] Crocker P, Kowalski N, Kowalski K. Smoking behaviour and dietary restraint in young adolescent women: the role of physical self-perceptions. *Can J Public Health* 2001;92:428–32.
- [33] Mikkilä V, Lahti-Koski M, Pietinen P, et al. Associates of obesity and weight dissatisfaction among Finnish adolescents. *Public Health Nutr* 2003;6:49–56.
- [34] Fisher M, Schneider M, Pegler C, et al. Eating attitudes, health-risk behaviors, self-esteem, and anxiety among adolescent females in a suburban high school. *J Adolesc Health* 1991;12:377–84.

- [35] Potter BK, Pederson LL, Chan SS, et al. Does a relationship exist between body weight, concerns about weight, and smoking among adolescents? An integration of the literature with an emphasis on gender. *Nicotine Tob Res* 2004;6:397–425.
- [36] Neumark-Sztainer D, Story M, Hannan PJ, et al. Factors associated with changes in physical activity: a cohort study of inactive adolescent girls. *Arch Pediatr Adolesc Med* 2003;157:803–10.
- [37] Sallis JF, Alcaraz J, McKenzie TL, et al. Predictors of change in children's physical activity over 20 months. *Am J Prev Med* 1999; 16:222–9.
- [38] McDonald K, Thompson JK. Eating disturbance, body image dissatisfaction, and reasons for exercising: gender differences and correlational findings. *Int J Eat Disord* 1992;11: 289–92.