

# Five-Year Prevalence and Persistence of Disturbed Eating Behavior and Eating Disorders in Girls With Type 1 Diabetes

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**D**isturbed eating behavior (DEB), which includes subthreshold and full-syndrome eating disorders (EDs) as well as milder eating disturbances, is more common in girls and women with type 1 diabetes than in their nondiabetic peers (1,2). DEB is associated with poorer metabolic control (1,3) and increased hospitalizations and diabetes-related medical complications (4–7). At baseline of the present study, there were higher rates of DEB in girls with type 1 diabetes 9–13 years of age than in a nondiabetic control group (8 vs. 1%) (8), and baseline DEB persisted in one-half of individuals 1 year later (9). The current brief report summarizes data from baseline to 5-year follow-up.

## RESEARCH DESIGN AND METHODS

— See Colton et al. (8) for a description of methodology. Participants were classified as normal weight, overweight, or obese using the International Obesity Task Force cutoffs for children and adolescents (10), which extrapolate BMI values of 25 and 30 kg/m<sup>2</sup> into the pediatric age range. Rates of DEB and ED were organized by age (in years) at the time of each assessment (Table 1). Point prevalence was calculated as all “cases” of DEB in participants of a particular age/total number assessed at that age. Similar calculations were carried out for point prevalence of ED. Cumulative prevalence includes current and/or past DEB or ED.

**RESULTS** — A total of 126 girls participated at baseline (71.2% participation), 106 at 1 year (84.1%), 88 at 2 years (83.0%), 76 at 3 years (86.4%), and 98 at 5 years (77.8%). Girls who dropped out at 5 years were not more likely to have DEB at baseline than those who stayed in the study ( $\chi^2 = 0.18$ , d.f. = 1;  $P = 0.9$ ). Mean age was  $11.8 \pm 1.5$  years at baseline and  $16.5 \pm 1.6$  years at 5 years. Mean BMI was  $20.1 \pm 3.2$  kg/m<sup>2</sup> at baseline and  $24.8 \pm 4.2$  kg/m<sup>2</sup> at 5 years. Mean A1C was  $8.3 \pm 1.1\%$  at baseline and  $8.5 \pm 1.1\%$  at 5 years. At 5 years, 55.1% (54 of 98) of girls were classified as normal weight, 34.7% (34 of 98) as overweight, and 10.2% (10 of 98) as obese.

At 5 years, 49.0% (48 of 98) of participants reported current DEB, 43.9% (43 of 98) active dietary restraint, 6.1% (6 of 98) binge-eating episodes, 3.1% (3 of 98) self-induced vomiting, 3.1% (3 of 98) insulin omission, and 25.5% (25 of 98) intense, excessive exercise for weight control. Thirteen participants (13.3%) met criteria for an ED: three girls had bulimia nervosa, three had an eating disorder not otherwise specified, and seven had a subthreshold ED. A1C was not higher in girls with DEB (8.7 vs. 8.4%;  $t = 1.60$ , d.f. = 91;  $P = 0.11$ ), although there was a trend for higher A1C in those with an ED (9.1 vs. 8.5%;  $t = -1.75$ , d.f. = 91;  $P = 0.08$ ). BMI was higher in those with DEB ( $26.1$  vs.  $23.5$  kg/m<sup>2</sup>;  $t = -3.28$ , d.f. = 96;  $P = 0.001$ ).

Of 126 baseline participants, 64 (50.8%) reported DEB at one or more assessments. At least two assessments are available for 116 of the 126 at baseline (92.1%). Of these 116 girls, 26 (22.4%) had early DEB at baseline and/or at 1-year follow-up, and 90 (77.6%) did not. Of 26 girls, 24 (92.3%) with early DEB also reported DEB at later stages of the study. Of the 90 girls with no early DEB, 35 (38.9%) had DEB at a later assessment, and 55 girls (61.1%) had no DEB detected at any time. DEB was highly persistent over time ( $\chi^2 = 23.0$ ; d.f. = 1;  $P < 0.001$ ).

**CONCLUSIONS** — Using a validated diagnostic interview, one-half of girls reported DEB at some point during this longitudinal study, and early DEB almost universally persisted. The expected relationship between DEB and poorer metabolic control was not evident at 5 years, although there was a trend for higher A1C in individuals with an ED. This offers hope that early intervention might prevent the worsening metabolic control that is often associated with DEB. Low rates of binge eating and deliberate insulin omission may account for this weaker-than-expected association.

Higher BMI and DEB were strongly associated. Higher BMI is associated with dieting in the general population (11,12), and girls and women with type 1 diabetes are, on average, heavier than their peers (13). Although this study did not include a general population comparison group, 44.9% of participants were overweight or obese at 5-year follow-up, approximately twice the rate in the Canadian Community Health Survey (14). This is likely one pathway for increased risk of DEB in individuals with type 1 diabetes.

The relationship between higher weight and DEB presents a management dilemma for clinicians, since both dietary restraint and higher weight are clear risk factors for the development of ED and their negative health consequences. Efforts focused on maintaining weight below the overweight range may increase food and weight preoccupation in vulnerable individuals and may lead paradoxically to reactive overeating and binge

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**Abbreviations:** DEB, disturbed eating behavior; ED, eating disorder.

A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

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Table 1—Point prevalence and cumulative prevalence of DEB and subthreshold/full syndrome EDs by age

Age (years)	N	DEB		ED	
		Point prevalence	Cumulative prevalence	Point prevalence	Cumulative prevalence
9	19	1 (5.3)	1 (5.3)	0 (0)	0 (0)
10	36	5 (13.9)	5 (13.9)	1 (2.8)	1 (2.8)
11	54	6 (11.1)	7 (13.0)	2 (3.7)	3 (5.6)
12	73	8 (11.0)	10 (13.7)	2 (2.7)	4 (5.5)
13	75	23 (30.7)	26 (34.7)	8 (10.7)	11 (14.7)
14	75	17 (22.7)	30 (40.0)	1 (1.3)	9 (12.0)
15	57	17 (29.8)	23 (40.4)	5 (8.8)	8 (14.0)
16	47	15 (31.9)	24 (51.1)	2 (4.3)	8 (17.0)
17	25	10 (40.0)	13 (52.0)	3 (12.0)	4 (16.0)
18	19	12 (63.2)	14 (73.7)	1 (5.30)	2 (10.5)
19	12	7 (58.3)	8 (66.7)	4 (33.3)	6 (50.0)

Data are n (%) unless otherwise indicated. Point prevalences calculated as all “cases” of DEB in participants of a particular age/total number assessed at that age.

eating. On the other hand, inattention to body weight may fail to reduce the risk associated with an elevated BMI in this population. Screening should start early and occur annually. Clinical approaches should focus on normalizing eating behavior and enhancing self-esteem based on personal attributes unrelated to weight and eating, with a low threshold for referral for specialized ED services.

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