Prevalence of Eating Disorder Symptoms in Preadolescent and Adolescent Girls With IDDM

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OBJECTIVE — To assess attitudinal and behavioral symptoms of eating disorders in preadolescent and adolescent girls with IDDM and a matched sample of nondiabetic subjects, and to explore the relationship between the perceived impact of IDDM and eating disorder symptoms.

RESEARCH DESIGN AND METHODS — All eligible IDDM patients (girls, age 8–18 yr) from the case register of the Yale Children's Diabetes Clinic were recruited for this study. Of 49 eligible patients, 46 participated in the study. Control subjects were recruited among students in several local schools; 46 girls, individually age and race-matched with IDDM patients, and group-matched by father's socioeconomic status, were included in this study. All subjects participated in an investigator-based clinical interview (EDE) and completed a self-report measure of eating-related psychopathology (EDI). IDDM subjects completed the DQOL measure to determine the perceived impact of diabetes on patients' lives.

RESULTS — IDDM patients reported significantly more regular consumption of meals and snacks than did nondiabetic subjects. No group differences were found on measures of symptoms of eating disorders: both groups reported minimal levels of symptoms. Among adolescent IDDM patients, eating disorder symptoms were related significantly to patients' dissatisfaction with the illness and its impact on their lives.

CONCLUSIONS — It appears that when applying stringent diagnostic procedures and matching criteria, IDDM girls do not evidence an elevated prevalence of eating disorder symptoms. However, those IDDM patients who did report symptoms may be a high-risk group for the development of an eating disorder and should be followed prospectively.

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IDDM, INSULIN-DEPENDENT DIABETES MELLITUS; EDE, EATING DISORDER EXAMINATION; EDI, EATING DISORDER INVENTORY; DQOL, DIABETES QUALITY OF LIFE; DSM-III-R, *DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS* (3RD EDITION, REVISED); EDI-C, EATING DISORDER INVENTORY FOR CHILDREN <12 YR OF AGE; MANOVA, MULTIVARIATE ANALYSIS OF VARIANCE; BMI, BODY MASS INDEX.

A growing number of case reports describe patients with IDDM who suffer from a clinical eating disorder (1–7). The typical patient is an adolescent or young adult women whose clinical picture includes frequent hypoglycemic episodes caused by insufficient food intake and/or frequent occurrences of hyperglycemia caused by deliberately insufficient insulin administration after meals or binges. Many of these patients have experienced life-threatening acute complications of IDDM as a result of disordered eating. In addition to those IDDM patients whose symptoms clearly warrant an eating disorder diagnosis, many patients are thought to experience symptoms of eating disorders that may pose a health risk. Behavioral symptoms such as binge-eating, for example, directly interfere with the treatment goal of glycemic control and thus may compromise a patient's health (8–14).

IDDM may be seen as a risk factor for the development of an eating disorder. Successful treatment of IDDM may require considerable changes in dietary habits that often are difficult (16,17). Moreover, some of the very behaviors that are important in dietary management of IDDM are thought to be precursors of disordered eating in nondiabetic populations; for example, following a diet that limits the amount of highly palatable foods, such as sweets, has been proposed to contribute to binge-eating (18–19).

Prevalence studies have found that female IDDM patients are considerably more likely than male patients to exhibit symptoms of eating disorders, a finding that mirrors the staggering sex differences in eating disorders reported among nondiabetic populations (20). Conflicting results have been reported, however, concerning the relative prevalence of eating disorders in diabetic women versus nondiabetic women. Some studies suggest that eating disorders, especially bulimia nervosa, may be more common among IDDM patients

Table 1—*Characteristics of sample groups*

	TOTAL SAMPLE		PREADOLESCENT SAMPLE		ADOLESCENT SAMPLE	
	IDDM PATIENTS (N = 46)	CONTROL SUBJECTS (N = 46)	IDDM PATIENTS (N = 18)	CONTROL SUBJECTS (N = 18)	IDDM PATIENTS (N = 28)	CONTROL SUBJECTS (N = 28)
AGE (YR)	13.0 ± 0.5	13.0 ± 0.5	9.3 ± 0.4	9.3 ± 0.4	15.3 ± 0.3	15.3 ± 0.3
RACE (% WHITE)	93	93	6	6	7	7
SOCIOECONOMIC GROUP (%)*						
I	13	15	11	16	14	14
II	24	22	22	17	25	25
III	33	30	34	28	32	32
IV	19	20	22	28	18	14
V	11	13	11	11	11	14
BMI (KG/M^2)†	21.2 ± 0.7	19.7 ± 0.6	17.9 ± 0.7	17.2 ± 0.7	23.4 ± 0.9	21.3 ± 0.8
ONSET OF IDDM‡ (YR)	7.04 ± 0.5	—	5.39 ± 0.7	—	8.11 ± 0.7	—
		—		—		—
DURATION OF IDDM‡ (YR)	5.91 ± 0.6	—	3.89 ± 0.6	—	7.21 ± 0.7	—
		—		—		—
HbA_{1c}	12.20 ± 0.5	—	11.44 ± 0.5	—	12.69 ± 0.7	—
		—		—		—

Values are means ± SE, unless otherwise noted.

* Based on parental job description: (I), major executives, owners of medium to large businesses, major professionals; (II), owners of small businesses, minor professionals; (III) skilled workers; (IV), semiskilled workers; (V), unskilled workers. Rating was based on the parent with the highest level.

† $P < 0.001$, preadolescent vs. adolescent subjects.

‡ $P < 0.01$, preadolescent vs. adolescent IDDM patients.

than in the general population (11,12, 14,21–23), whereas other studies conclude that IDDM patients have prevalence rates comparable with (24–27) or even less than (13) those observed among nondiabetic populations. These conflicting results may be attributable to methodological differences, including differences in definition and measurement of eating disorders and in sampling techniques. In IDDM patients, elevated scores on inventories measuring eating disorder symptoms may reflect compliance with the dietary regimen rather than eating pathology (13,22,27).

Prevalence studies to date have focused primarily on young adult women. A growing body of literature suggests that even preadolescent girls exhibit body-image concerns and engage in dieting and occasional binge-eating (28). Although experts call for early identification of eating disorder symptoms to prevent the development of a clinical syndrome (29), the frequency of such problems in young IDDM patients has not yet been established. The purpose of this study was to assess attitudinal and behavioral symptoms that accompany eating disorders in preadolescent and adolescent girls with IDDM and a matched sample of nondiabetic subjects, and to explore the potential relationship between the perceived impact of IDDM on the patient's life and the symptoms of eating disorders. Eating-disorder symptoms were assessed using a state of the art interview that permits distinction of behaviors related to demands of the diabetes regimen from those attributable to an eating disorder.

RESEARCH DESIGN AND METHODS

— A list of eligible patients (girls with IDDM, age 8–18 yr) was generated from the case register of the Yale Children's Diabetes Center. Patients diagnosed <1 yr before the study and one mentally retarded patient were not included in this study. The study was described to all potential candidates during a routine clinic visit or by telephone contact. Of 49 IDDM patients eligible for the study, 47 agreed to participate, 2 declined, and 1 moved away before she could be interviewed. All 46 patients and their parents gave informed written consent according to approved procedures of the Yale Human Investigation Committee before being included in the study. Subjects are described more fully in Table 1. A comparison group of female subjects without IDDM was recruited among students in several local schools. The study was described to control subjects during a regular class period, and students received consent forms to take home. The parents of interested students were contacted subsequently by telephone and upon receipt of student and parental consent, an assessment appointment was made. Response

rates varied by school and ranged from a low of 82% to a high of 95%. To permit matching, 79 control subjects were interviewed, and 46 girls, individually matched with patients by age and race, and group-matched by father's employment status (e.g., employed full-time, part-time, or unemployed) and socioeconomic group (30), were included in this study.

All IDDM patients and most control subjects were interviewed in their homes; 10 control subjects were interviewed at school. All assessments were confidential and were not related to clinic staff, school personnel, or parents. The assessment included a structured interview, completion of self-report questionnaires, and measurement of subjects' height and weight. For IDDM subjects, HbA_{1C} level at the clinic visit before the interview was obtained from patients' charts.

The Eating Disorder Examination

The primary measure of eating disorder symptoms in this study was the EDE (31). This standardized investigator-based interview of established reliability and validity (32–34) includes more than 50 items eliciting information concerning regular eating habits (descriptive items) and attitudes, and feelings and behaviors associated with eating disorders (clinical items). The interviewer rates the frequency of key behaviors (e.g., eating regular meals or snacks, overeating, restrictive dieting, purging) and the severity of features such as concern about shape and weight, based on the past 28 days. Importantly, the EDE permits an assessment of diabetes-related concerns, which might be mistaken for symptoms of eating disorders. Examples include avoidance of carbohydrates, adherence to rigid dietary rules, and feeling guilty after eating. When present, these symptoms are rated only if they are motivated by weight or shape concerns. Based on 31 clinical items, five subscale scores can be derived: the weight concern (5 items) and shape concern (8 items) scales measure disturbed attitudes regarding body weight and body shape; the restraint scale (5 items) measures excessive dieting to control weight or shape; the overeating scale (8 items) assesses frequency and severity of overeating episodes; and the eating concern scale (5 items) probes a range of concerns about eating commonly found among anorexic or bulimic patients, such as eating in secret or guilt about eating. Subscale scores are derived by summing across the appropriate items (each rated from 0 to 6) and dividing the total by the number of items on each subscale. Subscale scores may range from 0 to 6. An EDE total score may be calculated by summing across the five subscale scores and may range from a low of 0 to a high of 30. The EDE permitted operationalized diagnoses of anorexia nervosa, bulimia nervosa, and eating disorders not otherwise specified (DSM III-R; 35). Diagnoses are based on 16 items that measure clinical symptoms of eating disorders. The definition of a clinical symptom specifies both the type of symptom (e.g., strict dieting) and a minimum frequency of occurrence of ≥50% of the time during the past 28 days. A minimum four clinical symptoms is required for a diagnosis of anorexia nervosa and bulimia nervosa, respectively, whereas three symptoms are sufficient to meet criteria for eating disorders not otherwise specified (DSM III-R; 35).

The Eating Disorder Inventory

As a secondary measure of eating-related pathology, the EDI (36) was administered. For subjects <12 yr of age, the children's version, EDI-C (D.M. Garner, unpublished), was used. This widely used self-report questionnaire measures attitudes, feelings, behaviors, and personality traits characteristic of individuals with eating disorders. Subjects rated each of 64 items (59 items on the EDI-C) on a 6-point scale from "never" to "always." Three subscales related to eating disorders symptoms, and five subscales measuring personality traits were derived by summing the appropriate items and dividing the total by the number of items on each subscale. Dividing the total subscale score by the number of subscale items is not part of the standard EDI scoring procedure. However, to permit comparison, we chose to correct subscale sum scores for the number of subscale items on EDI-C scores (which are based on 59 items) and EDI scores (which are based on 64 items).

Diabetes Quality of Life

The DQOL (38) evaluates diabetic patients' perceptions of the impact of their illness on major life domains. The pediatric version contains 59 items. Subjects rated each item on a 5-point scale ranging from 1 (no impact) to 5 (high impact). Four subscale scores were derived by summing the appropriate items and dividing the total by the number of items on each subscale. Satisfaction measures both general life satisfaction and satisfaction with the medical treatment and its influence on daily life. Impact assesses how much diabetes interferes with important aspects of the patient's life, including family relationships, school, and leisure activities, and with the patient's health. Two "worry" scales measure the degree of a patient's worries concerning the illness itself (worry-diabetes related), and worries concerning the long-term impact of diabetes on the patient's life (worry-social).

Statistical analysis

Prevalence data between IDDM patients and control subjects were analyzed using χ^2 tests. Power analyses were conducted to determine the probability of detecting specified differences between IDDM patients and nondiabetic subjects in prevalence rates. Nonnormally distributed continuous variables (EDE subscales, EDE total, EDI subscales) were transformed logarithmically, and geometric means were used for group comparisons and regression analyses (26). Group comparisons of symptom severity were based on MANOVA with planned con-

Table 2—*Between-group comparison of reported daily eating habits based on the past 28 days*

	Breakfast	Morning snack	Lunch	Afternoon snack	Dinner	Evening snack
Diabetic patients (n = 46)						
Never (%)	0	24.4	0	2.2	0	18.2
Sometimes (%)	17.4	57.8	13.0	46.7	6.5	34.1
Daily (%)	82.6	17.8	87.0	51.1	93.5	47.7
Control subjects (n = 46)						
Never (%)	0	39.1	2.2	4.4	0	23.9
Sometimes (%)	51.1	54.4	39.1	73.9	23.9	67.4
Daily (%)	48.9	6.5	58.7	21.7	76.1	8.7
χ^2	11.50*	4.00	9.52†	8.5†	5.4‡	17.60*

* $P < 0.001$.
† $P < 0.01$.
‡ $P < 0.05$.

trasts (IDDM girls vs. nondiabetic girls; younger girls vs. older girls), whereas separate MANOVAs were calculated for measures concerning body image, excessive weight control, loss of control over eating, and eating concerns. For planned contrasts comparing younger and older subjects, we chose a cut-off of 12 yr for classification by age. This permits comparison of our data with prior studies of adolescent IDDM patients. The relationship between measures of perceived impact of IDDM and eating disorders symptoms was examined using stepwise regression analyses.

RESULTS

IDDM patients vs. nondiabetic subjects: diabetes management

The first set of comparative analyses explored group differences regarding subjects' regular meal patterns. Subjects were asked how often during the past 28 days they had consumed breakfast, a midmorning snack, lunch, an afternoon snack, dinner, or an after-dinner snack, rated as never, sometimes, and daily. As shown in Table 2, IDDM patients reported significantly more regular consumption of breakfast, lunch, and dinner, and afternoon and evening snacks, than did nondiabetic subjects.

Because of the relatively young age of our sample, many of our patients still received help with their insulin therapy. For example, 59% drew-up insulin completely on their own, 18% shared this task with a parent, and 33% had their insulin drawn-up by a parent. About half of the patients (52%) self-administered their insulin injections, and 22% shared this task with their parents. The remaining 26% of patients received their shots from their parents. Two interview questions were aimed at identifying insulin manipulation for the purpose of weight control: "Over the past 4 wk, have you purposefully changed the amount of insulin you take as a means of controlling your weight or shape, or to counteract the effects of eating?" and "Over the past 4 wk, have you purposefully skipped an insulin injection as a means of controlling your shape or weight, or to counteract the effects of eating?" One IDDM patient reported regularly reducing the amount of insulin injected in an effort to burn calories. This 13-yr-old IDDM patient scored in the clinically significant range on EDE items concerning body image and excessive weight-control behaviors and was in poor metabolic control (HbA_{1c} = 21.2). Two additional patients admitted to occasionally (once or twice during the past month) reducing insulin for weight control. These two adolescent patients reported clinically significant body-image concerns but were in good metabolic control ($HbA_{1C} > 12$).

Symptoms of eating disorders

Examination of subjects' responses to those interview items that measure diagnostic criteria for anorexia nervosa, bulimia nervosa, and eating disorders not otherwise specified found that none of the patients met criteria for an eating disorder. However, many of the girls with and without diabetes experienced at least one clinical symptom of eating disorders. As shown in Table 3, closer inspection of symptoms revealed that symptoms of disturbed attitudes regarding shape or weight were most common (particularly feeling fat in certain areas of the body), followed by symptoms of excessive weight control efforts. Two control subjects but none of the IDDM patients had engaged in clinically significant binge-eating. All girls reporting symptoms of loss of control over eating or of excessive weight control also reported symptoms of body-image disturbance. The group differences in the prevalence of specific symptoms between IDDM patients and control subjects were not statistically significant, however. Power analyses of the prevalence rates observed for the symptoms related to body image and excessive weight control were conducted using the 0.05 level of significance. These analyses indicated that the power to detect the observed difference of 11% in the prevalence of symptoms related to body image was 0.13, whereas the power to detect the 9% difference in the prevalence of symptoms related to excessive weight control was 0.12. Note that only large differences in prevalence rates would be detectable with the current sample size of 46 in each group; for example, if 25% of the nondiabetic and 65% of the diabetic population experienced a given symptom, the power would be much higher (0.90). Larger sample sizes would be re-

Table 3—*Percentage of subjects experiencing at least one symptom of eating disorders at a clinically relevant level, grouped by symptom domains*

Symptoms related to . . .	IDDM patients (*N* = 46)	Control subjects (*N* = 46)
Body image (%)		
All subjects	52	41
Younger subjects	22*	17†
Older subjects	71	57
Excessive weight control (%)		
All subjects	33	24
Younger subjects	0*	0†
Older subjects	50	39
Loss of control over eating (%)		
All subjects	0	4
Younger subjects	0	0
Older subjects	0	14

Younger subjects (8–11 yr old): *n* = 18 IDDM patients and *n* = 18 control subjects, mean age = 9.3 ± 0.5 yr; older subjects (12–18 yr old): *n* = 28 IDDM patients and *n* = 28 control subjects, mean age = 15.3 ± 0.3 yr. "Clinically relevant" refers to a rating of at least 4 (on a scale from 0 to 6), indicating a frequency of ≥50% of the time.

*$P < 0.05$ preadolescent vs. adolescent IDDM patients.

† $P < 0.05$ preadolescent vs. adolescent control subjects.

quired to detect smaller differences in prevalence rates between the two populations. Of note, only 19% of younger girls with or without IDDM compared with 64% of older girls, reported a clinically relevant symptom related to body image ($P < .001$), and none of the younger subjects reported behavioral symptoms such as dieting or overeating.

As shown in Table 4, group means on EDE subscales also indicated minimal levels of symptoms in each of the five scales in IDDM patients and control subjects. With the exception that control subjects obtained significantly higher scores on the overeating subscales than IDDM patients, no other experimental group effect was found. Older IDDM patients and control subjects scored significantly higher on weight concern, shape concern, and restraint subscales than did younger girls, whereas on the overeating subscale, significant age differences were found for older vs. younger control subjects only. In addition, comparisons of scores on the EDI self-report questionnaire found no group differences on any of the EDI subscales, including the bulimia subscale, which is related conceptually to the overeating subscale (EDE). The EDE total score was correlated significantly with

Table 4—*Between group comparisons of scores on the EDE interview and the EDI self-report questionnaire for IDDM patients and control subjects*

	IDDM patients (*N* = 46)	Control subjects (*N* = 46)
Weight concern (EDE)		
All subjects	0.9 ± 1.0	0.9 ± 1.1
Younger subjects	0.3 ± 0.6*	0.4 ± 0.9†
Older subjects	1.2 ± 1.1	1.2 ± 1.1
Shape concern (EDE)		
All subjects	1.0 ± 1.2	0.9 ± 1.1
Younger subjects	0.3 ± 0.5‡	0.4 ± 0.8§
Older subjects	1.4 ± 1.3	1.3 ± 1.2
Restraint (EDE)		
All subjects	0.4 ± 0.5	0.4 ± 0.6
Younger subjects	0.2 ± 0.3‡	0.1 ± 0.3†
Older subjects	0.6 ± 0.6	0.6 ± 0.7
Overeating (EDE)		
All subjects	0.1 ± 0.2‖	0.3 ± 0.4
Younger subjects	0.1 ± 0.2	0.1 ± 0.2§
Older subjects	0.1 ± 0.2	0.4 ± 0.4
Eating concern (EDE)		
All subjects	0.2 ± 0.4	0.3 ± 0.4
Younger subjects	0.1 ± 0.3	0.1 ± 0.2
Older subjects	0.3 ± 0.5	0.4 ± 0.5
Body dissatisfaction (EDI)		
All subjects	0.8 ± 0.9	0.9 ± 0.9
Younger subjects	0.2 ± 0.4‡	0.6 ± 0.9
Older subjects	1.2 ± 1.0	1.0 ± 0.9
Drive for thinness (EDI)		
All subjects	0.7 ± 0.9	0.5 ± 0.6
Younger subjects	0.4 ± 0.6*	0.4 ± 0.5
Older subjects	0.9 ± 0.7	0.6 ± 0.6
Bulimia (EDI)		
All subjects	0.1 ± 0.3	0.2 ± 0.4
Younger subjects	0.1 ± 0.1	0.2 ± 0.5
Older subjects	0.2 ± 0.4	0.2 ± 0.3

Values are means ± SD. Younger subjects (8–11 yr old): *n* = 18 IDDM patients and *n* = 18 control subjects, mean age = 9.3 ± 0.5 yr. Older subjects (12–18 yr old): *n* = 28 IDDM patients and *n* = 28 control subjects, mean age = 15.3 ± 0.3 yr. EDI subscales pertaining to personality characteristics not shown.

* $P < 0.01$, preadolescent vs. adolescent IDDM patients.

† $P < 0.01$, preadolescent vs. adolescent control subjects.

‡ $P < 0.001$, preadolescent vs. adolescent IDDM patients.

§ $P < 0.001$, preadolescent vs. adolescent control subjects.

‖ $P < 0.01$, IDDM patients vs. control subjects.

Table 5—*Mean DQOL subscales scores and partial correlations of DQOL subscales scores (corrected for BMI) with the EDE total score*

	IDDM PATIENTS					
	ALL (N = 46)		YOUNGER (N = 2618)		OLDER (N = 28)	
	SCORE	PR	SCORE	PR	SCORE	PR
SATISFACTION	1.9 ± 0.6	0.36*	1.7 ± 0.5	0.20	2.2 ± 0.6	0.45*
IMPACT	2.1 ± 0.4	0.11	2.2 ± 0.4	0.39	2.3 ± 0.4	0.11
WORRY:DIABETES	1.8 ± 0.6	0.28	1.6 ± 0.6	0.18	1.9 ± 0.6	0.28
WORRY:SOCIAL	1.8 ± 0.6	0.31	1.6 ± 0.5	0.32	2.0 ± 0.6	0.31*
EDE TOTAL	2.5 ± 2.9		1.1 ± 1.4		3.5 ± 3.1	

Values are means ± SD, except *pr*. DQOL subscale scores may range from 1 (high satisfaction, no impact, no worries) to 5 (low satisfaction, high impact, many worries). EDE total score may range from 0 (no symptoms) to 30 (highly disturbed eating). BMI correlated significantly with each of the DOQL subscales, therefore, partial correlations (*pr*) are reported here.

BMI in both younger ($r = 0.57$, $P < 0.001$) and older ($r = 0.53$, $P < 0.001$) subjects. To illustrate the importance of exploring the reasons underlying certain eating-related attitudes and behaviors for proper assessment of eating pathology, we reanalyzed all EDE items of the restraint subscale (e.g., avoid certain foods). Correct scoring of the EDE requires that the particular attitude or behavior is motivated at least in part by weight or shape concerns—and not exclusively by health concerns (e.g., dietary restrictions because of diabetes) or ideological concerns (e.g., avoidance of meat because of animal rights concerns). Deliberately ignoring this scoring rule, both groups obtained higher scores on restraint, ($X_{DIABETES} = 0.9$, SD = 0.6; $X_{CONTROL} = 0.6$, SD = 0.6), with IDDM patients scoring significantly higher than control subjects ($P < 0.05$).

Diabetes and symptoms of eating disorders

As shown in Table 5, mean scores on the DQOL subscales indicate that our IDDM patients reported feeling satisfied with their quality of life and that their illness and its impact were minimally burdensome. Significant correlations were obtained between the EDE total score and each of the four DQOL subscales, whereas concerns with body image and eating were associated positively with higher perceived impact of IDDM. To determine the relationship between perceived impact of IDDM and eating disorders symptoms, while taking into consideration the colinearity of the DQOL subscales (intercorrelations of DQOL subscales ranged from a low of $r = 0.25$ to a high of $r = 0.70$), a stepwise regression analysis was calculated for each of the two age-groups. (A MANOVA comparing mean DQOL scale scores of younger and older subjects was not significant.) To test for the unique contribution of the DQOL subscales to the EDE total score, the potentially confounding variable of body fatness (BMI) was entered into the model first, followed by the four DQOL subscales as predictors of the EDE total score. For preadolescent IDDM patients, neither BMI nor any of the DQOL subscales met statistical significance criteria for entry into the regression. In contrast, controlling for BMI, a significant positive association was found between satisfaction ($b = 1.01$, SE = 0.4, $P < 0.05$) and the EDE-total score ($R^2 = 0.50$, $P < 0.001$) in the adolescent patients. None of the other DQOL subscale were significant, possibly because of the high intercorrelations of the DQOL subscales.

CONCLUSIONS— This study found significant group differences in subjects' reports of their daily eating habits. The highly regular pattern of meals and snacks reported by IDDM patients is consistent with the dietary recommendations for IDDM. In contrast, IDDM patients and control subjects did not differ on measures of prevalence or severity of eating disorders. This finding is comparable with those of recent studies comparing diabetic and nondiabetic adult men and women (26) and diabetic and nondiabetic adolescents (this issue, Peveler, Fairburn, Boller, and Dunger, p. 1357–61). Our results also are consistent with a large survey study that illustrated how prevalence rates of disordered eating are inflated in adolescent diabetic patients when assessment instruments fail to distinguish dietary restrictions as part of the treatment regimen from dieting for cosmetic reasons (13). Finally, EDI subscale scores of our girls 12–18 yr old are comparable with norms reported for nondiabetic adolescents (40,41). Norms have not yet been published for the EDI-C.

The degree of eating-related pathology was observed to be minimal in both IDDM and nondiabetic groups. Discrepancies between our low rate of eating disorder symptoms and rates reported in earlier studies (11,14,21) may be attributable to differences in the methods used to assess symptoms. Studies using self-report questionnaires typically find considerably higher rates of symptomatology than studies where diagnosis is based on clinical interviews (11,20). In addition, some researchers have suggested that eating disorders may be on the decline (42; R.L. Pyle, unpublished observations). Hence, the lower rates found in more recent studies, compared with earlier reports, may reflect trends in base rates of eating disorders. Also consider the fact that most of our subjects have not reached the peak age of risk for development of an eating disorder (43). We have shown strong age effects for symptoms: of subjects reporting a clinically significant symptom of body image, 85%

were ≥12 yr; of those subjects who reportedly engaged in rigid dieting, all were ≥12 yr old. Although clinical accounts have described cases of preadolescent children with eating disorders (28), our results and those of other epidemiological studies suggest that these are rare exceptions (43). The question remains whether developmental changes, such as increasing autonomy in the daily management of IDDM, leaving home, or entering college or the work force, might promote higher levels of symptomatology, particularly among those IDDM patients who did report profound body image concerns and manipulation of insulin injections. Finally, for many IDDM patients, continuity of medical care was maintained through regular clinic attendance, positive relationships with clinic staff, and family involvement in treatment. Comprehensive and supportive clinical care may serve a protective function as it permits early intervention for patients who acknowledge symptoms. Hence, the unique risks for eating disorders experienced by IDDM patients may be attenuated in patients who participate in on-going medical care.

This study found that patients perceived the impact of their illness as relatively minimal, a result that contrasts with reports describing diabetes and its management as intrusive (16). Our data are very similar, however, to DQOL scores of adolescent IDDM patients reported by the Diabetes Control and Complications Trial group (38). Regression analyses exploring the associations between perceived impact of IDDM and degree of eating disorders symptoms found different results for preadolescent patients and adolescent patients. For younger patients, who reported significantly lower levels of eating pathology than older patients, the DQOL was not correlated significantly with EDE total scores. Given the small number of preadolescent subjects, the power of this analysis is quite limited. In contrast, we found that eating disorder symptoms were related significantly with patients' dissatisfaction with the illness and its management. Our cross-sectional data do not permit a causal interpretation of this relationship. One might argue that IDDM promotes a focus on the body and thus contributes to the development of body-image dissatisfaction. However, the absence of group differences on measures of body esteem challenges this interpretation. Conversely, those patients for whom body image is a concern may feel more burdened by their illness and its management precisely because IDDM requires increased attention to the body.

The relatively small sample size raises questions about whether our data can be generalized. We note that a very high response rate was obtained, suggesting that our sample is representative of the patients seen at the Yale Children's Diabetes Center. Moreover, the close similarity of results on the DQOL scale with data from a representative samples of diabetic adolescents (38) leads us to believe that our sample is comparable with other diabetic samples. A major methodological strength of this study is the careful assessment of eating disorder symptoms. We were able to demonstrate that imprecise assessment of dietary restraint (i.e., confounding food restriction for medical reasons and dieting for cosmetic reasons) resulted in inflated symptom scores among our IDDM patients. Our findings are consistent with other prevalence studies among nondiabetic samples that have shown rigorous diagnostic procedures to result in much lower prevalence data for eating disorders symptoms than those obtained from questionnaire data (20). It is reassuring to note a similar low prevalence of eating disorder symptoms in young IDDM patients, even in face of the added attention paid to dietary issues as part of the treatment regime. However, those patients who did report symptoms may be a high-risk group for poor glycemic control and for the development of an eating disorder and should be followed prospectively.

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