Disordered Eating Among Adolescents With Chronic Illness and Disability

The Role of Family and Other Social Factors

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Objectives: To compare prevalence rates of weight-control behaviors among adolescents with and without chronic illness and to explore the role of familial and other social factors on associations between disordered eating and chronic illness.

Design and Setting: Survey conducted in public schools in Connecticut.

Participants: A representative statewide population-based sample of 9343 7th-, 9th-, and 11th-grade public school students, of whom 1021 reported a chronic illness.

Main Outcome Measures: Disordered eating (vomiting, diet pills, and laxatives), dieting, and exercise for weight control; chronic illness status; family structure, family communication, parental caring, parental monitoring, parental expectations, peer support, and sexual and physical abuse.

Results: Adolescents with chronic illness were at greater risk for disordered eating than youth without chronic illness, after controlling for sociodemographic variables (girls: odds ratio, 1.59 [95% confidence interval, 1.19-2.14]; boys: odds ratio, 2.22 [95% confidence interval, 1.49-3.32]). Adolescents with chronic illness were less likely to come from 2-parent families; reported lower levels of family communication, parental caring, and parental expectations; and reported more sexual and physical abuse than youth without chronic illness. Male adolescents with chronic illness were more likely to report low peer support and low parental monitoring. Most of these familial-social factors were also associated with an increased prevalence of disordered eating. After familial-social factors were controlled for, however, associations between disordered eating and chronic illness remained statistically significant.

Conclusions: Adolescents with chronic illness are at greater risk for disordered eating behaviors than youth without chronic illness. Factors other than the familial-social factors assessed in this study may be contributing to this increased risk. In the clinical setting, youth with chronic illness need to be screened for disordered eating and familial and other social concerns.


Editor’s Note: This study points out the need to evaluate disordered eating in adolescents with chronic illnesses. Just add that to the long list of issues with which these youngsters and their families must cope.

Catherine D. DeAngelis, MD

High prevalence rates of weight-control behaviors among adolescents, in particular among adolescent girls, have been well documented. For example, in the Youth Risk Behavior Survey, which is completed by a national sample of 6th-, 9th-, and 12th-grade adolescents, 48% of girls and 16% of boys reported dieting for weight control. Among youth engaging in weight-control behaviors, a high percentage report the use of unhealthy methods. Of particular concern is the use of extreme weight-control behaviors, such as self-induced vomiting or laxative use, often referred to as disordered eating behaviors.

Although the use of disordered eating behaviors among healthy adolescents is disturbing, particular concern exists regarding the use of these behaviors among adolescents with chronic illness. Although persons with chronic illness might be expected to avoid unhealthy weight-control behaviors in light of other health concerns, in many case reports and clinical studies, disordered eating behaviors or frank eating disorders have been noted among persons with chronic illness. Most of this work has focused on adolescents and young adults with insulin-dependent diabetes mellitus.
SUBJECTS AND METHODS

STUDY POPULATION

The study population included a representative sample of 7th-, 9th-, and 11th-grade public school students from Connecticut who participated in a statewide survey of adolescent health in 1995 to 1996. Among the study population, 1021 adolescents (12.3%) self-reported that they had a long-term illness or a physical disability, and 8322 adolescents did not report either condition. Adolescents reporting either a long-term illness (494 girls and 330 boys) or a physical disability (89 girls and 108 boys) were combined into a “chronic illness” group to allow for meaningful analyses. Sociodemographic characteristics of adolescents with and without chronic illness are shown in Table 1. Adolescents with chronic illness were more likely to be female and of minority status than adolescents without chronic illness, whereas differences between the groups were not found for grade in school or socioeconomic status.

The body mass index (BMI [weight in kilograms divided by height in meters squared]), based on self-reported heights and weights, was compared across chronic illness status separately for adolescent girls and adolescent boys. Mean (SD) BMI values were significantly higher among adolescent girls with chronic illness (21.2 [3.7]) than among adolescent girls without chronic illness (20.5 [3.4]) (P < .001). Among adolescent boys, differences in BMI values were not found between those with chronic illness (21.6 [4.3]) and those without chronic illness (21.4 [3.8]) (P = .26).

Sampling Design

The sampling frame used a set of geographic and socioeconomic criteria established by the departments of health and education in Connecticut. The state’s 5 geographic service delivery areas, which were established for the delivery and monitoring of government programs and services, were crossed with 5 socioeconomic strata defined by combining the state’s educational reference groups (ERGs), which are used to compare student achievement across school districts, controlling for socioeconomic level. The original 9-level ERG system used by the state was defined using a statistical model that was based on several indicators of economic need—eg, family income, parental level of education, occupation, percentage of single-family homes, and percentage of homes in which English is the second language. The ERG system is useful because there is great diversity in socioeconomic levels in Connecticut, with some regions being among the poorest in the nation and others among the wealthiest. Thus, the use of both service delivery area and ERG classification systems ensured a sample that was geographically and socioeconomically representative of youth in public schools throughout the state, as compared with 1990 census data for Connecticut.

A stratified random sampling strategy was used based on the crossings of the 5 service delivery areas with the 5 socioeconomic strata; 2 of the resulting 25 cells contained no school districts. Sampling from each cell was done in proportion to the number of school districts and students within the cell, with the final goal of ensuring that there was proportional representation of school districts and 7th-, 9th-, and 11th-grade students for each service delivery area and for each ERG. A total of 61 schools were included in this analysis.

SURVEY DEVELOPMENT

The Voice of Connecticut Youth Survey was designed to provide a comprehensive assessment of adolescent health needs in Connecticut. Survey topics and priorities for the extent of coverage were first determined by a statewide advisory board. Items were primarily derived from 4 existing surveys: the National Longitudinal Study of Adolescent Health Survey, a 1994 national in-home interview of 20,000 youth in the 7th through 12th grades; the Family Health Assessment Survey, an international survey of familial risk and protective factors sponsored by the Pan American Health Organization; the Minnesota Adolescent Health Survey, a 1986 statewide survey of Minnesota youth in the 7th through 12th grades; and the Youth Risk Behavior Survey, a survey administered nationally to 9th through 12th graders on an ongoing basis. Items were organized into topic areas and modified to simplify language, simplify response scales, and conform to the advisory board’s priorities. The survey was reviewed and revised by the advisory board, pilot tested, revised again, and then subjected to a final pilot test in Connecticut with 3 classrooms of youth to ensure that it was clear, easy to follow, and could be completed during a single classroom period.

The final survey included 225 items covering all key domains of health risk behaviors and factors known from the literature to either enhance risk or protect against such behaviors. The survey was administered in a classroom setting. Because of the minimal-risk nature of the research, only student consent forms were required by the Institutional Review Board. Surveys were anonymous, and students were assured that only group results would be reported.

MEASURES

Chronic illness status was assessed with the question, “Do you have a physical or health condition that keeps you from doing some things other kids your age do (such as school activities, sports, or getting together with friends)?” Adolescents indicating that they had either a physical disability or a long-term illness were combined into a chronic illness group. Response options were worded as follows: no; yes, a physical disability (deafness, cerebral palsy, wheelchair use, etc); yes, a long-term illness (diabetes, asthma, etc); or yes, overweight. Adolescents who indicated that they were overweight (n = 299) were deleted from the present study because of difficulties in interpretation: 40% of those reporting that they were overweight had BMIs below the 85th percentile. In addition, respondents indicating that they had more than 1 condition (eg, overweight and long-term illness) (n = 32) or those with missing values for this item (n = 269) were not included in analyses.
Weight-control behaviors were assessed with the question, “During the past week (7 days), did you do any of the following things to lose weight or keep from gaining weight?” Responses included “dieted (ate less or differently)”; “exercised (to burn calories or fat)”; “made yourself vomit (throw up)”; “took diet pills (Dexatrim)”; and “took laxatives (like Ex-Lax) or diuretics (water pills).” Respondents were asked to check all that apply. Types of weight-control behaviors thus included dieting, exercise, and disordered eating behaviors (the last 3 categories combined).

Factor analysis (principal components, varimax rotation) resulted in 4 distinct factors assessing different aspects of familial and peer relations that were labeled “family communication,” “parental caring,” “parental monitoring,” and “peer support.” Each of these factors was subsequently examined for internal consistency using the Cronbach \( \alpha \). Family communication was based on 6 items assessing the perceived level of communication and understanding from parents and other family members: “How often do your parents talk or share an activity with you at night?” “How much do you feel people in your family understand you?” “How much do you feel you can tell your mother (or father) about your problems?” and “When you do something wrong, does she (or he) talk with you and help you understand why it is wrong?” (\( \alpha = .83 \)). Parental caring was based on 2 items assessing the perceived level of caring by parents: “How much do you feel your mother (or father) cares about you?” (\( \alpha = .66 \)). Parental monitoring was assessed with 4 items on the perceived level of autonomy in decision making regarding curfew on weeknights, friends, clothes, and amount of television watched: “How often do your parents let you decide who to hang around with?” and “How often do your parents let you decide what you wear?” (\( \alpha = .75 \)). Peer support was based on 2 items assessing the perceived level of communication and caring from peers: “How much do you feel your friends care about you?” and “How much do you feel you can tell your friends about your problems?” (\( \alpha = .70 \)). Likert response categories with 4- and 5-point scales were used for each item. Scores for each of the scales were plotted, based on visual inspection of the plots, and dichotomized or trichotomized for analysis. Mean scores were calculated based on available data for each scale. If more than half of the items were missing, the variable was defined as missing.

Family structure was assessed with the question, “Who do you live with most of the time?” The 8 responses were dichotomized into “2-parent family structure” and “other family structure.” Respondents were categorized as living in a 2-parent family if they chose “2 parents (birth parents, adoptive parents, or stepparents)” or “both parents, but at different times (such as mom 1 week and dad another).” Other responses (eg, “only 1 parent—my mother”) were categorized as “other family structure.”

Parental expectations, as perceived by the adolescent, were assessed with the question, “How much do your parents expect of you?” Response categories ranged from 1 (indicating “they have no expectations of me”) to 5 (indicating “they have high expectations of me”). Sexual abuse by a family member or anyone else was assessed with the question, “Have you ever been sexually abused? (Has someone in your family or someone else caused you to have black and blue marks, bleeding, or a broken bone?)” Response categories to both questions included “no”; “yes, once”; or “yes, more than once.” Responses were coded dichotomously (yes or no).

Sociodemographic and personal variables included sex, grade level (7th, 9th, and 11th grades), ethnicity (assessed in the categories of white, African American, Hispanic or Latino, Asian or Pacific Islander, Native American, multiracial, and other; coded as white vs nonwhite), BMI, and socioeconomic status. The socioeconomic status was based on adolescents’ self-reports of parental education and employment status and was divided into 4 levels in addition to an unknown category. Questions were asked separately for each parent, and the maximum value of either the mother’s or the father’s categorical measure was used.

DATA ANALYSIS

Weight-control behaviors and familial and other social factors were examined across chronic illness status for boys and girls separately. The significance of differences in prevalence rates across chronic illness status was assessed by \( \chi^2 \) tests, using SAS software (Statistical Analysis System), version 6.12.35

Multivariate analysis took into account the 2-stage sampling design in which schools were randomly selected from each of the 25 geographic-socioeconomic strata, as previously described, and thus included the school as a random effect. Analyses were performed using SAS GLIMMIX version 6.12 for boys and girls separately.36 GLIMMIX implements the generalized linear mixed model37,38 and is appropriate for data with multiple sources of random variation and observation-level errors that have a non-Gaussian distribution. The outcome variables of interest (weight-control behaviors) were dichotomous, and therefore a logit link and binomial error distribution were specified for the generalized linear mixed model. All analyses were done separately for boys and girls.

Odds ratios (ORs) and confidence intervals (CIs) were calculated for weight-control behaviors among youth with chronic illness compared with youth without chronic illness, controlling for sociodemographic variables (socioeconomic status, ethnicity, and grade), which were included as covariates in the model. Odds ratios of 1.0 indicate no association, and if the value 1.0 is included in the CI, then the association may be considered to be statistically insignificant. The magnitude of deviation from 1.0 indicates the strength of the association. Models were also run controlling for the BMI as a covariate in addition to the sociodemographic variables. The focus of the analysis, however, is on models run without the BMI as a covariate, to avoid overcontrolling, because the BMI may be functioning as an intervening variable between chronic illness and weight-control behaviors.

Associations were further examined by adjusting for familial and social factors in addition to sociodemographic variables. Covariates included family structure, family communication, parental caring, parental monitoring, parental expectations, peer support, sexual abuse, or physical abuse. To examine the effects of specific familial and other social factors on the association between disordered eating and chronic illness, separate models were run in which only 1 familial or social factor (eg, sexual abuse) was included as a covariate in addition to the sociodemographic variables.
dependent (type 1) diabetes mellitus.\textsuperscript{10-12,17-25} Personal and familial factors related to issues of control may be contributing to the onset of disordered eating among this population.\textsuperscript{26,27} Clinical samples tend to be skewed, however, because persons displaying both chronic illness and disordered eating are more likely to be seen in clinical settings than persons with only 1 of these conditions. Therefore, the study of prevalence rates of behaviors and associated factors among clinical populations presents several difficulties.

Population-based samples are preferable for examining associations between chronic illness and weight-control behaviors. Unfortunately, large-scale surveys of adolescent health, such as the Youth Risk Behavior Survey,\textsuperscript{2} do not include questions on chronic illness, despite that approximately 10% of adolescents have some type of chronic illness.\textsuperscript{28-30}

To our knowledge, only 1 large population-based study has focused on this association, using data from the 1986 to 1987 Minnesota Adolescent Health Survey.\textsuperscript{31} In this study, adolescents with different types of chronic illness were found to be at greater risk for body dissatisfaction, dieting, and disordered eating behaviors than a comparison group of youth without chronic illness. The findings of this study led to the hypothesis that chronic illness may be associated with a number of familial, peer, and other social factors that, in turn, may be contributing to the increased risk.\textsuperscript{31} It was further proposed that through the study of disordered eating among youth with chronic illness, we could learn more about these youth and about the cause of disordered eating behaviors.\textsuperscript{31}

The present study expands on the limited number of population-based studies focusing on weight-control behaviors among adolescents with chronic illness and disordered eating among youth with and without chronic illness, we could learn more about these youth and about the cause of disordered eating behaviors.\textsuperscript{31}

Results

ASSOCIATIONS BETWEEN WEIGHT-CONTROL BEHAVIORS AND CHRONIC ILLNESS STATUS

Unadjusted prevalence rates of disordered eating, dieting, and exercise for weight-control were all higher among adolescents with chronic illness than among adolescents without chronic illness (Table 2). Prevalence rates of disordered eating were especially high among youth with chronic illness, with 10.3% (60/581) of adolescent girls and 6.9% (30/434) of adolescent boys reporting the use of laxatives, diet pills, or self-induced vomiting during the previous week compared with 6.8% (287/4251) of girls and 2.8% (111/4010) of boys without chronic illness.

Odds ratios and CIs for weight-control behaviors among youth with chronic illness compared with youth without chronic illness, controlling for sociodemographic variables, are shown in Table 3. Associations between weight-control behaviors and chronic illness continued to be statistically significant after sociodemographic variables were controlled for, with the exception of exercise among adolescent boys. A particularly strong association was noted between disordered eating and chronic illness among adolescent boys (OR, 2.22; 95% CI, 1.49-3.2), but the association among girls was more moderate (OR, 1.59; 95% CI, 1.19-2.14).

Associations were further examined after controlling for the BMI in addition to sociodemographic variables. Similar associations were found, with the exceptions of those between disordered eating and chronic illness among girls (OR, 1.36; 95% CI, 0.99-1.87) and between dieting and

<p>| Table 1. Sociodemographic Characteristics of Study Population by Chronic Illness Status* |</p>
<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No Chronic Illness (n = 8322)</th>
<th>Chronic Illness (n = 1021)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Male</td>
<td>4045 (48.6)</td>
<td>438 (42.9)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>4277 (51.4)</td>
<td>583 (57.1)</td>
</tr>
<tr>
<td>Grade</td>
<td>7th</td>
<td>2921 (35.1)</td>
<td>369 (36.1)</td>
</tr>
<tr>
<td>9th</td>
<td>3031 (36.4)</td>
<td>389 (38.1)</td>
<td></td>
</tr>
<tr>
<td>11th</td>
<td>2370 (28.5)</td>
<td>263 (25.8)</td>
<td></td>
</tr>
<tr>
<td>Ethnicity†</td>
<td>White</td>
<td>6068 (73.8)</td>
<td>708 (69.8)</td>
</tr>
<tr>
<td></td>
<td>African American</td>
<td>756 (9.2)</td>
<td>97 (9.6)</td>
</tr>
<tr>
<td></td>
<td>Hispanic</td>
<td>567 (6.9)</td>
<td>90 (8.9)</td>
</tr>
<tr>
<td></td>
<td>Asian/Pacific Islander</td>
<td>213 (2.6)</td>
<td>21 (2.1)</td>
</tr>
<tr>
<td></td>
<td>Other/multiethnic</td>
<td>618 (7.5)</td>
<td>98 (9.7)</td>
</tr>
<tr>
<td>Socioeconomic status</td>
<td>High</td>
<td>1656 (19.9)</td>
<td>160 (15.7)</td>
</tr>
<tr>
<td></td>
<td>Middle high</td>
<td>2291 (27.5)</td>
<td>278 (27.2)</td>
</tr>
<tr>
<td></td>
<td>Middle low</td>
<td>3259 (46.0)</td>
<td>443 (43.4)</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>513 (6.2)</td>
<td>75 (7.3)</td>
</tr>
<tr>
<td>Unknown</td>
<td>533 (6.4)</td>
<td>65 (6.4)</td>
<td></td>
</tr>
</tbody>
</table>

* Data are given as number (percentage).
† African Americans, Hispanics, Asians, and other minority groups were combined for analysis purposes. Numbers do not add up to the total number of respondents because 107 respondents did not indicate their ethnicity.
chronic illness among boys (OR, 1.31; 95% CI, 0.98-1.76), which were no longer statistically significant.

FAMILIAL ASSOCIATIONS BETWEEN SOCIAL FACTORS AND CHRONIC ILLNESS STATUS

Differences in familial and other social factors were apparent among adolescents with and without chronic illness (Table 4). Compared with adolescents without chronic illness, both male and female youth with chronic illness were less likely to live in 2-parent households, reported lower levels of family communication, perceived less parental caring, and perceived lower parental expectations. Adolescent boys with chronic illness reported lower levels of parental monitoring and slightly lower levels of peer support than those without chronic illness, whereas differences among adolescent girls were not apparent. The prevalence of sexual abuse and of physical abuse was considerably higher among both male and female youth with chronic illness than among their peers. Prevalence rates were about twice as high among youth with chronic illness than among youth without chronic illness, eg, 20.4% (118/579) of girls with chronic illness reported sexual abuse compared with 10.7% (454/4251) of girls without chronic illness.

The relatively high rates of disordered eating among adolescents, to prevent the use of unhealthy weight-control practices.

Prevalence rates for dieting behaviors and exercise aimed at weight control were higher among youth with chronic illness than among youth without chronic illness, and most of these associations remained statistically significant after controlling for sociodemographic variables. These findings suggest that adolescents with chronic illness are as likely as or more likely to be concerned about weight-related issues than adolescents without chronic illness. A preoccupation with weight is prevalent among adolescents, in particular adolescent girls, and having a chronic illness does not preclude them from having normative developmental concerns. The findings demonstrate the need to discuss weight-related issues with youth with chronic illness, as is recommended for all adolescents, to prevent the use of unhealthy weight-control practices.

Of greater concern were the high prevalence rates of disordered eating among adolescents with chronic illness. Although respondents were asked only about the use of extreme behaviors (vomiting, diet pills, and laxatives) during the past 7 days, about 10% of the girls and 7% of the boys with chronic illness reported their use. Presumably, these rates would have been even higher had the period of reference been longer (eg, past month or past year).

Higher prevalence rates of weight-control behaviors among youth with chronic illness may be partially due to differences in the BMI, as girls with chronic illness had higher BMIs than girls without chronic illness. Even after the BMI was controlled for, however, girls with chronic illness were more likely to report dieting and exercise, and boys with chronic illness were more likely to report disordered eating behaviors than youth without chronic illness.

The relatively high rates of disordered eating among adolescent boys with chronic illness and the strong associations between disordered eating and chronic illness among these boys are noteworthy. Sex differences in strengths of association between disordered eating and chronic illness may be due to the unique challenges faced by teenage boys with chronic illnesses or may be a result of the higher rates of disordered eating among girls

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**Table 2. Prevalence of Weight-Control Behaviors Among Adolescent Girls and Boys With and Without Chronic Illness**

<table>
<thead>
<tr>
<th>Weight-Control Behavior</th>
<th>Adolescent Girls, No. (%)</th>
<th>Adolescent Boys, No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Chronic Illness (n = 4251)</td>
<td>Chronic Illness (n = 581)</td>
</tr>
<tr>
<td></td>
<td>No Chronic Illness (n = 4010)</td>
<td>Chronic Illness (n = 434)</td>
</tr>
<tr>
<td>Disordered eating†</td>
<td>287 (6.8)</td>
<td>60 (10.3)§</td>
</tr>
<tr>
<td>Dieting</td>
<td>1560 (36.7)</td>
<td>270 (46.5)§</td>
</tr>
<tr>
<td>Exercise</td>
<td>2550 (60.0)</td>
<td>385 (66.5)§</td>
</tr>
</tbody>
</table>

* Some adolescents reported engaging in more than 1 behavior.
†Laxatives, diet pills, and/or vomiting.
§P < .01.
‡P < .001.

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**Table 3. Odds Ratios (ORs) and 95% Confidence Intervals (CIs) for Weight-Control Behaviors Among Adolescents With Chronic Illness Compared With Those Without Chronic Illness**

<table>
<thead>
<tr>
<th>Weight-Control Behavior</th>
<th>Adolescent Girls (n = 4774)</th>
<th>Adolescent Boys (n = 4398)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR 95% CI</td>
<td>OR 95% CI</td>
</tr>
<tr>
<td>Disordered eating†</td>
<td>1.59 1.19-2.14</td>
<td>2.22 1.49-3.32</td>
</tr>
<tr>
<td>Dieting</td>
<td>1.53 1.28-1.83</td>
<td>1.50 1.13-1.97</td>
</tr>
<tr>
<td>Exercise</td>
<td>1.32 1.10-1.59</td>
<td>1.22 1.00-1.50</td>
</tr>
</tbody>
</table>

* Controlling for grade, ethnicity, and socioeconomic status.
Family or Social Factor | Female, No. (%) | Male, No. (%) | P
--- | --- | --- | ---
| No Chronic Illness | Chronic Illness | No Chronic Illness | Chronic Illness |
Family structure 2-Parent family | 2981 (71.3) | 365 (64.3) | <.001 | 2862 (72.4) | 263 (62.8) | <.001
Other family structure | 1199 (28.7) | 203 (35.7) | 1089 (27.6) | 156 (37.2) |
Family communications High | 1054 (25.1) | 113 (20.1) | 1177 (30.0) | 103 (24.3) | <.05
Middle | 2212 (52.8) | 299 (53.1) | 2045 (52.0) | 227 (53.5) |
Low | 925 (22.1) | 151 (26.8) | 708 (18.0) | 94 (22.2) |
Parental caring High | 2840 (68.1) | 322 (57.6) | <.001 | 2748 (70.5) | 246 (58.9) | <.001
Low | 1329 (31.9) | 237 (42.4) | 1149 (29.5) | 172 (41.1) |
Parental monitoring High | 1189 (28.4) | 150 (26.6) | 964 (24.6) | 81 (19.2) | <.01
Middle | 2192 (52.4) | 293 (52.0) | 1961 (50.0) | 205 (48.6) |
Low | 806 (19.2) | 121 (21.4) | 997 (25.4) | 136 (32.2) |
Parental expectations High | 3824 (90.6) | 502 (88.2) | <.01 | 3582 (90.4) | 370 (85.6) | <.01
Middle | 336 (8.0) | 49 (8.6) | 286 (7.2) | 45 (10.4) |
Low | 63 (1.5) | 18 (3.2) | 95 (2.4) | 17 (3.9) |
Peer support High | 3159 (75.7) | 420 (75.0) | .70 | 2305 (59.2) | 227 (54.2) | <.05
Low | 1012 (24.3) | 140 (25.0) | 1588 (40.8) | 192 (45.8) |
Past sexual abuse‡ No | 3797 (89.3) | 461 (79.6) | <.001 | 3895 (97.0) | 406 (93.3) | <.001
Yes | 454 (10.7) | 118 (20.4) | 120 (3.0) | 29 (6.7) |
Past physical abuse‡ No | 3657 (86.1) | 437 (75.5) | <.001 | 3623 (90.3) | 391 (9.7) | <.001
Yes | 592 (13.9) | 142 (24.5) | 391 (9.7) | 79 (18.2) |

* Percentages do not all add up to 100 due to rounding.
†By an adult within or outside the family.

in general, regardless of chronic illness status. Clinicians working with youth with chronic conditions, and, in particular, with adolescent boys, may not be inclined to inquire about disordered eating behaviors. Our findings clearly suggest the relevance of doing so.

Findings from the present study regarding the high rates of dieting and disordered eating behaviors among youth with chronic illness are in congruence with the few scientific studies focusing on this phenomenon. Several case reports and case series have described eating disorders among persons with Crohn disease,13 blindness,14 cystic fibrosis,15 and inflammatory bowel disease.16 For the most part, larger studies allowing for comparisons of youth with and without chronic illness have focused on persons with type 1 diabetes mellitus.17,19 Despite the severe possible consequences of engaging in disordered eating for persons with type 1 diabetes, several studies17,19,22 have found higher rates of disordered eating among persons with this condition than among those without this condition. In a study of a large nonclinical population of youth in Minnesota, Neumark-Sztainer et al.21 found higher rates of body dissatisfaction and disordered eating behaviors among youth with a range of chronic illnesses than among youth without chronic illness. These associations were not limited to youth with nutrition-related conditions, being also apparent among youth with conditions such as asthma and attention-deficit disorder. As in the present study, associations between disordered eating and chronic illness tended to be stronger among adolescent boys than among adolescent girls.

Findings in the present study indicated that familial and social factors may differ between youth with and without chronic illness. Particularly striking were the higher levels of sexual and physical abuse, lower prevalence of 2-parent family structures, and lower levels of perceived parental caring among youth with chronic illness compared with their peers. Differences in familial and social factors across chronic illness status tended to be more consistent among male adolescents. Although we had expected parental monitoring to be higher among youth with chronic illness than among youth without chronic illness, this was not found, and among adolescent boys, parental monitoring was found to be somewhat lower among those with chronic illness. It may be that the measure of monitoring...
was not sensitive to “overmonitoring” at its upper end but was intended to identify youth who were not being adequately supervised. It was encouraging that differences in peer support were not found between youth with and without chronic illness. These prevalence rates should be interpreted with some caution because they are unadjusted for differences in sociodemographic variables and do not take into account the 2-stage sampling design. Nevertheless, there is agreement with previous studies that have found that youth with chronic illness are more likely to report lower levels of family connectedness and higher levels of sexual abuse experiences than youth without chronic illness.27,39,51

Familial and other social concerns tended to be higher among youth with chronic illness than among those without chronic illness. Therefore, in working with youth with chronic illness who are engaging in disordered eating behaviors, it is imperative to gain an understanding of familial and other social experiences to effectively intervene. Particular attention should be directed toward assessing past sexual and physical abuse experiences because they were prevalent among both boys and girls with chronic illness. Furthermore, abuse experiences may increase adolescents’ risk for disordered eating behaviors, in particular when occurring in an adverse familial situation.

Associations between chronic illness and disordered eating, however, remained statistically significant after controlling for familial and other social concerns. This suggests that chronic illness is an independent risk factor for disordered eating or at least that factors associated with chronic illness other than the familial and social factors assessed in the present study are contributing to the increased risk. Differences in prevalence rates of disordered eating among youth with and without chronic illness were generally not explained by familial and other social factors.

In drawing conclusions from this study, both strengths and weaknesses of the study design and survey instrument need to be considered. Strengths of the study included the sample, which was large, diverse, and representative of adolescents from public school districts in Connecticut. The nonclinical nature of the study population allowed for an examination of associations in an unskewed population. Another strength of the study was the comprehensive nature of the survey instrument, which allowed for the analysis of chronic illness status, weight-control behaviors, and a range of familial and social factors. The comprehensive nature of the survey also had implications regarding the number of items that could be devoted to assessing important constructs because the survey covered many topics; yet, it needed to be completed during 1 class period. Although the survey included questions on extreme weight-control behaviors (eg, vomiting), it would have been useful to have more detailed questions on specific types of healthy weight-control behaviors (eg, decreasing fat intake and increasing fruit and vegetable intake) and unhealthy methods (eg, fasting and skipping meals). It also would have been useful to have more details on types and severity of chronic illness. Furthermore, the response categories for the item assessing chronic illness presented a number of difficulties in interpretation because of the inclusion of “overweight” as a category. (Although the intention may have been to identify youth with morbid obesity, a considerable number of those responding to this category had BMIs below the 85th percentile.)

Regarding the study design, the limitations of self-reported data need to be taken into account. Concerns about self-reported height and weight have been well documented.32-35 For example, Crawley and Portides2 found that tall, thin adolescents were more likely to underreport their height and that shorter, fatter adolescents were more likely to overestimate their height and underestimate their weight. Furthermore, to the best of our knowledge, the validation of self-reported heights and weights among youth with chronic illness has not been examined. Nevertheless, when it is not possible to obtain actual measurements, the inclusion of items assessing self-reported height and weight adds useful information. Also, students with chronic illness and, in particular, severe chronic illness are more likely to be absent from school or to attend a special school than their peers and thus would have been excluded from this study. Finally, the cross-sectional study design allows for the examination of associations (eg, between chronic illness and familial factors), but statements regarding the direction of causation should be avoided.

Further research is needed to more fully understand the association between chronic illness and weight concerns or disordered eating behaviors. Youth with chronic illness who are engaging in disordered eating behaviors need to be questioned in depth with regard to possible motives for these behaviors. Population-based studies, in particular of national samples of youth, should incorporate questions on chronic illness. This would allow a study of a range of health behaviors and concerns among youth with chronic illness. Work is needed to develop questions on chronic illness that are valid, brief, and informative. Finally, the strong associations seen between chronic illness and disordered eating among adolescent boys point to a need for further research on adolescent boys with chronic illness (eg, the effects of chronic illness on these boys) and on boys engaging in disordered eating behavior (eg, etiologic factors leading to the onset of these behaviors among adolescent boys).

### Table 5. Odds Ratios (ORs) and 95% Confidence Intervals (CIs) for Disordered Eating Among Adolescents With Chronic Illness Compared With Those Without Chronic Illness, Controlling for Specific Familial/Social Factors and Sociodemographic Variables

<table>
<thead>
<tr>
<th>Familial or Social Factor</th>
<th>Females†</th>
<th>Males‡</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR 95% CI</td>
<td>OR 95% CI</td>
</tr>
<tr>
<td>Family structure</td>
<td>1.57</td>
<td>1.17-2.11</td>
</tr>
<tr>
<td>Family communication</td>
<td>1.63</td>
<td>1.21-2.19</td>
</tr>
<tr>
<td>Parental caring</td>
<td>1.63</td>
<td>1.21-2.19</td>
</tr>
<tr>
<td>Parental monitoring</td>
<td>1.59</td>
<td>1.18-2.13</td>
</tr>
<tr>
<td>Parental expectations</td>
<td>1.63</td>
<td>1.21-2.18</td>
</tr>
<tr>
<td>Peer support</td>
<td>1.63</td>
<td>1.21-2.19</td>
</tr>
<tr>
<td>Past sexual abuse</td>
<td>1.61</td>
<td>1.20-2.15</td>
</tr>
<tr>
<td>Past physical abuse</td>
<td>1.61</td>
<td>1.20-2.15</td>
</tr>
</tbody>
</table>

* Separate models were run in which specific familial/social factors (listed in left column) were included as covariates, in addition to grade, ethnicity, and socioeconomic status.
† N = 4648 to 4746.
‡ N = 4233 to 4365.
The high prevalence rates of disordered eating behaviors and familial and other social concerns among youth with chronic illness emphasize the need for comprehensive care of youth with chronic illness, which extends well beyond treating the condition-specific symptoms. An in-depth screening of personal, familial, and social issues among youth with chronic illness is essential and should take into account their greater likelihood of engaging in disordered behaviors and having been victims of sexual or physical abuse. As appropriate, individual or family counseling (or both) may be warranted. Our findings suggest that families in which a child has a chronic illness may be experiencing excessive stress and may be dealing with multiple issues. Adequate support for these families from community, educational, social, and health services is essential.

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REFERENCES