Published in final edited form as:
Int J Eat Disord. 2003 April ; 33(3): 320–332. doi:10.1002/eat.10142.

A Longitudinal Examination of Patterns in Girls' Weight Concerns and Body Dissatisfaction from Ages 5 to 9 Years

Kirsten Krahnstoever Davison[1,*], **Charlotte N. Markey**[2], and **Leann L. Birch**[1]

1 *Department of Human Development and Family Studies, The Pennsylvania State University, University Park, Pennsylvania*

2 *Department of Psychology, Rutgers University, Camden, New Jersey*

Abstract

Objective—To examine the development of girls' weight concerns and body dissatisfaction from ages 5 to 9 years and how change and continuity in these constructs from age 5 to 7 years is associated with girls' eating attitudes, dietary restraint, and dieting status at age 9.

Methods—Weight concerns, body dissatisfaction, and weight status were assessed for 182 girls when they were 5, 7, and 9 years old, and their eating attitudes, dietary restraint, and dieting status were assessed when they were 9.

Results—Girls tended to maintain their rank in weight concerns and body dissatisfaction across ages 5 to 9 years, and associations among girls' weight concerns, body dissatisfaction, and weight status increased with age. In addition, positive associations were found between changes in girls' weight concerns, body dissatisfaction, and weight status across ages 7 to 9. Finally, girls' who reported high weight concerns or high body dissatisfaction across ages 5 to 7 reported higher dietary restraint, more maladaptive eating attitudes, and a greater likelihood of dieting at age 9, independent of their weight status.

Conclusion—Girls' reported weight concerns and body dissatisfaction across middle childhood showed consistency over time, were systematically related to their weight status, and predicted their dietary restraint, eating attitudes, and the likelihood of dieting at age 9. These results reflect patterns identified among adolescent girls and women.

Keywords

girls; childhood; weight concerns; body dissatisfaction; weight status; overweight; dietary restraint; dieting

INTRODUCTION

In a society where most adults and a significant proportion of children are overweight and attempting to lose weight, it is not surprising that weight concerns and body dissatisfaction are now common among young girls. Previous research suggests that 21% of 5-year-old girls (Davison, Markey, & Birch, 2000), up to 37% of 9-year-old girls (Field, Camargo, Taylor, Berkey, Frazier, Gillman, & Colditz, 1999; Schreiber, Robins, Striegel-Moore, Obarzanek, Morrison, & Wright, 1996), and 50% of 8- to 13-year-old girls (mean age = 10.07 years) report concerns about their weight (Rolland, Farnill, & Griffiths, 1997; Schur, Sanders, & Steiner,

*Correspondence to: K. Davison, Department of Human Development and Family Studies, The Pennsylvania State University, S-110 Henderson Building, University Park, PA 16802. E-mail: kdavison@psu.edu.

2000). Concern about weight is behaviorally manifest at a young age, with 40% of 8- to 13-year-old girls reporting that they have actively tried to lose weight (Rolland et al., 1997). Thus, by middle childhood, concerns about weight and dieting behaviors are normative among girls.

This trend is problematic, because evidence points to the significant, deleterious behaviors associated with weight concerns and attempted weight loss (Thompson & Smolak, 2001). In particular, individuals who are concerned with their weight tend to engage in unhealthy dieting behaviors, including fasting, bingeing, and purging (Goodrick, Poston, & Foreyt, 1996), which have been linked to the development of eating disorders (Patton, Johnson-Sabine, Wood, Mann, & Wakeling, 1990). In addition, research suggests that dieting among adolescent girls can lead to weight gain rather than weight loss, which may prompt more drastic weight loss efforts and disordered eating (Stice, Cameron, Killen, Hayward, & Taylor, 1999). Therefore, early dieting and weight concerns have negative consequences for all young girls, including overweight and non-overweight girls.

Although there is substantial evidence that girls are expressing concerns about their weight and report attempts at weight loss at younger ages, there is a clear absence of long-term studies assessing girls' weight concerns and body dissatisfaction throughout childhood and the impact of such patterns on their eating attitudes and behaviors as they approach adolescence. A recent study by Ohring, Graber, and Brooks-Gunn (2002), however, assessed developmental patterns in body dissatisfaction during adolescence and their association with the emergence of disordered eating patterns. Results showed that girls who had recurrent body dissatisfaction during adolescence reported more problematic eating attitudes during adolescence and young adulthood.

This study uses longitudinal data to describe the development of girls' weight concerns and body dissatisfaction during childhood, specifically from ages 5 to 9 years old. Because there are few published studies examining longitudinal patterns in weight concerns and body dissatisfaction among children, this article takes an exploratory approach and examines various associations using a number of different methods. Relationships among weight concerns, body dissatisfaction, and weight status will be assessed as girls move through middle childhood (ages 5 to 9 years). In addition, two approaches will be adopted to investigate links between girls' weight concerns and body dissatisfaction during middle childhood and their eating behaviors and attitudes at age 9. First, change in weight concerns, body dissatisfaction, and weight status across ages 5 to 7 will be used to predict their eating attitudes, dietary restraint, and dieting status at age 9. Second, similar to Ohring et al. (2002), girls will be classified as showing no, early, late or recurrent signs of body dissatisfaction or weight concerns, and these patterns will be used to predict their eating attitudes, dietary restraint, and dieting status at age 9.

METHODS

Participants

Participants were part of a longitudinal study investigating girls' nutrition, early experience, and physical development. At entry into the study, participants included 197 5-year-old girls (mean age, 5.4 years ± 0.3), of whom 192 were reassessed 2 years later when they were 7 years old (mean age, 7.3 years ± 0.3), and 182 were assessed a third time 4 years later when they were 9 years old (mean age, 9.4 years ± 0.3). All girls were from central Pennsylvania and were non-Hispanic white. Families were generally well educated and of middle income. At the most recent time of measurement, 98% of families reported a level of education higher than a high school diploma for both parents, all fathers and three quarters of mothers were employed, and 56%, 28%, 13%, and 3% of families reported incomes in the following income brackets, respectively (a) > $50,000, (b) $35,000–$50,000, (c) $20,000–$35,000, and (d) < $20,000.

Sample characteristics reflect the demographics of the area from which the sample was recruited.

Procedures

Girls and their parents were recruited for the study using flyers and newspaper advertisements. In addition, families with age-eligible girls within a five-county radius received letters inviting them to participate in the study. Eligibility criteria for girls' enrollment in the project included, in addition to age, living with both biological parents, the absence of severe food allergies or chronic medical problems affecting food intake, and the absence of dietary restrictions involving animal products. Families visited the laboratory every second summer for 5 years. At each time of assessment, girls were individually interviewed, and parents completed self-report questionnaires.

Measures

Girls' weight concerns, body dissatisfaction, and weight status were assessed at ages 5, 7, and 9, and their eating attitudes, dietary restraint, and dieting status were assessed at age 9.

Weight Concerns—The Weight Concerns scale is a 5-item questionnaire that assesses fear of weight gain, worry about weight and body shape, the importance of weight, diet history, and perceived fatness (Killen, Taylor, Hayward, Wilson, Simmonds, Robinson, Litt, Varaday, & Kraemer, 1994). A modified form of this questionnaire was administered to girls at each time of measurement. Because this measure was originally developed for adolescent girls, modifications were necessary to make the scale developmentally appropriate. At all ages, the number of response options was reduced from 5 to 3. In addition, at age 5 we simplified all questions and the wording of the response options. At each age, an average weight concerns score was calculated. Previous research using an adolescent sample has shown that scores on the weight concerns scale are concurrently associated with restrained eating, drive for thinness, and body dissatisfaction and are prospectively associated with the development of disordered eating patterns (Killen et al., 1994). In this study, internal consistency coefficients were $\alpha = 0.65$, $\alpha = 0.61$, and $\alpha = 0.63$ at ages 5, 7, and 9 years, respectively. Because dieting status was one of the outcome variables that was of interest at age 9, the dieting history variable was not included in the weight concerns score at any age so that girls' history of concern about their weight could be used to predict their dieting status at age 9.

Body Dissatisfaction—The Body Esteem Scale is a 24-item scale that assesses overall, nonspecific body satisfaction (e.g., "I like what I look like in pictures," "I'm proud of my body," "I wish I were thinner") and is suitable for use with young children (Mendelson & White, 1982). To increase variability in responses, the response set was adjusted slightly from a two-item response set (Yes/No) to a three-item response set (Yes/No/Sometimes). Responses for the 24 items were averaged to create a total body satisfaction score. To facilitate the discussion of results in this study, scores were reverse coded such that high scores indicate greater levels of dissatisfaction. The primary reason that the Body Esteem scale was included in this study was to validate the results obtained for the weight concerns scale. That is, similar relationships were expected for the Weight Concerns and Body Esteem scales, because they assess similar constructs. Previous research illustrates the reliability and validity of this scale (Mendelson & White, 1982). In this sample, the internal consistency coefficients were $\alpha = 0.74$, $\alpha = 0.84$, and $\alpha = 0.87$ at ages 5, 7, and 9 years, respectively.

Weight Status—Girls' height and weight were measured in triplicate at each age and were used to calculate their body mass index (BMI: weight(kg)/height$(m)^2$). Because BMI during childhood is age and gender specific, BMI percentiles were calculated using recent growth

charts from the Centers for Disease Control and Prevention (Kuczmarski, Ogden, Grummer-Strawn, Flegal, Guo, Wei, Mei, Curtin, Rocher, & Johnson, 2000).

Eating Attitudes—The Children's Eating Attitude Test (chEAT; Garner, & Garfinkel, 1979) is a well-established and well-validated clinical instrument that is designed to assess maladaptive or problematic eating attitudes and behaviors among children (Maloney, McGuire, Daniels, & Specker, 1989; Smolak & Levine, 1994). Two of the original 26 items, which focus on purging, were deleted, because they were not deemed appropriate for this age group. An additional item was removed from the total score, because it did not correlate well with the rest of the items ("I can show self-control around food"). Responses are measured using a 6-point Likert type scale and summed across all items to create a total ranging from 0 to 69, with higher scores indicating more problematic or maladaptive attitudes. The internal consistency of the chEAT in this sample was $\alpha = 0.71$.

Dietary Restraint—An amended version of the restraint scale of the Dutch Eating Behavior Questionnaire, which was originally developed by Van Strien, Frijters, Bergers, and Defares (1986), was used to assess girls' dietary restraint. The wording from the original questionnaire was simplified to make it appropriate for children. For example, "how often do you try not to eat between meals because you are watching your weight?" was changed to "do you try not to eat snacks because you are worried about getting fat?" In addition, the response scale was simplified from a 5-point Likert scale to a 3-point scale (Yes/Sometimes/No). The internal consistency of this measure in this sample was $\alpha = 0.83$.

Dieting Status—In addition to the dietary restraint measure, girls were explicitly asked (in a separate portion of the interview) if they had ever been on a diet. Girls' responses to this single item are used in these analyses as a dichotomous (i.e., yes or no) measure of dieting status. If girls reported that they dieted, they were prompted about diet methods that they had used to provide some validity to their reports of dieting.

Background Characteristics and Potential Confounding Variables—A number of variables were examined in this study as potential confounding variables, because they have been previously linked with children's weight status, weight concerns, or body dissatisfaction. These variables included parents' educational status, family income, and girls' pubertal status. When girls were 5 years old, mothers' reported their own and the fathers' highest level of education and their combined family income. When girls were 9 years old, their breast development was assessed by visual inspection of the breasts using the rating scheme developed by Marshall and Tanner (1969). Each breast was rated on a 1–5 scale, with 1 representing no development and 5 representing completed development; this is a widely used standardized procedure (Hermann-Giddens & Bourdony, 1995).

RESULTS

The distributions for all variables were examined and transformed when necessary to approximate normality before conducting analyses. For cases in which variables were transformed, the inferential statistics for the transformed variables and the means for the original variables are reported. Only girls with complete data for all waves of measurement were included in the analyses, resulting in a final sample size of 182 girls, which was 92% of the original sample. Compared with families with complete data, families with incomplete data did not differ significantly in family income, fathers' education, girls' weight status, girls' body dissatisfaction, or girls' weight concerns. The only difference identified was for mothers' education; mothers from families with complete data were significantly more educated than mothers from families with incomplete data.

What Developmental Patterns Are Evident in Girls' Weight Concerns and Body Dissatisfaction Across Ages 5 to 9 Years?

Girls' average weight concerns, body dissatisfaction, and BMI percentile at each age are reported in Table 1. A repeated measures ANOVA was used to test whether mean values for these variables differed significantly across time. Repeated measures ANOVA was considered an appropriate method of analysis, because results from repeated measures ANOVA are conceptually identical to methods such as growth curve analysis (including SAS's proc MIXED and Hierarchical Linear Modeling) in cases in which there are three waves of data with equal spacing (Little, Milliken, Stroup, & Wolfinger, 1996). Results indicated that girls' mean weight concerns ($F(2, 361) = 25.89$, $p < 0.0001$ for overall model) scores differed significantly at all ages, with consistent decreases noted with increasing age. The same pattern was found for girls' body dissatisfaction ($F(2, 361) = 64.82$, $p < 0.0001$ for overall model). Results for specific age differences were as follows: Weight concerns from (1) 5 to 7 years $t = -3.35$, $p < 0.0001$; (2) 5 to 9 years $t = -7.16$, $p < 0.0001$; and (3) 7 to 9 years $t = -4.51$, $p < 0.0001$; Body dissatisfaction from (1) 5 to 7 years $t = -8.28$, $p < 0.0001$; 5 to 9 years $t = -11.12$, $p < 0.0001$; and 7 to 9 years $t = -4.35$, $p < 0.0001$. These changes were independent of changes in girls' mean BMI percentile ($F(2, 362) = 14.08$, $p < 0.0001$ for overall model), which was significantly greater at age 9 compared with ages 5 ($t = 3.46$, $p < 0.0001$) and 7 ($t = 5.30$, $p < 0.001$). Because of the suggested developmental declines in weight concerns and body dissatisfaction, girls' weight concerns and body dissatisfaction scores were standardized (mean = 0, $SD = 1$) at each age for all analyses outlined below. This conversion aids in the interpretation of the results, and the new variables will be referred to as standardized or relative weight concerns and body dissatisfaction. For both constructs, higher scores indicate higher weight concerns or body dissatisfaction relative to the sample.

Concurrent associations among girls' weight concerns, body dissatisfaction, and BMI percentile were assessed at ages 5, 7, and 9 years using Spearman rank correlation analysis (see Table 2). Results provide support for the concurrent validity of girls' responses at each age, while indicating that links between weight concerns, body dissatisfaction, and weight status increased with age. Specifically, at age 5, girls with higher weight concerns reported higher body dissatisfaction. At age 7, girls with higher weight concerns reported greater body dissatisfaction, girls with greater body dissatisfaction had significantly higher BMI percentile values, and girls with higher weight concerns had marginally higher BMI values. At age 9, weight concerns, body dissatisfaction, and weight status were all positively correlated, and correlations were substantially higher than those noted at ages 5 and 7.

Rank order consistency in girls' weight concerns and body dissatisfaction across time was assessed using Spearman rank correlation analysis for each construct at ages 5, 7, and 9. Results showed that girls tended to maintain their relative position across time for both weight concerns and body dissatisfaction. That is, relative to the group, girls with higher weight concerns at age 5 reported significantly higher weight concerns at ages 7 ($r = 0.19$, $p < 0.01$) and 9 ($r = 0.15$, $p < 0.05$), and girls with higher weight concerns at age 7 reported higher weight concerns at age 9 ($r = 0.27$, $p < 0.01$). For body dissatisfaction, girls who reported greater dissatisfaction at age 5 reported greater dissatisfaction at age 7 ($r = 0.23$, $p < 0.01$); furthermore, girls with greater dissatisfaction at age 7 reported greater dissatisfaction at age 9 ($r = 0.37$, $p < 0.01$).

Associations among changes in girls' weight status and their relative weight concerns and body dissatisfaction scores (i.e., standardized scores) across ages 5 to 7 and 7 to 9 were assessed using Spearman rank correlation analysis. BMI scores rather than BMI percentile scores were used in these analyses to account for a ceiling effect that can occur with change in BMI percentile. Results indicated that there were no associations between changes in girls' relative weight concerns, body dissatisfaction, and BMI across ages 5 to 7. However, positive correlations were noted between all variables across ages 7 to 9. Girls who reported greater

increases in their weight concerns relative to the sample (i.e., using the standardized scores) also reported greater increases in their relative body dissatisfaction ($r = 0.17$, $p < 0.05$) and BMI ($r = 0.19$, $p < 0.01$). In addition, girls who reported greater increases in their relative body dissatisfaction also showed greater increases in BMI ($r = 0.20$, $p < 0.01$). All associations between change in BMI, weight concerns, and body dissatisfaction occurred across the same time interval. That is, no associations were found between change in BMI from ages 5 to 7 and change in relative weight concerns or body dissatisfaction from ages 7 to 9 or between change in weight concerns and body dissatisfaction from ages 5 to 7 and change in BMI from ages 7 to 9.

Are Patterns in Weight Concerns and Body Dissatisfaction Across Ages 5 to 7 Associated with Maladaptive Eating Attitudes and Behaviors at Age 9?

To better understand the developmental consequences of young girls' body dissatisfaction and weight concerns, these constructs were used to predict girls' dieting, maladap-tive eating attitudes, and restrained eating at age 9. Twenty-six girls, or 14% of the sample, reported dieting at age 9. Compared with girls who did not report dieting, girls who reported dieting also reported significantly higher dietary restraint ($F(1, 181) = 44.08$, $p < 0.0001$; mean for dieters = 1.84 ± 0.48; mean for nondieters = 1.30 ± 0.36), more problematic eating attitudes ($F(1,181) = 12.93$, $p < 0.0001$; mean for dieters = 3.28 ± 3.73; mean for nondieters = 7.35 ± 7.94) and were more overweight ($F(1,181) = 7.04$, $p < 0.0001$; mean BMI percentile for dieters = 77.68 ± 25.66; mean for nondieters = 62.65 ± 25.9). In addition, higher dietary restraint was concurrently associated with maladaptive eating attitudes ($r = -0.33$, $p < 0.0001$) and higher BMI percentile ($r = -0.40$, $p < 0.0001$); girls' eating attitudes and weight status were not correlated.

Two approaches were used to assess associations between girls' weight concerns and body dissatisfaction across ages 5 to 7 and girls' eating attitudes, dietary restraint, and dieting status at age 9. For both approaches outlined below, family income, parental education, and girls' breast development were examined to determine whether these variables confounded associations with the outcome variables of interest and were entered as covariates in the following analyses when necessary.

The first approach examined whether girls' average relative weight concerns and body dissatisfaction and change in relative weight concerns and body dissatisfaction across ages 5 to 7 were associated with each of the outcome variables at age 9. Analyses were conducted separately for weight concerns and body dissatisfaction, and girls' average BMI across ages 5 to 7 was entered into each analysis to account for the fact that girls who were more overweight reported higher weight concerns, body esteem, dietary restraint, more problematic eating attitudes, and were more likely to diet. Multiple regression analysis was used to predict girls' dietary restraint and eating attitudes (continuous variables), and multiple logistic regression analysis was used to predict girls' dieting status (categorical variable).

As shown in Table 3, higher average weight concerns and BMI across ages 5 to 7 were both associated with higher dietary restraint at age 9 (R^2 for model = 0.16, $p < 0.0001$). A similar pattern was found for body dissatisfaction when predicting dietary restraint (R^2 for model = 0.20, $p < 0.0001$). For girls' eating attitudes, higher average weight concerns and greater relative change in weight concerns across ages 5 to 7 were associated with maladaptive eating attitudes at age 9 (R^2 for model = 0.07, $p < 0.001$); the same pattern was noted for body dissatisfaction (R^2 for model = 0.11, $p < 0.0001$). Finally, neither average weight concerns nor change in weight concerns across ages 5 to 7 was associated with the likelihood of dieting at age 9 independent of girls' average BMI ($\chi^2 = 13.31$, $p < 0.01$; not shown in Table 3). However, higher average body dissatisfaction and higher average BMI were both associated with a greater likelihood of dieting at age 9 ($\chi^2 = 15.49$, $p < 0.01$)[1].

The second approach used to assess associations between girls' weight concerns and body dissatisfaction across ages 5 to 7 and their eating attitudes, dietary restraint, and dieting status at age 9 reflects the method adopted by Ohring et al. (2002). Specifically, girls were divided into four groups for weight concerns and body dissatisfaction based on their relative scores for each variable across ages 5 to 7. These groups included: (1) girls who had below average scores relative to the sample at both ages (no weight concerns/no body dissatisfaction); (2) girls with above average scores at age 5 but not at age 7 (early weight concerns/early body dissatisfaction); (3) girls with above average scores at age 7 but not at age 5 (late weight concerns/late body dissatisfaction); and (4) girls with above average scores at both ages (recurrent weight concerns/recurrent body dissatisfaction). Initial analyses examined differences in the grouping variable (i.e., weight concerns or body dissatisfaction) and BMI percentile for the four groups using a series of one-way ANOVAs. For the weight concerns groups, girls in the recurrent concerns group generally reported higher weight concerns at all ages than girls in no concerns group (see bottom of Table 4). No differences were noted in BMI percentile. For the body dissatisfaction groups, girls in the recurrent dissatisfaction group generally reported higher body dissatisfaction and higher BMI percentiles at all ages compared with girls in the no dissatisfaction group (see bottom of Table 5).

Planned comparisons using analysis of covariance (ANCOVA) were then used to assess differences in girls' dietary restraint and eating attitudes at age 9 for the weight concerns and body dissatisfaction groups while taking girls' average BMI across ages 5 to 7 years into account. The planned comparisons tested the hypothesis that girls in the recurrent group would report higher levels of dietary restraint and more problematic eating attitudes at age 9 compared with girls in the three remaining groups and the alternative hypothesis that girls in the late and recurrent groups would report higher dietary restraint and more problematic eating attitudes than girls in the no (weight concerns/body dissatisfaction) and early groups. Results for the weight concerns groups showed that girls in the recurrent group reported significantly higher dietary restraint at age 9 ($F(1, 181) = 4.85$, $p < 0.05$ for planned comparison), and girls in the recurrent and late weight concerns groups reported more problematic eating attitudes at age 9 ($F(1, 181) = 11.95$ $p < 0.001$ for planned comparison) than the remaining groups of girls (see Table 4). Similar relationships were found for the body dissatisfaction groups. Specifically, girls in the recurrent group reported the highest dietary restraint ($F(1,181) = 9.87$, $p < 0.01$ for planned comparison) and girls in the recurrent and late groups reported more problematic eating attitudes at age 9 than girls in the remaining groups ($F(1,181) = 11.47$, $p < 0.01$ for planned comparison) (see Table 5). In summary, these results indicate that girls with recurrent weight concerns and body dissatisfaction across ages 5 and 7 reported the highest dietary restraint at age 9, and girls with recurrent and late weight concerns or body dissatisfaction reported the most problematic eating attitudes at age 9.

Differences in girls' likelihood of dieting at age 9 for the weight concerns and body dissatisfaction groups were assessed using χ^2 analysis (see Tables 4 and 5). The percentage of girls who reported dieting at age 9 did not differ across the weight concerns ($\chi^2 = 1.14$, $p > 0.05$) or body dissatisfaction ($\chi^2 = 5.08$, $p > 0.05$) groups. This analysis was rerun using dummy variable logistic regression to take into consideration differences in girls' average BMI across ages 5 to 7 and fathers' years of education, which was identified as a confounding variable for this analysis. The recurrent group was used as the referent group. For both the weight concerns and body dissatisfaction groups, the percentage of girls who reported dieting at age 9 did not differ for the recurrent groups compared with the no, early, and late groups.

[1]Note that for these analyses, we chose to use average weight concerns and body dissatisfaction rather than each of these variables at age 5, because the average scores are uncorrelated with the change scores, thus preventing problems with co-linearity.

DISCUSSION

To our knowledge, this is the first study to investigate longitudinal patterns in girls' body dissatisfaction, weight concerns, and weight status during early and middle childhood. Prior research has tended to focus on adolescent and adult samples. Results revealed moderate consistency in girls' body dissatisfaction and weight concerns. That is, girls' reports of concerns about their body and weight at age 5 predicted their weight concerns and body dissatisfaction at ages 7 and 9. Furthermore, relations among girls' BMI, body dissatisfaction, and weight concerns were found at each time of measurement, with these relations increasing with age. Similarly, positive associations were noted in changes in girls' relative weight concerns, relative body dissatisfaction, and weight status across ages 7 to 9 years. With respect to the developmental consequences of early weight concerns and body dissatisfaction, results from the longitudinal analyses showed that higher weight concerns and body dissatisfaction across ages 5 to 7 years were associated with higher dietary restraint, maladaptive eating attitudes, and a greater likelihood of dieting at age 9.

The first aim of this study was to examine patterns in girls' weight concerns and body dissatisfaction across ages 5 to 9 years. An overall decrease in girls' mean weight concerns and body dissatisfaction was noted from ages 5 to 9 years. This finding is consistent with previous research (Maloney et al., 1989; Ohring et al., 2002; Striegel-Moore, Schreiber, Crawford, Obarzanek, & Rodin, 2000) and suggests that girls' body and eating concerns decrease when assessed repeatedly across time. It is unlikely that these results reflect a true decrease in girls' concern about their weight; research consistently indicates that girls become increasingly vulnerable to dieting and weight restriction practices as they approach adolescence (Field et al., 1999; Smolak & Levine, 2001). These findings 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 (Jorm, Duncan-Jones, & Scott, 1989; Rolland et al., 1997; Windle, 1955). It has also been suggested that this pattern reflects age-related differences in children's cognitive development and response biases (Rolland et al., 1997; Wood, Becker, & Thompson, 1996). Although an overall decline was noted in girls' weight concerns and body dissatisfaction, girls who reported higher weight concerns and body dissatisfaction relative to the group at age 5 also reported higher weight concerns and body dissatisfaction at ages 7 and 9.

Consistent with previous research using older samples (Rolland, Farnhill, & Griffiths, 1996; Stice, Agras, & Hammer, 1999), heavier girls in this study reported higher weight concerns and higher body dissatisfaction at ages 7 and 9, with the strength of these relationships increasing across this time period. In addition, girls who showed greater increases in weight status across ages 7 to 9 reported simultaneous increases in weight concerns and body dissatisfaction relative to the group. This pattern of findings illustrates that weight status and body-related affect are already intricately connected during middle childhood and suggests that young girls are very aware of the stigma associated with being overweight. It should be noted, however, that the strengthening of these associations across time might also be due in part to girls' cognitive development and ability to respond to the relevant questionnaires with reduced measurement error. Future research should continue to explore how girls' actual body size and attitudes about their bodies and food are related and potentially lead to dieting and disordered eating across time.

The second aim of this study was to assess girls' weight concerns and body dissatisfaction at ages 5 and 7 in relation to their dietary restraint, maladaptive eating attitudes, and dieting status at age 9. In addition to providing evidence for consistency in girls' relative body and weight-related concerns across middle childhood, results from this study suggest that these concerns are meaningfully linked to girls' eating behaviors and attitudes as they approach

preadolescence. Girls with consistently high levels of body dissatisfaction and weight concerns at 5 and 7 years of age (the "recurrent" group) and girls with high levels of body dissatisfaction and weight concerns at age 7 (the "late" group) reported higher dietary restraint and maladaptive eating attitudes at age 9. These results parallel previous research showing that girls who experience recurrent body dissatisfaction during adolescence are most at risk for maladaptive eating patterns in adolescence and young adulthood (Ohring et al., 2002) and indicate that these patterns are already manifested during middle childhood. In addition, girls with higher average body dissatisfaction across ages 5 to 7 years (Table 3) were more likely to report dieting at age 9 independent of their weight status. These findings collectively indicate that body dissatisfaction and weight concerns during middle childhood can have negative implications for girls' eating attitudes and behaviors preceding adolescence, a time when extreme dieting behaviors begin to emerge.

CONCLUSIONS

This study extends previous research (e.g., Graber, Petersen, & Brooks-Gunn, 1996; Ohring et al., 2002) by documenting patterns in weight concerns and body dissatisfaction using longitudinal data in childhood, before the onset of adolescence. Girls' reported weight concerns and body dissatisfaction showed consistency across middle childhood relative to the sample, were positively related to their weight status, and were associated with their reported dietary restraint, maladaptive eating attitudes, and the likelihood of dieting at age 9. Results from this study are relevant to both overweight and normal weight girls; girls of all weight statuses are at risk for negative body-related affect that may hinder psychological functioning and exacerbate weight concerns and the risk of overweight through the use of inappropriate diet methods (Killen, Taylor, Hayward, Haydel, Wilson, Hammer, Kraemer, Blair-Greiner, & Strachowski, 1996; Stice, et al., 1999).

Findings from this study are limited in that they are based on a non-Hispanic white sample of girls. A longitudinal investigation of a multiethnic sample that extends this work into adolescence will add to our understanding of the developmental trajectory of girls' body dissatisfaction and weight concerns. In light of the increasing numbers of very young girls who are expressing concerns with their weight and dissatisfaction with their bodies, understanding developmental pathways associated with weight concerns and body dissatisfaction is critical.

Future research addressing longitudinal patterns in girls' weight concerns and body dissatisfaction will aid in our interpretation of past findings that may reflect true developmental trajectories or may be due in part to methodological artifacts associated with repeated measurement. A focus on young children's weight concerns and body dissatisfaction may lead to information about the etiology of maladaptive eating behaviors among youth, and, has the potential to benefit interventions aimed at preventing the development of clinical eating disturbances.

Acknowledgements

National Institute of Health grant # NIH HD 32973.

References

Abramovitz BA, Birch LL. Five-year-old girls' ideas about dieting are predicted by mothers' dieting. Journal of the American Dietetic Association 2000;100:1157–1163. [PubMed: 11043700]

Davison KK, Markey CN, Birch LL. Etiology of body dissatisfaction and weight concerns among 5-year-old girls. Appetite 2000;35:143–151. [PubMed: 10986107]

Field AE, Camargo CA Jr, Taylor CB, Berkey CS, Frazier L, Gillman MW, Colditz GA. Overweight, weight concerns, and bulimic behaviors among girls and boys. Journal of the American Academy of Child & Adolescent Psychiatry 1999;38:754–760. [PubMed: 10361795]

Garner DM, Garfinkel PE. The eating attitudes test: An index of the symptoms of anorexia nervosa. Psychological Medicine 1979;9:273–279. [PubMed: 472072]

Goodrick GK, Poston WSC, Foreyt JP. Methods for voluntary weight loss control: Update. The International Journal of Applied and Basic Nutritional Sciences 1996;12(10):672–676.

Graber, JA.; Petersen, AC.; Brooks-Gunn, J. Pubertal processes: Methods, measures, and models. In: Graber, JA.; Brooks-Gunn, J., editors. Transitions through adolescence: Interpersonal domains and context. Hillsdale, NJ: Lawrence Erlbaum Associates; 1996. p. 23-53.

Herman-Giddens, ME.; Bourdony, CJ. Assessment of sexual maturity stages in girls. Manual produced by the American Academy of Pediatrics; 1995.

Jorm AF, Duncan-Jones P, Scott R. An analysis of the re-test artifact in longitudinal studies of psychiatric symptoms and personality. Psychological Medicine 1989;19(2):487–493. [PubMed: 2788291]

Killen JD, Taylor CB, Hayward C, Haydel KF, Wilson DM, Hammer L, Kraemer H, Blair-Greiner A, Strachowski D. Weight concerns influence the development of eating disorders: A 4-year prospective study. Journal of Consulting and Clinical Psychology 1996;64:936–940. [PubMed: 8916622]

Killen JD, Taylor CB, Hayward C, Wilson DM, Simmonds B, Robinson TN, Litt I, Varaday A, Kraemer H. Pursuit of thinness and onset of eating disorder symptoms in a community sample of adolescent girls: A three year prospective analysis. International Journal of Eating Disorders 1994;16(3):227–238. [PubMed: 7833956]

Kuczmarski, RJ.; Ogden, CL.; Grummer-Strawn, LM.; Flegal, KM.; Guo, SS.; Wei, R.; Mei, Z.; Curtin, LR.; Roche, AF.; Johnson, CL. CDC growth charts: United States. Advance data from vital and health statistics; no. 314. Hyattsville, MD: National Center for Health Statistics; 2000.

Littell, RC.; Milliken, GA.; Stroup, WW.; Wolfinger, RD. SAS system for mixed models. Cary, NC: SAS Institute Inc; 1996.

Maloney MJ, McGuire J, Daniels SR, Specker B. Dieting behavior and eating attitudes in children. Pediatrics 1989;84:482–489. [PubMed: 2788865]

Marshall WA, Tanner JM. Variations in the pattern of pubertal changes in girls. Archives of Diseases in Children 1969;44:291–303.

Mendelson BK, White DR. Relation between body-esteem and self-esteem of obese and normal children. Perception and Motor Skills 1982;54:899–905.

Ohring R, Graber JA, Brooks-Gunn J. Girls' recurrent and concurrent body dissatisfaction: Correlates and consequences over 8 years. International Journal of Eating Disorders 2002;31:404–415. [PubMed: 11948645]

Patton GC, Johnson-Sabine E, Wood K, Mann AH, Wakeling A. Abnormal eating attitudes in London schoolgirls: A prospective epidemiological study: Outcome at twelve month follow-up. Psychological Medicine 1990;20:383–394. [PubMed: 2356264]

Rolland K, Farnhill D, Griffiths RA. Children's perceptions of their current and ideal body sizes and body mass index. Perceptual and Motor Skills 1996;82:651–656. [PubMed: 8724942]

Rolland K, Farnhill D, Griffiths RA. Body figure perceptions and eating attitudes among Australian schoolchildren aged 8 to 12 years. International Journal of Eating Disorders 1997;21:273–278. [PubMed: 9097200]

Schreiber GB, Robins M, Striegel-Moore R, Obarzanek E, Morrison JA, Wright DJ. Weight modification efforts reported by black and white preadolescent girls: National Heart, Lung, and Blood Institute Growth and Health Study. Pediatrics 1996;98:63–70. [PubMed: 8668414]

Schur EA, Sanders M, Steiner H. Body dissatisfaction and dieting in young children. International Journal of Eating Disorders 2000;27:74–82. [PubMed: 10590451]

Smolak L, Levine MP. Psychometric properties of the children's eating attitudes test. International Journal of Eating Disorders 1994;16:275–282. [PubMed: 7833961]

Smolak, L.; Levine, MP. Body image in children. In: Thompson, JK.; Smolak, L., editors. Body image, eating disorders, and obesity in youth: Assessment, prevention, and treatment. Washington, DC: American Psychological Association; 2001. p. 41-66.

Stice E, Agras WS, Hammer LD. Risk factors for the emergence of childhood eating disturbances: A five-year prospective study. International Journal of Eating Disorders 1999;25:375–387. [PubMed: 10202648]

Stice E, Cameron RP, Killen JD, Hayward C, Taylor CB. Naturalistic weight-reduction efforts prospectively predict growth in relative weight and onset of obesity among female adolescents. Journal of Consulting & Clinical Psychology 1999;67:967–974. [PubMed: 10596518]

Striegel-Moore RH, Schreiber GB, Lo A, Crawford P, Obarzanek E, Rodin J. Eating disorder symptoms in a cohort of 11 to 16-year-old Black and White girls: The NHLBI Growth and Health Study. International Journal of Eating Disorders 2000;27:49–66. [PubMed: 10590449]

Thompson, JK.; Smolak, L., editors. Body image, eating disorders, and obesity in youth: Assessment, prevention, and treatment. Washington, DC: American Psychological Association; 2001.

Van Strien T, Frijters JE, Bergers GP, Defares PB. The Dutch Eating Behavior Questionnaire (DEBQ) for assessment of restrained, emotional, and external eating behavior. International Journal of Eating Disorders 1986;5:295–315.

Windle C. Further studies of test-retest effect on personality questionnaires. Educational & Psychological Measurement 1955;15:246–253.

Wood KC, Becker JA, Thompson J. Body image dissatisfaction in preadolescent children. Journal of Applied Developmental Psychology 1996;17:85–100.

Table 1

Girls' weight concerns, body dissatisfaction, BMI percentile, maladaptive eating attitudes, dietary restraint, and dieting status at each age of assessment

	Mean	SD	Sample Range	Possible Range
Weight concerns				
Age 5	0.73[a]	0.52	0–1.8	0–2
Age 7	0.58[b]	0.43	0–1.8	0–2
Age 9	0.37[c]	0.34	0–2.0	0–2
Body dissatisfaction				
Age 5	1.65[a]	0.30	1–2.6	1–3
Age 7	1.44[b]	0.31	1–2.4	1–3
Age 9	1.34[c]	0.27	1–2.7	1–3
BMI percentile				
Age 5	60.0[a]	26.8	1.5–99.7	0–100
Age 7	59.5[a]	27.7	0.3–99.8	0–100
Age 9	64.8[b]	27.2	2.6–99.8	0–100
Maladaptive eating attitudes				
Age 9	5.3	4.8	0–31	0–69
Dietary restraint				
Age 9	1.4	0.4	1–3	1–3
Dieting status	Ever dieted		Never dieted	
Age 9	26/182 (14%)		156/182 (86%)	

Note: Different superscripts indicate means that are significantly different at $p < 0.05$ based on repeated measures ANOVA; see text for F values and inferential statistics.

Raw scores for girls' weight concerns and body dissatisfaction are reported in this table.

Table 2

Spearman rank correlations between girls' weight concerns, body dissatisfaction, and BMI percentile at each age

	Age 5		Age 7		Age 9	
	Weight Concerns	**Body Dissatisfaction**	**Weight Concerns**	**Body Dissatisfaction**	**Weight Concerns**	**Body Dissatisfaction**
Body dissatisfaction	0.18[c]		0.30[c]		0.39[c]	
BMI percentile	0.06	0.13[a]	0.13[a]	0.15[b]	0.40[c]	0.27[c]

[a] $p < 0.10$,

[b] $p < 0.05$,

[c] $p < 0.1$.

Table 3

Girls' standardized weight concerns and body dissatisfaction across ages 5 to 7 as predictors of their dietary restraint, maladaptive eating attitudes, and dieting status at age 9

	Dietary Restraint (β)	Maladaptive Eating Attitudes (β)	Dieting Status (Odds Ratio and CI)
Average weight concerns (ages 5 and 7)	0.15[a]	0.15[a]	1.54 (0.89–2.87)
Change in weight concerns (ages 5–7)	0.02	0.18[a]	1.02 (0.73–1.43)
Average BMI (ages 5 and 7)[1]	0.35[b]	0.12	1.37 (1.11–1.69)[b]
Average body dissatisfaction (ages 5 and 7)	0.24[b]	0.28[b]	1.84 (1.04–3.30)[a]
Change in body dissatisfaction (ages 5–7)	0.10	0.16[a]	1.05 (0.74–1.46)
Average BMI (ages 5 and 7)[1]	0.30[b]	0.04	1.30 (1.05–1.63)[a]

[a] $p < 0.05$,

[b] $p < 0.01$.

Multiple regression analysis was used to predict dietary restraint and maladaptive eating attitudes. Multiple logistic regression analysis was performed to predict the likelihood of reported dieting.

Girls' standardized weight concerns and body dissatisfaction scores were used in these analyses to aid interpretability.

[1] Average BMI was entered into each analysis as a covariate.

Table 4

Differences in dietary restraint, maladaptive eating attitudes, and dieting status for the weight concerns groups

	Weight Concerns Groups Across Ages 5 to 7				
	No (*n* = 49)	**Early (*n* = 55)**	**Late (*n* = 33)**	**Recurrent (*n* = 45)**	***F* Value from Omnibus Test**
Dietary restraint 9	1.28 (0.40)[1]	1.39 (0.41)[1]	1.34 (0.36)[1]	1.50 (0.48)[2]	1.99
Maladaptive eating attitudes 9	2.28 (2.60)[1]	3.8 (6.23)[1]	5.18 (4.09)[2]	4.69 (4.64)[2]	4.44**
Dieting age 9 (% yes)	10%	15%	15%	18%	$\chi^2 = 1.13$
Weight concerns 5	−0.94 (0.40)[a]	0.71 (0.66)[b]	−0.85 (0.40)[a]	0.84 (0.59)[b]	146.99***
Weight concerns 7	−0.85 (0.43)[a]	−0.64 (0.46)[a]	0.82 (0.59)[b]	1.05 (0.68)[b]	148.5***
Weight concerns 9	−0.38 (0.75)[a]	0.07 (1.18)[b]	0.04 (0.91)[b]	0.26 (0.94)[b]	3.78**
BMI percentile 5	54.90 (28.7)	60.24 (26.2)	62.35 (24.9)	63.64 (26.9)	0.95
BMI percentile 7	54.10 (29.4)	59.89 (27.3)	59.78 (27.9)	64.56 (26.1)	1.13
BMI percentile 9	60.75 (28.43)	62.56 (27.5)	66.03 (27.0)	71.04 (25.1)	1.31

* *Note:* $p < 0.05$;

** $p < 0.01$;

*** $p < 0.001$.

Different superscript numbers indicate significant differences ($p < 0.05$) based on the planned comparisons (see “Results” for an explanation).

Different superscript letters indicate significant differences ($p < 0.05$) in means based on follow-up post hoc analyses to the omnibus analysis.

Scores for weight concerns were standardized for the sample (mean = 0, *SD* = 1).

The scale ranges were 1–3 for dietary restraint and 0–69 for maladaptive eating attitudes.

Table 5

Differences in dietary restraint, maladaptive eating attitudes, and dieting status for the body dissatisfaction groups

	Body Dissatisfaction Groups Across Ages 5 to 7				
	No (*n* = 55)	**Early (*n* = 48)**	**Late (*n* = 30)**	**Recurrent (*n* = 49)**	***F* Value from Omnibus Test**
Dietary restraint 9	1.26 (0.39)[1]	1.32 (0.39)[1]	1.37 (0.34)[1]	1.57 (0.47)[2]	3.99***
Maladaptive eating attitudes 9	2.23 (2.57)[1]	3.14 (3.34)[1]	5.37 (6.42)[2]	5.46 (5.90)[2]	4.26**
Dieting age 9 (% yes)	5%	19%	17%	18%	$\chi^2 = 5.09$
Body dissatisfaction 5	−0.87 (0.62)[a]	0.70 (0.46)[b]	−0.83 (0.53)[a]	0.84 (0.66)[b]	120.33***
Body dissatisfaction 7	−0.73 (0.38)[a]	−0.70 (0.37)[a]	0.81 (0.74)[b]	1.04 (0.71)[b]	139.23***
Body dissatisfaction 9	−0.21 (0.71)[ab]	−0.29 (0.67)[a]	0.18 (1.24)[bc]	0.44 (1.21)[c]	6.24***
BMI percentile 5	52.34 (28.6)[a]	59.22 (25.80)[ab]	60.28 (24.75)[ab]	69.28 (24.95)[b]	3.61**
BMI percentile 7	50.35 (27.9)[a]	61.16 (27.80)[ab]	58.19 (28.24)[ab]	68.80 (25.12)[b]	4.12**
BMI percentile 9	58.61 (27.2)[a]	64.95 (27.65)[ab]	62.03 (26.70)[ab]	73.28 (25.46)[b]	2.72*

* *Note:* $p < 0.05$;

** $p < 0.01$;

*** $p < 0.001$.

Different superscript numbers indicate significant differences ($p < 0.05$) based on the planned comparisons (see “Results” for an explanation).

Different superscript letters indicate significant differences ($p < 0.05$) in means based on post hoc follow-up analyses to the omnibus analysis.

Scores for body dissatisfaction were standardized for the sample (mean = 0, *SD* = 1).

The scale ranges were 1–3 for dietary restraint and 0–69 for maladaptive eating attitudes.