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Prospective Predictors of Body Dissatisfaction in Young Adults: 10-year Longitudinal Findings

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Abstract

This study identified longitudinal risk factors for body dissatisfaction (BD) over a 10-year period from adolescence to young adulthood. Participants ($N = 2134$; age at baseline: $M = 15.0$, $SD = 1.6$ years) provided two waves of survey data. A 6-step hierarchical linear regression analysis examined the predictive contribution of Time 1 BD, weight status, demographics, family and peer environmental factors, and psychological factors. Among females, Asian race/ethnicity, low self-esteem, greater BD, and higher body mass index during adolescence contributed significantly to predicting greater BD at 10-year follow up ($R^2 = 0.27$). Among males, demographics (i.e., Asian, other-mixed ethnicity, education attainment), depressive symptoms, greater BD, higher body mass index, more parent communication, and less peer weight teasing during adolescence contributed to BD at follow-up ($R^2 = 0.27$). Findings indicate who may be at greatest risk for BD in young adulthood and the types of factors that should be addressed during adolescence.

The high prevalence of body dissatisfaction among female adolescents (24%–46%) and male adolescents (12%–26%), and the continued rise in body dissatisfaction from early adolescence to young adulthood is of public health concern (Eisenberg, Neumark-Sztainer, & Paxton, 2006; Neumark-Sztainer, Story, Hannan, Perry, & Irving, 2002; Presnell, Bearman, & Stice, 2004; Stice & Whitenton, 2002). The deleterious effects of body dissatisfaction, such as the development of disordered eating (McCabe & Ricciardelli, 2003; Phares, Steinberg, & Thompson, 2004), eating disorders (Stice, 2002) and poor psychological well-being (Holsen, Kraft, & Roysamb, 2001; Stice & Bearman, 2001) have been well documented in the literature. Thus, it is important to identify risk and protective factors for body dissatisfaction in both female and male adolescents.

Cross-sectional studies of female and male adolescents have found associations between body dissatisfaction and a number of variables such as body weight (Lawler & Nixon, 2011; Neumark-Sztainer, Story, Hannan, Perry, et al., 2002; Thompson et al., 2007), race/ethnicity (Akan & Grilo, 1994; Fitzgibbon, Blackman, & Avellone, 2000; Neumark-Sztainer et al., 2002), and socio-environmental influences including peer and parent dieting (Fulkerson et al., 2006; Jones, Vigfusdottir, & Lee, 2004), media (Holmstrom, 2004; Knauss, Paxton, & Alsaker, 2007; van den Berg et al., 2007), and weight-related teasing (Eisenberg, Neumark-Sztainer, & Story, 2003; Keery, Boutelle, van den Berg, & Thompson, 2005; Menzel et al., 2010). To confirm temporal ordering of these relationships, authors of cross-sectional studies have called for prospective studies that follow participants longitudinally over several years and are able to demonstrate the precedence of potential risk and protective factors of body dissatisfaction.

It is of particular interest to follow adolescents through young adulthood, given that this is an important transitional period in young people's lives (Arnett, 2001), and because of the high levels of body dissatisfaction during both adolescence and young adulthood (Graber, Petersen, & Brooks-Gunn, 1996; Paxton & Heinicke, 2008; JK Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999). Emerging adulthood is a unique developmental stage that is marked by important transitions, such as leaving home and increasing autonomy in decision making, while at the same time adult responsibilities, such as financial independence and residential and employment stability, are in flux (Arnett, 2004; Nelson, Story, Larson, Neumark-Sztainer, & Lytle, 2008). This developmental stage is also a time for exploration of new ideologies and behaviors that allow individuals to express their individuality and develop their own self-identity (Nelson, et al., 2008). Given that identity development is a primary task for young people during emerging adulthood, poor body image may hinder an otherwise smooth and healthy transition into young adulthood. Thus, it is important to comprehensively examine factors during adolescence that impact body dissatisfaction in young adulthood, including both personal factors (e.g., self-esteem, depression) and socio-environmental factors (e.g., peer and family weight teasing and dieting, parent communication). A better understanding of the types of factors that influence body dissatisfaction can inform the development of more effective intervention efforts focused on reducing negative body image and associated negative health outcomes during emerging adulthood.

As early as childhood, females and males are exposed to unrealistic body image ideals that may threaten their sense of well-being (Paxton & Heinicke, 2008; Striegel-Moore & Bulik, 2007). For instance, unrealistic or exaggerated body ideals encourage drive for thinness among females, while a drive for muscularity is heavily emphasized for males (Murnen, 2011). In turn, these unrealistic body image ideals are associated with greater body dissatisfaction in both genders. Body image ideals are associated with their respective gender roles where an emphasis on appearance is considered more important for women than men (Murnen, 2011; van den Berg, et al., 2007). Thus, it is common to find gender differences in the prevalence and magnitude of body dissatisfaction. Because the extant literature has indicated gender differences in body dissatisfaction (McKinley, 2006; Murnen, 2011) and suggests that there may be differences in the types of factors to which these factors influence body dissatisfaction (Paxton, Eisenberg, & Neumark-Sztainer, 2006;

Presnell, et al., 2004; Vincent & McCabe, 2000), it is important to explore risk and protective factors of body dissatisfaction by gender.

Additionally, previous research suggests that some racial/ethnic groups may be at greater or lesser risk for body dissatisfaction. For instance, Black women tend to experience less body dissatisfaction than white women (Grabe & Hyde, 2006; Roberts, Cash, Feingold, & Johnson, 2006; Wildes, Emery, & Simons, 2001). Similarly, white men have been found to be more dissatisfied with their body size/weight than Black men (Smith, Thompson, Raczynski, & Hilner, 1999). These racial/ethnic variations in body dissatisfaction may result from differing cultural and social contexts (Crago & Shisslak, 2003). For example, research has shown that the female body size considered ideal for Black female adolescents is somewhat larger than the size considered ideal by white female adolescents (Jones, Fries, & Danish, 2007; Neff, Sargent, McKeown, Jackson, & Valois, 1997). White female adolescents also are significantly more likely to engage in dieting and exercising as a method of weight management compared to Black females (Neff, et al., 1997). Similarly, Black male adolescents are more satisfied with being at a larger weight compared to their white peers (Adams et al., 2000; Jones, et al., 2007; Thompson, Corwin, & Sargent, 1997). Few studies have explored body dissatisfaction in a large and racially/ethnically diverse sample using strong measures of body image; thus, research exploring body dissatisfaction by race/ethnicity would be informative.

Body dissatisfaction is multifactorial (Paxton & Heinicke, 2008). Consistent with the social ecological model (Bandura, 2001), conditions, behaviors and experiences such as pubertal status, obesity, “fat-talk,” self-weighing, weight-teasing, parenting practices, media exposure, community norms and cultural values may all contribute to its development and maintenance over time (Eisenberg, Neumark-Sztainer, Haines, & Wall, 2006; Eisenberg, Wall, & Neumark-Sztainer, 2012; Haines, Neumark-Sztainer, Wall, & Story, 2007; Neumark-Sztainer et al., 2010; Quick, Loth, MacLehose, Linde, & Neumark-Sztainer, 2012). Therefore, research that simultaneously considers a variety of risk and protective factors at multiple levels of influence (i.e. individual, peer, environmental) is essential to furthering our understanding of this complex condition and to the development of meaningful prevention strategies.

Several longitudinal studies have examined personal and socio-environmental factors and their associations with body dissatisfaction in female and male adolescents using this socio-ecological approach (Jones, 2004; Ohring, Graber, & Brooks-Gunn, 2002; Stice & Whitenton, 2002). However, most longitudinal studies (Helfert & Warschburger, 2011; Rosenblum & Lewis, 1999) have not comprehensively examined personal and socio-environmental factors of potential relevance to body dissatisfaction in a racially/ethnically diverse sample. In a 3-year follow-up study of adolescent girls and boys aged 13, which did include a comprehensive assessment of potential risk and protective factors for body dissatisfaction, multivariate model findings indicated that greater body dissatisfaction, lower parental support, and greater dietary restraint among girls and boys at Time 1 were predictive of increases in body dissatisfaction at follow-up; however age, body mass index and ideal body internalization were not predictive of body dissatisfaction (Bearman, Presnell, Martinez, & Stice, 2006). A different 3-year longitudinal study among 7th and 10th

grade girls and boys, hierarchical regression analyses of physical risks (i.e., pubertal status, BMI, figure management), contextual risks (i.e., pop culture, teasing), and resource factors (i.e., sports activity, mother and father acceptance, church and/or other religious activity) showed that, among girls, greater BMI, figure management, perceived mother's acceptance, and appearance teasing at Time 1 predicted greater body dissatisfaction at follow-up; for boys, only being teased about appearance at Time 1 predicted greater body dissatisfaction at follow-up (Barker & Galambos, 2003). The differences from these two studies and other longitudinal studies have produced mixed findings regarding the number and type of personal (e.g., self-esteem, depression) and socio-environmental (e.g., peer weight teasing, parental support) factors predictive of body dissatisfaction, likely due to differences in variables assessed, survey measurements, and extensiveness of follow-up periods. Thus, the predictive power of personal and socio-environmental factors on body dissatisfaction remains inconclusive.

For the most part, follow-up periods have not been long enough to cover transitions from one life stage to another; some studies have had follow-up periods of two years or less (Helfert & Warschburger, 2011; Presnell, et al., 2004) whereas others have followed youth from 3 to 5 years (Barker & Galambos, 2003; Bearman, et al., 2006; Paxton, et al., 2006; Rosenblum & Lewis, 1999). The study with the longest follow-up period (8 years) (Ohring, et al., 2002), only included females in the analyses. To build upon these previous longitudinal study findings and address the gaps in the literature, studies that assess a wide variety of key personal and socio-environmental factors of potential relevance to body dissatisfaction during the transition from adolescence to young adulthood and include longer follow-up periods are warranted.

In a prior examination of personal and socio-environmental predictors of body dissatisfaction over a 5-year period (from early and late adolescence), utilizing earlier study waves of the same data set that is being used in the current study (Project EAT), risk factors for subsequent body dissatisfaction were identified, with some differences across gender and life stage group (early or late adolescence) (Paxton, et al., 2006). In general, regardless of gender and life stage group differences, greater body dissatisfaction and depression, higher body mass index (BMI), lower self-esteem, greater pressures from peers to diet, more weight teasing, and lower socioeconomic status during adolescence predicted increases in body dissatisfaction five years later, while being Black or African American was protective against increases in body dissatisfaction. It is important to note that gender differences in factors predictive of body dissatisfaction did emerge in relation to life stage group. For instance, among early adolescent girls, higher BMI, greater pressures from peers to diet and lower socioeconomic status predicted increases in body dissatisfaction, while among early adolescent boys, higher BMI and lower socioeconomic status predicted increases in body dissatisfaction.

The present study builds upon the Project EAT 5-year follow-up study (Paxton, et al., 2006), by including data from the third wave of data collection at 10-year follow-up. Thus, the aim of the current study is to identify factors in adolescence that predict body dissatisfaction 10 years later in female and male young adults. Numerous factors were assessed as potential correlates of body dissatisfaction at follow-up, including baseline demographic factors (i.e.,

race/ethnicity, SES, age), weight status, psychological factors, and peer and family environment factors, based on findings from the 5-year follow-up study. Based upon these earlier findings from Project EAT (Paxton, et al., 2006) and other studies (Barker & Galambos, 2003; Paxton, et al., 2006; Presnell, et al., 2004), it was hypothesized that body dissatisfaction and BMI during adolescence would contribute the most variance in predicting body dissatisfaction 10 years later in young adulthood, but that personal (i.e., self-esteem, depression) and socio-environmental factors (i.e., peer and family weight teasing, peer and family dieting behaviors, and parent communication) would also explain some variance in models predicting body dissatisfaction. Finally, based on previous research that suggests body dissatisfaction differs by gender (Barker & Galambos, 2003; Paxton, et al., 2006; Rosenblum & Lewis, 1999), it was hypothesized that different types of factors during adolescence would predict body dissatisfaction in young adulthood among female and male adolescents.

Materials and Methods

Study Design and Participants

Participants were recruited as part of Project EAT-III (Eating and Activity in Teens and Young Adults), a 10-year prospective, epidemiological study designed to explore dietary intake, physical activity, weight control behaviors, weight status, and factors associated with these outcomes in a diverse sample of young people. In-class surveys (Project EAT-I) were administered and height and weight were assessed during the 1998–1999 academic year (baseline) among 4,746 junior and senior high school students (aged 11–18 years) at 31 public schools in the Minneapolis/St. Paul metropolitan area (Neumark-Sztainer, Croll, et al., 2002; Neumark-Sztainer, Story, Hannan, & Moe, 2002). Approximately 10 years later in 2008–09 (Time 3), the Project EAT-III survey was administered via mail or online to participants (aged 21–28 years) who completed the baseline survey (Larson, Neumark-Sztainer, Story, van den Berg, & Hannan, 2011). The response rate for the 10-year follow-up was 48.2% of the original EAT-I sample and 66.4% of participants for whom we had usable contact information at Time 3. Participants were excluded from analyses if they did not have body dissatisfaction scores at both time points ($n = 63$), had missing height and weight measures ($n = 9$), or were pregnant at Time 3 ($n = 90$) leaving the total sample size to 2,134 participants who responded to both the Time 1 and Time 3 surveys and met inclusion criteria. However, since a number of participants were missing data on one or more relevant variables (22.4%), the total analytic sample was restricted to participants without missing data ($n = 1,655$). Participants included in the model were significantly older, had greater BMIs, higher SES, more likely to be white and more educated than those not included in the model.

Because the analytic sample ($n = 1,655$) included only those who provided data at both time points, analyses were weighted to account for differential loss to follow-up using the response propensity method (Little, 1986), in which the inverse of the estimated probability that an individual responded at Time 3 was used as the weight. Thus, all Time 3 estimates were generalizable to the population represented by the original Project EAT-I school-based sample. The weighted sample was 48% white, 20% African American, 18% Asian, 5%

Hispanic, 3% Native American, 5% mixed or other race/ethnicity. Additionally, the 48% of the original EAT-I sample who responded to the EAT-III survey were not significantly different in Time 1 BMI or body dissatisfaction compared to participants who did not respond to the EAT-III survey; thus indicating that the total analytic sample in this study is representative of the original EAT-I sample on key variables of interest. The Institutional Review Board at the University of Minnesota approved all protocols used in Project EAT.

Survey Development

Development of the Project EAT-I survey was based on social cognitive theory (Bandura, 2001), focus groups with adolescents (Neumark-Sztainer, Story, Perry, & Casey, 1999), an extensive literature review, content reviews by multidisciplinary experts and adolescents, and pilot testing. Key items on the Project EAT-I survey were preserved on the EAT-III survey to enable longitudinal comparisons (Larson, et al., 2011). Test-retest reliability over a 2-week period was assessed at baseline in a diverse sample of 161 adolescents (Neumark-Sztainer, Croll, et al., 2002) and at 10-year follow-up in a diverse sample of 66 young adults (Larson, et al., 2011). All measures were assessed at baseline, except for educational status, which was assessed at follow-up. All psychometric tests presented are from baseline.

Measures

Body dissatisfaction—At both baseline and 10-year follow-up the outcome variable of interest, body dissatisfaction, was measured with a 10-item scale that was adapted and modified from the Body Shape Satisfaction Scale (Pingitore, Spring, & Garfield, 1997). This scale has demonstrated high reliability in the different age and gender groups in all study waves (Neumark-Sztainer, Wall, Eisenberg, Story, & Hannan, 2006; Paxton, et al., 2006). The scale assessed body satisfaction by asking participants, “How satisfied are you with your.... height, weight, body shape, waist, hips, thighs, stomach, face, body build and shoulders?” with responses ranging from “very dissatisfied” to “very satisfied” on a 5-point scale for each body feature. All items were reverse scored and summed for an overall score, with higher scores indicating greater body dissatisfaction (range: 10 to 50; Cronbach’s $\alpha = 0.92$; test-retest for individual items: $r = 0.68 - 0.77$). Few participants missed completing more than 8 answers on this scale; only participants who completed 8 out of the 10 items were retained ($n = 2,134$).

Body mass index (BMI)—BMI was calculated using the standard formula [weight (kg)/height (m^2)] at baseline using self-reported height and weight. High correlations were found between self-reported and measured BMI in male ($r = 0.88$) and female ($r = 0.85$) adolescents at baseline (Himes, Hannan, Wall, & Neumark-Sztainer, 2005).

Depressive symptoms—Depressive mood was assessed with a 6-item scale (Kandel & Davies, 1982), comprised of items such as, “During the past 12 months, how often have you been bothered or troubled by feeling unhappy, sad or depressed?” Responses ranged on a 3-point scale from “not at all” to “very much.” This measure provides a brief index of depressive symptoms and does not yield a diagnosis of depression. All items were summed for an overall score, with higher scores indicating more depressive symptoms (range 6 to 18; Cronbach’s $\alpha = 0.82$; test-retest of individual items ranged from 0.31 to 0.72) (Neumark-

Sztainer et al., 2007). Few participants ($n = 29$; 1.4%) missed completing more than 4 answers on this scale; only participants who completed at least 4 out of the 6 items were retained ($n = 2,105$).

Self-esteem—Self-esteem was assessed by asking participants to indicate how strongly they agreed with six statements (e.g., “At times I think that I am no good at all”) that were adapted from the Rosenberg Self-Esteem Scale (Rosenberg, 1965). Responses for each statement ranged on a 4-point scale from “strongly disagree” to “strongly agree.” All items were summed for an overall score, with higher scores indicating higher self-esteem (range: 6 to 24, Cronbach’s $\alpha = 0.83$, test-retest: $r = 0.85$). Few participants ($n = 45$; 2.1%) missed completing more than 4 answers on this scale; only participants who completed at least 4 out of the 6 items were retained ($n = 2,089$).

Peer dieting—Perception of peer dieting was assessed by asking participants how strongly they agreed with the statement, “Many of my friends diet to lose weight or keep from gaining weight” (Eisenberg, Neumark-Sztainer, Story, & Perry, 2005; Neumark-Sztainer, Wall, Story, & Perry, 2003). Responses ranged on a 4-point scale from “not at all” to “very much,” with an additional response option of “I don’t know.” Participants who responded “I don’t know” were not included in models using the peer dieting variable ($n = 333$; 15%). Higher scores indicated greater perceived peer involvement in dieting (range: 1 to 3, test-retest: $r = 0.48$). For the regression analyses, responses of “somewhat” and “very much” were combined because of relatively few participants endorsing “very much.”

Peer weight teasing—Peer weight teasing was assessed by asking participants, “Have you ever been teased or made fun of by other kids because of your weight?” with responses of “yes” or “no” (test-retest: $r = 0.59$) (Haines, Neumark-Sztainer, Eisenberg, & Hannan, 2009).

Parent dieting—Perception of parent dieting was assessed by asking participants how strongly they agreed with the following statements: “My mother diets to lose weight or keep from gaining weight” and “My mother encourages me to diet to control my weight.” Responses ranged on a 4-point scale from “not at all” to “very much.” These same two questions also were asked in regards to the respondent’s father. Since approximately 7% of participants responded to only the items regarding their mother or their father, parent dieting items were averaged for an overall mean score, thereby allowing those with data for only one parent to achieve the full range of the scale. Higher scores indicated more parental dieting and encouragement to diet (Neumark-Sztainer, et al., 2003). For regression analyses, responses of “somewhat” and “very much” were combined because of relatively few participants endorsing “very much” (range: 1 to 3, Cronbach’s $\alpha = 0.78$).

Parent communication—Parent communication was assessed by asking participants, “How much do you feel you can talk to your mother about your problems?” Responses ranged on a 4-point scale from “not at all” to “very much.” The same questions was asked in regards to father. As with parent dieting, communication items were averaged for a mean score; higher scores indicated more communication with parents (range: 1 to 4, Cronbach’s $\alpha = 0.59$).

Family weight teasing—Family weight teasing was assessed by asking participants, “Have you ever been teased or made fun of by family members because of your weight?” with responses of “yes” or “no” (test-retest: $r = 0.78$) (Eisenberg, Berge, Fulkerson, & Neumark-Sztainer, 2011; Neumark-Sztainer, et al., 2010).

Socio-demographic variables—Participants’ gender, age, racial/ethnic identity, socioeconomic status (SES) at Time 1 and highest educational attainment at Time 3 were self-reported. Race/ethnicity was assessed with one item: “Do you think of yourself as 1) white, 2) Black or African American, 3) Hispanic or Latino, 4) Asian American, 5) Hawaiian or Pacific Islander, or 6) American Indian or Native American.” Respondents were grouped as white, Black or African American, Asian American, or other-mixed ethnicity. Socio-economic status (SES) was calculated by classification and regression tree analyses (Breiman, Friedman, Olshen, & Stone, 1984) in which indicators of parent education, work status and receipt of public assistance were used in a series of decision rules to separate cases into homogeneous subgroups. Analyses revealed five approximately equally distributed categories (low, low/medium, medium, medium/high, and high) and were primarily reflective of the education level of the highest educated parent in a household (Neumark-Sztainer, Story, Hannan, & Moe, 2002).

Data Analysis

Variables expected to be highly correlated with one another, such as self-esteem and depression, were examined for multicollinearity using Spearman correlations. Correlation coefficients among all predictors ranged from 0.03 to 0.58 with a mean correlation of 0.14; thus multicollinearity was not a concern.

Spearman correlations were run to determine bivariate associations between baseline predictors and body dissatisfaction at 10-year follow-up. We conducted hierarchical linear regression analyses with body dissatisfaction at 10-year follow-up as the outcome variable of interest. This method allowed us to test the change in predictability of Time 3 body dissatisfaction associated with Time 1 predictor variables entered later in the analysis over and above that contributed by predictor variables entered earlier in the analysis. Time 1 predictor variables were entered in the hierarchical regression analysis as we have done previously (Paxton, et al., 2006). A total of 6 steps were performed in the hierarchical regression analyses that entered Time 1 predictors variables sequentially as follows: 1) body dissatisfaction, 2) weight status (BMI), 3) demographic characteristics (i.e., race/ethnicity, SES, age, Time 3 education status), 4) family environment factors (i.e., family weight teasing, parent dieting, parent communication), 5) peer environment factors (i.e., peer dieting, peer weight teasing), and 6) psychological factors (i.e., depression, self-esteem). Conditional F-tests were computed to determine the significant ($p < 0.05$) change in R -square as each step of predictor variables were entered into the model.

Given a priori expectations of gender differences based on prior research (Murnen, 2011; van den Berg, et al., 2007), all analyses were stratified by gender. Additional models were run including gender interactions with each Time 1 predictor variable in the final hierarchical regression, to identify significant differences across gender in the observed

associations with body dissatisfaction. Additionally, interactions of race/ethnicity and each Time 1 predictor variable were tested to identify differences in the associations with body dissatisfaction. A total of 20 out of 96 tests were statistically significant ($p < 0.05$); however, these did not show any clear or meaningful patterns across the four racial/ethnic categories (by gender) so they are not reported here. All analyses were conducted using SAS software (version 9.2, 2003; SAS, Inc., Cary, NC).

Results

Characteristics of Sample and Univariate Correlates of Time 3 Body Dissatisfaction

Participant characteristics are presented in Table 1. Mean body dissatisfaction during adolescence for females was $M = 19.2$, $SD = 9.0$ and for males $M = 14.3$, $SD = 8.6$, while mean body dissatisfaction in young adulthood for females was $M = 21.6$, $SD = 8.6$ and for males was $M = 16.7$, $SD = 8.8$. Bivariate correlations between all Time 1 variables and Time 3 body dissatisfaction are shown in Table 2; although most associations between Time 1 variables and Time 3 body dissatisfaction were statistically significant, associations tended to be small in magnitude. Time 1 body dissatisfaction and body mass index in both genders and self-esteem in females were the variables found to be most highly correlated with Time 3 body dissatisfaction, with modest correlations (0.30 – 0.40).

Females: Longitudinal Predictors of Young Adult Body Dissatisfaction

Table 3 summarizes findings from the hierarchical linear regression analysis for females. Time 1 body dissatisfaction, BMI, demographic characteristics (i.e., race/ethnicity, socioeconomic status, age, education level attainment), family environment factors (i.e., family weight teasing, parent dieting, parent communication) and psychological factors (i.e., depression, self-esteem) each contributed significantly to Time 3 body dissatisfaction as determined by the change in R -square at each model step. The peer environment factors (i.e., peer dieting, peer weight teasing) were the only predictor variables that did not contribute significantly to Time 3 body dissatisfaction, above and beyond Time 1 body dissatisfaction, BMI, demographic characteristics and family environment factors (Step 5, $R^2 = 0.00$). Greater body dissatisfaction, higher BMI, Asian race/ethnicity, and low self-esteem at Time 1 individually predicted Time 3 body dissatisfaction, and these remained statistically significant predictors above and beyond all other predictor variables entered into the model (Step 6, $R^2 = 0.27$). Parent dieting (i.e., encouragement from parents to diet) was the only family environment factor that individually predicted body dissatisfaction at 10-year follow-up above and beyond Time 1 body dissatisfaction, BMI, demographics and peer environment factors, but became non-significant when psychological factors were entered into the model.

Males: Longitudinal Predictors of Young Adult Body Dissatisfaction

Prospective predictors of Time 3 body dissatisfaction for males are shown in Table 4. Time 1 body dissatisfaction, BMI, demographic characteristics (i.e., race/ethnicity, socioeconomic status, age, education level attainment), family environment factors (i.e., family weight teasing, parent dieting, parent communication), peer environment factors (i.e., peer dieting, peer weight teasing) and psychological factors (i.e., depression, self-esteem) each

contributed significantly to Time 3 body dissatisfaction as determined by the change in R -square at each step. Greater body dissatisfaction, higher BMI, Asian race/ethnicity or other-mixed ethnicity race, greater depressive symptoms, less peer weight teasing, and more parent communication at Time 1, and low education attainment at Time 3, individually predicted Time 3 body dissatisfaction, and these remained statistically significant predictors above and beyond all other predictor variables entered into the model (Step 6, $R^2=0.27$). Peer dieting (i.e., encouragement from peers to diet) individually predicted body dissatisfaction at 10-year follow-up above and beyond Time 1 body dissatisfaction, BMI, demographics and family environment factors, but became non-significant when depression and self-esteem were entered into the model.

Table 5 provides a summary of the hierarchical regression analysis that identified Time 1 predictor variables that were predictive of Time 3 body dissatisfaction among females and males. The overall variance of Time 3 body dissatisfaction explained by all factors in the models for female and male adolescents was approximately 27%. Findings reveal that Time 1 body dissatisfaction explained 22% of the variance in females' Time 3 body dissatisfaction and 17% of the variance in males' Time 3 body dissatisfaction. Significant ($p < 0.05$) gender interactions with Time 1 predictor variables in the hierarchical regression model were also found for body dissatisfaction, body mass index, family and peer weight teasing, parent communication, and depression (Table 5).

Discussion

This longitudinal study examined associations between personal and socio-environmental factors during adolescence and body dissatisfaction 10 years later during young adulthood in an ethnically diverse sample of females and males. Most personal and socio-environmental factors during adolescence that were assessed in this study were associated with body dissatisfaction in young adulthood, suggesting the long-lasting effects of psychological well-being and social influences during adolescence. Factors during adolescence found to be the most influential regarding body dissatisfaction in young adulthood included weight status and psychological (i.e., body dissatisfaction, self-esteem, depressive symptoms) factors; thus, interventions during adolescence should address these factors.

Even after controlling for Time 1 weight status, demographic characteristics, personal (psychological) and socio-environmental (family and peer) factors, body dissatisfaction during adolescence explained a large percentage of Time 3 body dissatisfaction, and this association was significantly stronger for female adolescents. That is, regardless of adolescents' weight status and other personal and socio-environmental factors, heightened body image concerns as an adolescent may predict continued body dissatisfaction 10 years later as a young adult. This finding is consistent with the 5-year follow-up study of the Project EAT sample (Paxton, et al., 2006) and further supports the importance of implementing body image intervention programs for adolescents early on in an effort to halt the progression of body dissatisfaction into young adulthood.

Race/ethnicity was associated with body dissatisfaction at 10-year follow-up, even after body dissatisfaction, weight status, and personal and socio-environmental factors during

adolescence were entered into the predictor model. For instance, Asian females and males, and other-mixed ethnicity males, were at increased risk for Time 3 body dissatisfaction in gender-stratified models. There is conflicting evidence in the literature to suggest that certain racial groups are protected against (Edwards George & Franko, 2010; Hesse-Biber, Sharlene, Howling, Leavy, & Lovejoy, 2004) or at increased risk for (Grabe & Hyde, 2006; Paxton & Heinicke, 2008) body dissatisfaction, and few of these studies have focused on male adolescents (Paxton, et al., 2006; Ricciardelli, McCabe, Williams, & Thompson, 2007). However, some research has suggested that non-white groups may respond differently to mainstream beauty standards through social comparison processes (Evans & McConnell, 2003; Poran, 2002). That is, individuals who do not identify themselves as being white may be comparing themselves to the dominant white culture beauty standards in society in assessing their own level of physical attractiveness. If this sample of participants were acculturated to the Western dominant beauty ideal, and thus, were similar in striving to meet the Western ideal, their levels of body dissatisfaction would be similar to whites, as seen here for Blacks and those of other race/ethnicity. Unfortunately this type of acculturation could not be directly tested in the present study. Research has found that those who are acculturated to the Western lifestyle are more likely to suffer from eating disorders and body dissatisfaction (Cachelin, Veisel, Barzegarnazari, & Striegel-Moore, 2000). Qualitative research examining how acculturation may affect the body image experiences among Asian females and males are needed in better understanding the mechanisms of body dissatisfaction. Future research should also delve further into body image experiences among the various Hispanic/Latino groups, as there were too few in the present study for a robust analysis of influences specific to these populations.

Our study findings are somewhat similar to the previous 5-year follow-up study of Project EAT, where female adolescents with low self-esteem and male adolescents with greater depressive symptoms had greater body dissatisfaction at 10-year follow-up regardless of weight status, demographic characteristics, and other peer and family environmental factors. Interestingly, the significant predictors of parent dieting for females and peer dieting for males became non-significant in the hierarchical model when depression and self-esteem variables were entered. This change suggests that features of the social environment (i.e., peers and family members) may contribute to an adolescent's psychological profile (i.e. self-esteem and depression), and that these proximal psychological factors are more directly associated with body dissatisfaction. Concurrent with previous research (Paxton, et al., 2006), having low self-esteem and depression over an extended period of time may cause adolescents to be more vulnerable to real or perceived criticism (e.g., weight teasing) and pressures to achieve the ideal body type (e.g., dieting), thereby contributing to negative body image (Litteton & Ollendick, 2003). Based on our study findings, psychological factors during adolescence, including Time 1 body dissatisfaction, still had a significant impact on body dissatisfaction at the 10-year follow-up, above and beyond other potential factors that influence body dissatisfaction during adolescence (i.e., weight status, demographic characteristics, family/peer environment). Thus, findings suggest that improving self-esteem and reducing depressive symptoms among adolescents is important, and although gender interaction tests for self-esteem were not statistically significant this construct may be of particular relevance to females. Additionally, since weight status during adolescence also

explained a large percentage of body dissatisfaction at 10-year follow-up even after controlling for demographics, and personal and socio-environmental factors in the model, body image interventions for all adolescents should aim to address healthy weight management.

It is important to note that in the final hierarchical model greater parent communication and low peer weight teasing during adolescence predicted body dissatisfaction during young adulthood which run counter to our correlation analyses that showed lower parent communication and greater peer weight teasing to be significantly correlated with Time 3 body dissatisfaction. Differences in the direction of Time 1 peer weight teasing and parent communication variables predicting Time 3 body dissatisfaction in the regression model may have been influenced by other unknown confounding factors. For instance, in a cross-sectional study among adolescent girls, internalization of the thin ideal and appearance comparison fully mediated the relationship between parental influence and body dissatisfaction (Keery, van den Berg, & Thompson, 2004). Additionally, internalization of the thin ideal and appearance comparison partially mediated the relationship between peer influence and body dissatisfaction (Keery, et al., 2004). Since in our study we were unable to examine internalization of the thin ideal and appearance comparison factors in the hierarchical regression models, our findings should be viewed with caution.

This study has a number of strengths that help in drawing conclusions from our findings. To the best of our knowledge, the current study is the first study to examine a large number of personal and socio-environmental factors predictive of body dissatisfaction over a 10-year time period in both genders. The comprehensive nature of the data collected enabled us to examine complex relationships and gain a deeper understanding of the long-term risk factors for body dissatisfaction. The diverse nature of the sample, in terms of race/ethnicity and socio-economic status, is an additional strength, as this increases the generalizability of study findings beyond results found in clinical, self-referred, or college-based samples.

It is also important to consider the limitations of this study. There was substantial attrition between Time 1 and Time 3 testing periods. Thus, only participants completing surveys at both time points were included in analyses and population weights reflecting the original Project EAT-I school-based sample were utilized. Additionally, there were significant differences in BMI, age, race, SES, and education attainment between participants who were included in the total analytic sample ($n = 1655$) compared to those not included in the total analytic sample ($n = 479$) due to missing data on one or more relevant variables. However, all models included BMI, age, race, SES and education attainment which may correct for this potential bias (Miller, 2007). Although this study included a large, ethnically diverse sample from the Minneapolis/St. Paul area, it is not representative of all U.S. adolescents. Additionally, due to limited available data we were unable to examine predictors of body dissatisfaction by acculturation status and by more homogenous race/ethnic groups; these should be considered in future research. Furthermore, although a number of psychosocial factors were examined, it is important to consider other factors not explored in this study (e.g., internalization of the thin ideal), which may also be predictive of increases in body dissatisfaction. Finally, even though longitudinal findings in this study provide information

regarding temporal precedence, third variable explanations cannot be ruled out with a non-experimental design; thus, findings should be held with caution.

In conclusion, body dissatisfaction is a public health problem that persists over time (Barker & Galambos, 2003; French & Jeffery, 1994; Gardner, Stark, Friedman, & Jackson, 2000). This study identified a number of modifiable and non-modifiable risk factors during adolescence that predicted body dissatisfaction in young adulthood. In female and male participants, demographic characteristics, weight status and most of the three types of risk factors (psychological, peer, and family) during adolescence contributed significantly to body dissatisfaction at 10-year follow-up. Some gender differences emerged in risk factors that were each individually predictive of body dissatisfaction at 10-year follow-up. Study findings highlight the need to develop body image interventions that address a number of personal and socio-environmental factors during adolescence. Specifically, findings suggest that interventions for female and male adolescents should address healthy weight management; aim to improve psychological well-being (i.e., self-esteem, body satisfaction, depression); and include family and peer components (i.e., increasing parent-adolescent communication, avoidance of negative weight talk and parent or peer environments that encourage dieting). Finally, from a preventive standpoint, health care providers should screen and monitor child and adolescent patients for negative body image and indicators of body dissatisfaction (e.g., low self-esteem, depression) during clinical visits, and provide them with the appropriate counseling or referral as needed.

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Table 1

Means and frequencies of body dissatisfaction and predictor variables by gender during adolescence (Time 1) and 10 years later in young adulthood (Time 3)[†]

Variable (score range)	Females (n=891)		Males (n=764)	
	<i>M (SD)</i>	%	<i>M (SD)</i>	%
Body mass index	22.4 (4.0)		22.7 (4.4)	
Age (years)	15.1 (1.4)		15.3 (1.5)	
Socioeconomic Status (%)				
Low		16.7		18.8
Low-middle		17.9		17.7
Middle		25.9		22.6
Middle-high		24.0		25.8
High		15.6		15.1
Time 3 Education level (%)				
Some high school or less		36.0		48.1
Some college		24.9		21.1
Bachelor degree or higher		39.1		30.8
Body dissatisfaction (10–50)				
Time 1 (1999)	19.2 (9.0)		14.3 (8.6)	
Time 3 (2009)	21.6 (8.6)		16.7 (8.8)	
Psychological variables				
Depressive symptoms (6–18)	12.8 (2.9)		11.1 (3.0)	
Self-esteem (6–24)	17.4 (3.4)		18.9 (3.0)	
Peer environment				
Peer dieting (1–3)	2.1 (0.8)		1.6 (0.8)	
Peer weight teasing (% Yes)		28.4		24.0
Family environment				
Parent dieting [§] (1–3)	1.2 (0.4)		1.2 (0.4)	
Parent communication (1–4)	3.1 (1.1)		2.9 (1.0)	
Family weight teasing (% Yes)		29.4		14.0

[†] All *n*'s and percents (%) are weighted with non-response propensity weights.

Table 2

Spearman correlations of Time 1 predictor variables with Time 3 body dissatisfaction

Time 1 Variable	Females (<i>n</i> =891)	Males (<i>n</i> =764)
Body dissatisfaction	0.40 ^{***}	0.31 ^{***}
Body mass index	0.31 ^{***}	0.25 ^{***}
Age	0.06	0.05
Socioeconomic status	-0.19 ^{***}	-0.12 ^{***}
Education	-0.11 ^{**}	-0.07 [*]
Depressive symptoms	0.22 ^{***}	0.18 ^{***}
Self-esteem	-0.35 ^{***}	-0.21 ^{***}
Parent dieting	0.11 ^{***}	0.09 [*]
Peer dieting	0.13 ^{**}	0.14 ^{***}
Parent communication	-0.13 ^{***}	-0.01
Peer weight teasing	0.10 ^{**}	0.19 ^{***}
Family weight teasing	0.20 ^{***}	0.10 ^{**}

*
 $p < 0.05$;**
 $p < 0.01$;***
 $p < 0.001$

Table 3

Hierarchical linear regression: relations of weight status, demographics, and family environment, peer environment and psychological variables at baseline with body dissatisfaction at 10-year follow-up among females ($n=891$)

Body Dissatisfaction at 10-year follow-up				
Baseline variables	<i>B</i>	<i>SE</i>	<i>t</i>	<i>R</i>²
Step 1				
Body dissatisfaction	0.41	0.03	14.17***	
Step 2				
Body dissatisfaction	0.35	0.03	11.36***	0.026***
Body mass index	0.34	0.06	5.36***	
Step 3				
Body dissatisfaction	0.32	0.03	10.35***	0.039***
Body mass index	0.37	0.06	5.73***	
Asian	3.83	0.78	4.89***	
Black	-1.07	0.81	-1.31	
Other-mixed ethnicity	-0.39	0.87	-0.45	
SES	-0.32	0.23	-1.38	
Education	-0.63	0.33	-1.87	
Age	-0.03	0.18	-0.17	
Step 4				
Body dissatisfaction	0.29	0.03	9.25***	0.009***
Body mass index	0.34	0.06	5.33***	
Asian	3.64	0.78	4.65***	
Black	-1.17	0.82	-1.44	
Other-mixed ethnicity	-0.50	0.87	-0.58	
SES	-0.32	0.23	-1.38	
Education	-0.50	0.34	-1.49	
Age	-0.06	0.18	-0.34	
Family weight teasing	1.00	0.61	1.63	
Parent dieting	1.49	0.60	2.49*	
Parent communication	-0.34	0.26	-1.29	
Step 5				
Body dissatisfaction	0.29	0.03	9.07***	0.000
Body mass index	0.34	0.07	5.29***	
Asian	3.62	0.79	4.60***	
Black	-1.10	0.82	-1.34	
Other-mixed ethnicity	-0.50	0.87	-0.57	
SES	-0.31	0.23	-1.32	
Education	-0.52	0.34	-1.53	

Body Dissatisfaction at 10-year follow-up				
Baseline variables	<i>B</i>	<i>SE</i>	<i>t</i>	<i>R</i>²
Age	−0.07	0.18	−0.38	
Family weight teasing	−1.02	0.63	−1.63	
Parent dieting	1.34	0.61	2.19*	
Parent communication	−0.32	0.26	−1.21	
Peer dieting	0.34	0.34	1.00	
Peer weight teasing	0.04	0.64	0.07	
Step 6				
Body dissatisfaction	0.22	0.04	5.92***	0.013***
Body mass index	0.37	0.07	5.70***	
Asian	3.39	0.78	4.32***	
Black	−0.84	0.82	−1.03	
Other-mixed ethnicity	−0.56	0.86	−0.65	
SES	−0.31	0.23	−1.34	
Education	0.44	0.33	−1.33	
Age	−0.10	0.18	−0.54	
Family weight teasing	−0.91	0.63	−1.44	
Parent dieting	1.06	0.61	1.72	
Parent communication	−0.12	0.27	−0.45	
Peer dieting	0.26	0.34	0.76	
Peer weight teasing	0.27	0.64	0.42	
Depression	0.05	0.11	0.43	
Self-esteem	−0.34	0.11	−3.25**	
Total <i>R</i>²				0.271

*
 $p < 0.05$;

**
 $p < 0.01$;

 $p < 0.001$

Note. Change in R^2 values indicate the associated significance test (Conditional F-test) for change in R^2 as each step of variables is entered into the model.

Table 4

Hierarchical linear regression: relations of weight status, demographics, and family environment, peer environment and psychological variables at baseline with body dissatisfaction at 10-year follow-up among males ($n=764$)

Body Dissatisfaction at 10-year follow-up				
Baseline variables	<i>B</i>	<i>SE</i>	<i>t</i>	<i>R</i>²
Step 1				
Body dissatisfaction	0.34	0.03	9.72***	
Step 2				
Body dissatisfaction	0.25	0.04	6.97***	0.051***
Body mass index	0.48	0.07	6.75***	
Step 3				
Body dissatisfaction	0.22	0.04	6.17***	0.071***
Body mass index	0.51	0.07	7.32***	
Asian	5.46	0.86	6.35***	
Black	-1.79	0.93	-1.92	
Other-mixed ethnicity	1.78	0.92	1.93	
SES	0.22	0.25	0.86	
Education	-0.79	0.36	-2.23*	
Age	0.02	0.20	0.13	
Step 4				
Body dissatisfaction	0.23	0.04	6.22***	0.009***
Body mass index	0.49	0.07	6.89***	
Asian	5.80	0.87	6.69***	
Black	-1.29	0.94	-1.37	
Other-mixed ethnicity	1.99	0.93	2.13*	
SES	0.24	0.25	0.97	
Education	-0.82	0.36	-2.31*	
Age	0.09	0.20	0.46	
Family weight teasing	-0.84	0.85	-0.98	
Parent dieting	0.82	0.65	1.26	
Parent communication	0.67	0.28	2.40*	
Step 5				
Body dissatisfaction	0.20	0.04	5.39***	0.016***
Body mass index	0.45	0.07	6.31***	
Asian	6.01	0.87	6.89***	
Black	-1.22	0.94	-1.30	
Other-mixed ethnicity	1.92	0.92	2.08*	
SES	0.29	0.25	1.15	

Body Dissatisfaction at 10-year follow-up				
Baseline variables	<i>B</i>	<i>SE</i>	<i>t</i>	<i>R</i>²
Education	−0.80	0.36	−2.26*	
Age	0.09	0.20	0.44	
Family weight teasing	0.32	0.90	0.35	
Parent dieting	0.21	0.69	0.30	
Parent communication	0.65	0.28	2.36*	
Peer dieting	0.80	0.39	2.08*	
Peer weight teasing	−2.68	0.77	−3.48***	
Step 6				
Body dissatisfaction	0.17	0.04	4.41***	0.001***
Body mass index	0.46	0.07	6.45***	
Asian	6.01	0.87	6.90***	
Black	−1.39	0.94	−1.49	
Other-mixed ethnicity	2.05	0.92	2.22*	
SES	0.31	0.25	1.26	
Education	−0.77	0.35	−2.18*	
Age	0.01	0.20	0.03	
Family weight teasing	0.85	0.91	0.93	
Parent dieting	0.29	0.69	0.42	
Parent communication	0.72	0.28	2.53*	
Peer dieting	0.70	0.39	1.82	
Peer weight teasing	−2.54	0.77	−3.30**	
Depression	0.35	0.12	3.05**	
Self-esteem	0.05	0.11	0.41	
Total <i>R</i>²				0.267

*
 $p < 0.05$;

**
 $p < 0.01$;

 $p < 0.001$

Note. Change in R^2 values indicate the associated significance test (Conditional F-test) for change in R^2 as each step of variables is entered into the model.

Unstandardized hierarchical regression coefficients for females ($n=891$) and males ($n=764$): relations of weight status, demographics, and family environment, peer environment and psychological variables at baseline predicting body dissatisfaction at 10-yr follow-up

Table 5

	Body Dissatisfaction					
	Females			Males		
Baseline variables	<i>B</i>	<i>SE</i>	<i>R</i> ²	<i>B</i>	<i>SE</i>	<i>R</i> ²
Gender interactions						
Step 1						
Body dissatisfaction	0.22	0.04	***	0.17	0.04	***
Step 2:						
			0.026			0.051
Weight status						
Body mass index	0.37	0.07	***	0.46	0.07	***
Step 3:						
			0.039			0.071
Demographics						
Asian	3.39	0.78	***	6.01	0.87	***
Black	-0.84	0.82		-1.39	0.94	
Other-mixed ethnicity	-0.56	0.86		2.05	0.92	*
SES	-0.31	0.23		0.31	0.25	
Education	0.44	0.33		-0.77	0.35	*
Age	-0.10	0.18		0.01	0.20	
Step 4:						
			0.009			0.009
Family environment						
Family weight teasing	-0.91	0.63		0.85	0.91	***
Parent dieting	1.06	0.61		0.29	0.69	
Parent communication	-0.12	0.27		0.72	0.28	*
Step 5:						
			0.000			0.016
Peer environment						
Peer dieting	0.26	0.34		0.70	0.39	
Peer weight teasing	0.27	0.64		-2.54	0.77	***
Step 6:						
			0.013			0.001

Body Dissatisfaction						
	Females			Males		
	<i>B</i>	<i>SE</i>	<i>R</i> ²	<i>B</i>	<i>SE</i>	<i>R</i> ²
Baseline variables						
Psychological factors						
Depression	0.05	0.11		0.35	0.12**	*
Self-esteem	-0.34	0.11**		0.05	0.11	
Total <i>R</i> ²			0.271			0.267

* *p* < 0.05;
** *p* < 0.01;
*** *p* < 0.001

Note. Change in *R*² values indicate the associated significance test (Conditional F-test) for change in *R*² as each step of variables is entered into the model. Coefficient estimates and standard errors are shown for the final model only.