Body Image and Dieting Behavior in Cystic Fibrosis

Helen Truby, PhD, APD*, and Susan J. Paxton, PhD‡

ABSTRACT. Objective. To examine the relationship between pulmonary function, nutritional status, body image, and eating attitudes in children with cystic fibrosis (CF) compared with healthy controls.

Method. Seventy-six children with CF (39 girls) and 153 healthy control children (82 girls) were recruited. All children were between 7 and 12 years of age. After being weighed and measured, participants undertook a structured 1-to-1 interview. Four measures were used to assess body image: body size (perception and satisfaction) were ascertained using the Children’s Body Image Scale (CBIS), which uses photographs of children of various body mass index (BMI) representative of the range of BMI percentiles for children 7 to 12 years of age. Body size satisfaction was measured by the response to the questions, “Do you think your body is 1) much too thin, 2) too thin, 3) just right, 4) too fat, and 5) much too fat?” Body weight satisfaction was measured by the question, “Would you like your body to be 1) much thinner, 2) a little bit thinner, 3) stay the same, 4) a little bit fatter, and 5) much fatter?” Global self-esteem was measured using the children’s version of the Rosenberg Self-Esteem Scale and Body Esteem Scale using a 24-item scale. Dieting behavior was measured by asking directly about previous weight control behaviors, use of the Dutch Eating Behavior-Restraint Scale (DEBQ–R), and, in children who acknowledged previous dieting behavior, the Children’s Eating Attitude Test (ChEAT) was additionally administered.

Results. Both girls and boys with CF had significantly reduced BMI percentiles compared with control children. Boys with CF did not have a significantly different BMI compared with girls with CF. There were significant positive correlations between forced expiratory volume in 1 second (FEV1) (% of predicted) and BMI percentile in girls ($r = .35$) and boys ($r = .50$) with CF. Body image perceptions in boys and girls with CF were examined in relation to the healthy control group using 2 (CF and control groups) by 2 (male and female) analysis of variance. The interaction effect was examined to explore the prediction that girls compared with boys with CF would have greater acceptance of their body shape and less desire to become larger. There were no differences between groups or sex in body esteem. On the CBIS body dissatisfaction score, children with CF were significantly more likely to perceive their ideal body size as a little larger than their current size while control children desired a smaller body size than their current size. CF children had a significantly lower mean score for body size satisfaction (an item assessing perception being too thin) and a significantly higher mean score on body weight satisfaction. There was a significant main effect of gender for only 1 measure, difference between the CBIS body dissatisfaction score, with girls being more likely to nominate a smaller ideal than their current figure. There were no significant interaction effects.

Of children with CF and a low BMI (< 10th percentile), 25% of girls and 38% of boys thought they were too thin. Fewer girls (19%) than boys (38%) would have liked to be fatter.

The CF group had significantly lower mean scores on the DEBQ–R scale compared with controls. Of the children with CF completing the ChEAT ($n = 13$), none obtained a score of clinical significance compared with 6 (4%) for controls.

To examine predictors of BMI a multiple regression analysis was conducted separately for boys and girls with CF and control boys and girls in which the dependent variable was BMI and the independent variables were FEV1 (% of predicted) (in CF children only), body esteem, self-esteem, and body dissatisfaction score. In the case of boys with CF, the regression equation was significant (Adjusted $R^2 = 0.30$). In the case of girls with CF, the regression equation was significant (Adjusted $R^2 = 0.25$) with body dissatisfaction making a significant independent contribution. For control boys the regression equation was significant (Adjusted $R^2 = 0.18$). Variables making a significant contribution to the equation were body esteem and body dissatisfaction. Finally, for control girls the regression equation was significant (Adjusted $R^2 = 0.13$). The only variable to make a significant contribution to the equation was body dissatisfaction.

Discussion. Children with CF had very similar body esteem and general self-esteem as controls. A consideration of body image constructs does reveal group differences between perception and satisfaction with body size between groups. Children with CF were more likely to perceive their body size as larger than it actually was and have greater satisfaction with their current body size in contrast to control children. The girls and boys with CF with a higher BMI frequently selected a smaller body size as their ideal. Control children displayed a large degree of body dissatisfaction, selecting an ideal figure smaller than their own and the desire to be thinner. Given the likely positive health consequences of being larger, it is encouraging that children with CF are not adopting the desire to be thinner, widely held by their healthy peers. However, this may be attributable to the fact that CF children are thinner than average and so fit the prevailing body shape ideal. These analyses do not support the prediction that more girls with CF would be satisfied with their body size compared with boys but do provide information of clinical importance as it indicates that some children with CF, although perceiving themselves to be thin, do not necessarily wish to be any fatter and they may not be motivated to eat the high-energy diet recommended. Clinicians need to be aware of the
life expectancy is improving in individuals with cystic fibrosis (CF). This improvement is attributed to enhanced clinical interventions, one of which is a greater emphasis on adequate nutritional status. Although health outcomes have improved, there is a marked discrepancy between life expectancy in males and females. The reason for this is unknown, but physiological risk factors explored to date do not adequately explain this discrepancy. Gender differences in body image and related dietary restraint, explored in the present study, may contribute psychological differences affecting clinical outcome.

In healthy females there is strong social pressure to be thin, which is reflected in widespread dietary restraint, high body dissatisfaction, and high frequency of disordered eating in adults and in adolescents. Pressure to conform to this aesthetic ideal is supported by public health messages encouraging the prevention of obesity. Body image concerns and potentially unhealthy weight loss behaviors are increasingly being observed in younger children, especially girls, and the cultural preference for the thin body build is internalized in childhood. Female children with CF are likely to be exposed to the same social pressures to desire a thin body size and to fear becoming fat. This may conflict with the need of children with CF to consume a high-energy and high-fat diet. Previous research indicates that there is a significant negative correlation between a CF child’s weight and whether his or her mother was successfully dieting, suggesting the possibility that a mother’s weight concerns may be reflected in the food consumption of her child. To assist in the nutritional management of children with CF, it would, therefore, be valuable to understand the attitudes, of girls particularly, to body size and dietary restraint, and the frequency of disordered eating.

Few studies have examined body image or disturbed eating in children with CF. Behavioral eating problems during childhood and adolescents have been reported. One recent study indicated the potentially important contribution of body image concerns to inadequate nutritional status in girls.

This study compared body esteem, eating attitudes, and daily caloric intake of 15 females with CF (8–15 years of age) and 15 age-matched healthy controls. Although on average CF girls in this sample wanted to weigh slightly more than they did (in contrast to the control participants), the heavier CF girls did desire to lose weight and had decreased caloric intake, potentially compromising their health.

More recently, Abbott et al reported that healthy females and female CF patients perceived their body size as less than it actually was and desired to be slimmer, whereas male CF participants desired to be heavier. These data do suggest the need for more comprehensive research in this area in children with CF and influences on body perception, satisfaction, and issues with eating.

Somewhat more research into eating attitudes has been conducted in groups including adolescents and adults with CF. Pearson et al found that 16.4% of children 8 to 15 years of age were in the symptomatic range for disordered eating on the Eating Attitudes Test. However, eating disorder symptoms may have been confounded with gastrointestinal CF symptoms and this was not clarified by interview. Pumariega et al observed that 12% of their 12- to 21-year-old CF patients had atypical eating patterns. Boyle et al observed that their entire sample of 27 adolescent and adult CF patients reported dissatisfaction with their bodies. These studies do indicate that for some adolescents and adults, body image concerns and disturbed eating are issues, which could influence nutritional status.

In summary, this study aims to examine the relationship between pulmonary function, nutritional status, body image, and eating attitudes in male and female children with CF between 7 and 12 years of age. In addition, it aims to compare attitudes of children with CF with a healthy control group.

METHODS

Participants

Children With CF

Approval was initially gained to conduct this study from the Royal Children’s Hospital (RCH) Human Research Ethics Committee. All children with CF between 7 and 12 years of age were identified from the RCH CF database. The RCH provides a clinical service to all children with CF in the State of Victoria, Australia, regardless of insurance status. Exclusion criteria were: severe liver disease, CF-related diabetes, and/or the presence of gastrointestinal tract fistula. A total of 102 children with CF were identified as eligible to enter the study. Of these, 19 were not seen at RCH during the 6-month study, and 5 were transferred to other centers. All potential participants were invited to participate when they attended their routine clinic appointment and active informed consent was obtained from parents and children. Although all parents agreed to participate, 2 children did not. Therefore, 76 children with CF, 97% of those available, completed the interview, which was conducted by the first author or a trained interviewer during their routine clinic visit. The sample consisted of 39 girls (mean age: 9.8 years; standard deviation [SD]: 1.7) and 37 boys (mean age: 9.9 years; SD: 1.6). Girls and boys did not differ significantly on mean forced expiratory volume in 1 second (FEV1 % of predicted) (girls = FEV1 [% of predicted] = 84.9%; SD: 3.5; boys – mean FEV1 [% of predicted] = 78.9%; SD: 22.6; t = 0.13, not significant).

Controls

Control children were recruited from 2 metropolitan primary schools, 1 from a low-medium and the other from a medium-high
social-economic area. All children in Grades 2 to 6 who attended the schools were invited by letter to participate in the study. Written informed consent was obtained from a parent/guardian before the study took place. All children for whom consent was available and who were present on the days of the study were interviewed (n = 159; 45% from low-medium school and 55% from medium-high school). Four children were excluded because, on interview, they reported being on a special diet (eg, diabetic or allergy) and 2 were excluded because of comprehension difficulties. The total control group consisted of 153 children, 82 girls (mean age: 9.2 years; SD: 1.8) and 71 boys (mean age: 9.3 years; SD: 1.7).

Procedures

The assessment instruments described below were administered by interview by dietitians trained in 1 to 1 interviewing. The interview was conducted in a quiet interview room during school hours, each interview taking ~25 minutes. Care was taken to ensure the child that their answers would be known only to the interviewer, this was not a test, there were no right or wrong answers, and that we were only interested in their honest responses. The interviewer also checked that the child understood the question if there seemed to be doubt or hesitation. This was particularly important in the assessment of eating behaviors, where, for example, some eating behaviors may have occurred because of illness rather than weight preoccupations.

Assessment Instruments

Pulmonary Function in Children With CF

FEV1 (% of predicted) was used as an indication of pulmonary function and measured at the time of interview during their routine clinic visit by a trained technician using Quanjer’s method.35

Body Mass Index (BMI)

All children were weighed and measured in private with the child in light clothing but without shoes. Height was measured using a portable stadiometer (accurate to 0.1 cm) in the school setting and in the hospital using a Holtain wall-mounted stadiometer (accurate to 0.1cm). Weight, using digital scales (accurate to 0.01 kg), was recorded at the same time. BMI (weight in kg/height in m2) was calculated and converted to percentiles using standards of the National Center for Health Statistics.34

Body Size Perception and Body Satisfaction

Four measures were used to assess body image. The first was the 24-item Body Esteem Scale, which is reliable in children as young as 7 years old.30 Cronbach’s α for the present sample was 0.84. The second measure was the Children’s Body Image Scale (CBIS) developed by the authors. This scale was based on body silhouette scales used previously to assess body image in children, and found to have strong psychometric properties36 in which a child is presented with a series of body figures ranging from very thin to obese and asked to identify which body size is most like your body to be: 1) much thinner, 2) a little bit thinner, 3) stay the just right, 4) too fat, or 5) much too fat? Body weight satisfaction was measured by the response to the question, “Would you like your body to be: 1) much thinner, 2) a little bit thinner, 3) stay the same, 4) a little bit fatter, or 5) much fatter?” Dieting Behaviors

Dieting behaviors were assessed in a 3-step process. First, children were asked, “Have you ever tried to lose or gain weight?” If the answer was that they had tried to lose weight, they were asked why they had done so and how they had attempted to lose weight. Second, children were given the Dutch Eating Behavior Questionnaire-Restraint Scale (DEBQ-R).39 This is a 10-item scale that assesses a person’s degree of involvement in weight control and dieting behaviors on a 5-point Likert scale and has previously been successfully used in children.17 A high score indicates more restraint in eating. Cronbach’s α for this sample was 0.89. Participants who responded positively to the first question regarding a previous weight loss attempt or responded positively to dieting items on the DEBQ-R were also given the Children’s Eating Attitudes Test (ChEAT). This 26-item test assesses disordered eating symptoms and has been found to be a valid and reliable measure in children.40 The ChEAT is not a diagnostic instrument, a higher score indicates more behaviors associated with dieting and a score above 20 is suggestive of anorexic symptomatology. Cronbach’s α for the 58 participants given the ChEAT in this sample was 0.77.

Self-Esteem

Global self-esteem was measured using a validated 5-item children’s version of the Rosenberg Self-Esteem Scale.33 First, it assesses general over arching feelings toward themselves by asking a series of general questions. “Everybody has some things about them that are good and bad. Are more things said about you that are good, bad, or both about the same?” A reply of good scores 0, both about the same scores 1, and bad scores 2. Specific qualities are then investigated such as feelings of being good at things. Respondents are asked the question, “Do you ever feel you’re not must good at things?” A negative reply scores 0 and a positive reply scores 1. Respondents are then asked about how often they feel that way: some of the time (2), most of the time (3), or all of the time (4), thereby rating responses according to the degree of feelings. The scores are then summed. A low score indicates that the person considers himself or herself to be a person of worth, and a high score would indicate some degree of self-rejection or dissatisfaction. Cronbach’s α for this sample was an adequate 0.67.

Statistical Analysis

Data were analyzed using SPSS, Version 10 software (SPSS, Chicago, IL). Cronbach’s α was used to provide details on the reliability of each scale and the internal consistency for this particular sample. BMI percentile was achieved by assigning the individual to the closest BMI percentile using growth standards of the National Center for Health Statistics and the median value is presented to express central tendencies. Where BMI percentile group has been used as interval data, the Mann-Whitney U test is used to compare differences in ranks. Two-way analysis of variance has been used to explore relationships between continuous variables in the normally distributed data. Because nutritional status is an important outcome measure in CF, multiple regression analysis was used to predict BMI using a range of factors previously identified in the literature as contributing to nutritional outcome in CF. Significance was defined as P < .05.

RESULTS

BMI and Pulmonary Function in Children With CF

The median BMI for the CF group (n = 76) was 25 (range: 5–90). The median BMI percentile for the control group (n = 153) was 50 (range: 5–105). To explore gender differences in BMI percentiles a Mann-Whitney U test was used. This showed that both girls (Z = -4.19; P < .01) and boys (Z = -5.83; P < .01) with CF had significantly reduced BMI percentiles compared with control children. Boys with CF did not have a significantly different BMI compared with girls with CF (Z = -1.80; P = .07). This supported previous findings.43 To confirm previous observations in children with CF, the relationship between FEV1 (% of predicted) and body size was examined. As anticipated, there were significant positive correlations between FEV1 (% of predicted) and BMI percentile in girls (r = 0.35; P = .016) and boys (r = 0.50; P = .006) with CF.
Body Image

Body image perceptions in boys and girls with CF were examined in relation to the healthy control group using 2 (CF and control groups) by 2 (male and female) analysis of variance. The interaction effect was examined to explore the prediction that girls compared with boys with CF would have greater acceptance of their body shape and less desire to become larger. As can be seen in Table 1, there were no differences between groups or sex in body esteem. On the CBIS – body dissatisfaction score, children with CF were significantly more likely to perceive their ideal body size as a little larger than their current size, whereas control children desired a smaller body size than their current size. CF children had a significantly lower mean score for body size satisfaction (an item assessing perception being too thin) and a significantly higher mean score on body weight satisfaction. There was a significant main effect of gender for only 1 measure, difference between weight satisfaction. There was a significant main effect of group on the DEBQ-R measure of dietary restraint, with CF children having significantly lower scores. There was no main effect of gender or interaction effect.

Of CF children, only 1 (3%) girl and 3 (8%) boys said that they had ever tried to lose weight, whereas 66% of girls and 81% of boys with CF reported ever having tried to gain weight. Of control participants, 20% of girls and 15% of boys reported ever having tried to lose weight, whereas 11% of girls and 13% of boys reported ever having tried to gain weight. The ChEAT was only given to these children and those who described some weight loss concerns on the DEBQ-R (CF, n = 13; control, n = 45). Of those children with CF given the ChEAT, none obtained a score of >20 (range: 0–14), the cutoff for clinical significance in children. Of control children given the ChEAT, 6 obtained scores above the cutoff (range: 1–53; 4.0% of total control sample), 5 girls (6% of girls) and 1 boy (1%).

Predictors of BMI

To examine predictors of BMI, a multiple regression analysis was conducted separately for boys and girls with CF and control boys and girls in which the dependent variable was BMI and the independent variables were FEV1 (% of predicted; in CF children only), body esteem, self-esteem, and body dissatisfaction score. In the case of boys with CF, the regression equation was significant (F = 4.26; df = 4.30; P = .0008; R² = 0.38; Adjusted R² = 0.30). None of the variables made a significant independent contribution to the equation (body esteem, P = .106; FEV1, P = .132; body dissatisfaction, P = .194; self-esteem, P = .106). In the case of girls with CF, the regression equation was significant (F = 4.08; df = 4.25; P = .008; R² = 0.33; Adjusted R² = 0.25). The variable making a significant contribution to the equation was body dissatisfaction (B = 5.8; standard error = 2.01; β = .31; t = 2.84; P = .006). In the case of control boys, the regression equation was significant (F = 6.23; df = 3.65; P = .001; R² = .22; Adjusted R² = .18). Variables making a significant contribution to the equation were body esteem (B = −2.10; standard error = 0.91; β = −.34; t = −2.29; P = .025) and body dissatisfaction (B = 5.7; standard error = 2.02; β = 0.321; t = 2.82; P = .006). Finally, for control girls the regression equation was significant (F = 4.84; df = 3.78; P = .004; R² = 0.16; Adjusted R² = .13). The only variable to make a significant contribution to the equation was body dissatisfaction.

### TABLE 1

<table>
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<tr>
<th></th>
<th>CF Girls</th>
<th>Group Boys</th>
<th>Control Girls</th>
<th>Group Boys</th>
<th>F Group</th>
<th>F Sex</th>
<th>F Group × Sex</th>
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<tr>
<td>Body esteem</td>
<td>17.50 (0.72)</td>
<td>18.49 (0.73)</td>
<td>17.93 (0.49)</td>
<td>19.24 (0.53)</td>
<td>0.34</td>
<td>0.07</td>
<td>0.79</td>
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<td>CBIS: body dissatisfaction</td>
<td>−0.13 (0.23)</td>
<td>−0.53 (0.24)</td>
<td>0.79 (0.16)</td>
<td>0.33 (0.17)</td>
<td>19.40**</td>
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<tr>
<td>Body size satisfaction</td>
<td>2.76 (0.11)</td>
<td>2.54 (0.11)</td>
<td>3.10 (0.07)</td>
<td>2.96 (0.08)</td>
<td>15.40**</td>
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<tr>
<td>Body weight satisfaction</td>
<td>3.20 (0.66)</td>
<td>3.30 (0.62)</td>
<td>2.56 (0.69)</td>
<td>2.79 (0.63)</td>
<td>36.82**</td>
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<tr>
<td>DEBQ-R</td>
<td>1.38 (0.13)</td>
<td>1.27 (0.13)</td>
<td>2.02 (0.08)</td>
<td>1.92 (0.09)</td>
<td>34.15**</td>
<td></td>
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<tr>
<td>Self-esteem</td>
<td>3.5 (0.46)</td>
<td>3.14 (0.47)</td>
<td>3.12 (0.32)</td>
<td>2.76 (0.34)</td>
<td>0.87</td>
<td>0.81</td>
<td>0.00</td>
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</table>

* P < .05; ** P < .001.
(B = -0.58; standard error = 2.01; β = 0.316; t = 2.84; 
P = .006).

**DISCUSSION**

In confirmation of previous studies, these data indicate that children with CF tend to be nutritionally compromised compared with healthy control children. Girls with CF were not more nutritionally compromised than boys, suggesting that at this age at least, a difference in nutritional status does not account for the poorer long-term survival of girls with CF. It has been documented that gender differences in nutritional deficits are observed during the adolescent years and do occur more frequently in females.43 Because this study examines children from 7 to 12 years of age, it may be reasonable to assume that differentiating paths of nutritional status occur after the age of 12 years. These data provide additional support for the contention that good nutrition and growth are important to health in children with CF. BMI percentile being positively correlated with FEV1 (% of predicted) in both girls and boys with CF. Although correlational data of this kind cannot be assumed to denote cause, this consistently observed relationship does suggest that every effort should be made to encourage a high-energy intake from an early age. Certainly, a low BMI has a significant negative influence on outcome after transplantation and achieving and maintaining a good nutritional status is worthy of much endeavor.44

The CF group in this study, despite their chronic illness, had very similar body esteem and general self-esteem to their healthy counterparts. It is notable that the children with CF were not suffering from acute illness at the time of the study and sick children may feel differently, but this finding is very positive in light of the difficulties many of them endure because of physical ill health. It is likely that positive self-attitudes are adaptive, enabling children to get on with life. As age increases, children with CF may become more aware that they are in a different position from other children, but starting with a positive view of themselves and their bodies is likely to reduce adverse psychological effects later.

Body image is widely thought to consist of 2 interacting constructs: perception and satisfaction with body size. A consideration of body image does reveal group differences between perception and satisfaction with body size between groups. Children with CF were more likely to perceive their body size as larger than it actually was and to have greater satisfaction with their current body size in contrast to control children. The girls and boys with CF with a higher BMI frequently selected a smaller body size as their ideal. This is consistent with the findings in adolescent girls27 and adults with CF.26 Control children displayed a large degree of body dissatisfaction, selecting an ideal figure smaller than their own and desiring to be thinner. Given the likely positive health consequences of being larger, it is encouraging that, on average, children with CF are not adopting the desire to be thinner, widely held by their healthy peers. Although it is possible that this is in part attributable to being responsive to the advice of family and health professionals encouraging a larger body size in children with CF, this is not the most probable explanation. It is more likely that this is attributable to the fact that CF children are thinner than average and so fit the prevailing body shape ideal. These analyses do not support the prediction that more girls with CF would be satisfied with their body size but do provide information of clinical importance because it indicates that some children with CF, although perceiving themselves to be thin, do not necessarily wish to be any fatter. However, more boys than girls in the lower BMI percentiles wished to gain weight and would have chosen to be fatter, which is a helpful attitude. Identifying these individuals for more intensive nutritional counseling may prove an effective use of resources and, in particular, dietetic time.

The finding that an important minority of children with CF selected an ideal body size smaller than their own or were content to stay the same size has clinical implications. These children may not be motivated to eat the high-energy diet recommended. Clinicians need to be aware of the possibility that medical targets for growth for individuals may not be in concordance with their desires and determining the child’s point of view may be helpful in identifying an appropriate intervention for the individual. The finding that body dissatisfaction is an independent predictor of nutritional status in controls and in girls with CF suggests that children’s own concepts of their body size is important. Encouraging positive body esteem and self-esteem and focusing attention away from weight gain and more toward achieving optimum growth may be a useful strategy for clinicians working with this population.

In this study, there was a significant gender effect in the difference between perceived and ideal body size with the mean difference being greater in girls (ie, the ideal being thinner than the perceived) than in boys; however, there was no significant interaction, girls and boys with CF not differing significantly on this measure. In the 2 items assessing body size and weight satisfaction, there were no gender or group by gender interactions. Therefore, along with the failure to find a BMI percentile difference, there was no indication in this study that a greater desire to be thinner in girls than in boys with CF is contributing to poorer health outcomes.

No children with CF had eating disorder symptoms as indicated by CheAT. Again, the fact that these children tend to be thin may contribute to this. Previous studies in children and adolescents with CF have reported the presence of eating disorder symptoms.29,31 The discrepancy in findings may be attributable to the data collection methods used. In this study, the measure of eating disorder symptoms was delivered in an interview format, which allowed the clarification of CF-related symptoms compared with intentional eating disorder/weight control behaviors. For example, one question on the CheAT asks the number of occasions that vomiting after eating occurs. Children and adolescents may not be able to make a clear distinction between these in a written questionnaire and there is potential for confusion.
Disordered eating is observed in younger children but less frequently than in adolescents. It may be that some girls with CF may develop frank eating disorder in later years.

It is notable that 6% and 1% of control girls and boys, respectively, scored above the ChEAT cutoff for disordered eating symptomatology. This is consistent with previous studies and demonstrates that we can no longer assume that disordered eating is an adolescent problem.\(^{17,18}\) Rather, clinicians seeing children must be alert to the possibility that these problems may develop in childhood.

This study is one of the first to examine body image and eating issues in children with CF. Strengths of the study are the relatively large sample size of children with CF and the use of interview presentation of questionnaires, which reduces misinterpretation. However, there are a number of methodological limitations. Self-report has been used and it was not possible to obtain supporting observer ratings. Consequently, children may have been giving socially desirable responses. It is also unclear, without replication, the extent to which data from this sample may be generalized to other samples. However, in light of these cautions, this study does indicate that in children with CF without acute disease, body esteem is comparable with healthy control children. There is no support for the hypothesis that girls with CF in this age group will have lower BMI percentiles than will boys with CF, or that they will have a greater desire to be thinner than they are. However, the data do indicate that some children with CF desire a thinner body size or are content to stay the same size, which could undermine motivation to comply with a high-energy diet. Clinicians working with nutritional issues in children with CF need to be aware of this possibility.

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