

# Disordered eating attitudes and behaviours in teenaged girls: a school-based study

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## Abstract

**Background:** Disordered eating attitudes and behaviours are common in older teens and young women in Western countries. Recent evidence suggests that the prevalence of these disorders is rising and that the age of onset has fallen. In the present study, disturbed eating attitudes and behaviours were evaluated in a large school-based population in Ontario in order to determine their prevalence and demographic distribution.

**Methods:** Females, aged 12–18 years, from schools in Toronto, Hamilton and Ottawa were invited to complete questionnaires, including 3 subscales of the Eating Disorder Inventory (Drive for Thinness, Body Dissatisfaction, Bulimia), the Eating Attitudes Test-26 (EAT-26) and the Diagnostic Survey for Eating Disorders (DSED).

**Results:** Questionnaires were completed by 1739 (70%) of the 2483 adolescent females who were approached. The mean age of subjects in the sample was 14.6 (standard deviation 1.9) years. Thirteen percent of those aged 12–14 years and 16% of those aged 15–18 years had scores above the recommended cut-off ( $\geq 20$ ) for disordered eating on the EAT-26. Current dieting to lose weight was reported by 23% of participants. Binge eating with associated loss of control was reported by 15% of participants, self-induced vomiting by 8.2% and the use of diet pills by 2.4%. Laxative and diuretic misuse were uncommon. Dieting was associated with an increased risk of binge-eating and purging behaviours. Older age and body mass index in the highest quartile were independently related to symptoms of eating disorders.

**Interpretation:** Disordered eating attitudes and behaviours were present in over 27% of girls aged 12–18 years and were seen to increase gradually throughout adolescence. Prevention programs to diminish the progression and impact of these disorders should be implemented and assessed.

The female adolescent years are often associated with weight and shape concerns and with disordered eating behaviour in Western countries, in which a thin body is considered desirable.<sup>1,2</sup> Many young women in Canada report feeling dissatisfied with their weight and want to lose weight. In one study, it was found that, by the age of 18 years, 80% of girls of normal height and weight reported that they would like to weigh less.<sup>3</sup> Although most of these attitudes and weight loss behaviours are often benign, their presence can still carry significant psychological and medical risks<sup>3–7</sup> and are associated with an increased subsequent risk of clinical eating disorders.<sup>8,9</sup> Furthermore, disordered eating behaviours are associated with an increased risk of other health-compromising behaviours, such as smoking, alcohol and drug use, depression and suicide.<sup>3,6,10–12</sup>

The evaluation of disordered eating attitudes and behaviours in nonclinical samples is necessary to monitor and track trends and changes in prevalence and to assist in the development and planning of preventive and treatment programs. Recent evidence from the United States and Europe suggests that disordered eating behaviours may be increasing in prevalence,<sup>10,13,14</sup> and it has been suggested that the age of

## Research

## Recherche

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onset of these disorders may be decreasing.<sup>10,15-17</sup> However, prevalence figures from such research have varied widely depending on the methodology employed and the sample studied. In addition, most studies have considered older adolescents and young adults rather than the full adolescent age spectrum.

The present cross-sectional study was designed to assess the prevalence of disordered eating attitudes and behaviours in a large school-based population in Ontario.

## Methods

We invited 2483 female students, aged 12–18 years, from junior high and high schools in Toronto, Ottawa and Hamilton to participate in a confidential, cross-sectional self-report study of eating attitudes and behaviour. Individual schools were identified, based on their location and number of students, and the principals of the schools were approached by the school board's research coordinator. Schools in which studies were already taking place or who reported that they were short staffed were not approached. In total, 5 schools in Ottawa (including one rural, one suburban, 2 central and one private school), 4 schools in Hamilton (distributed across the city) and 9 schools in the Greater Toronto Area (1 rural, 4 suburban and 4 central) participated in the study. Principals or administrative staff at each school provided a list of classes. Girls were introduced to the study either during homeroom class (the boys were excused) or at a general assembly, for which they were excused from class. In some cases, girls were recruited from specific classes. In order to prevent any sampling bias, we only included classes that were mandatory for all girls. Consent and demographic forms were distributed to be signed and completed by the students and by their parents, if the students were less than 18 years of age (as required by the school boards). All participants completed a self-report screening package, which included the 3 core subscales of the Eating Disorder Inventory (EDI),<sup>18</sup> the Eating Attitudes Test-26 (EAT-26)<sup>19</sup> and the Diagnostic Survey for Eating Disorders (DSED).<sup>20</sup> Before they filled out the survey, all participants were provided with a clear definition of dieting and binge eating and a description of what was meant by self-induced vomiting and diuretic and diet pill use. Body mass index (BMI) was calculated ( $\text{kg}/\text{m}^2$ ), based on self-reported height and weight, and was entered into the regression models in quartiles, based on the distribution within each age group. Socioeconomic status (SES) was based on Statistics Canada Income Tax and Postal Code data. The study protocol was approved by the scientific review committees at the participating school boards. Participants were informed that the results were confidential.

## Measures

The EDI, EAT-26 and DSED are widely used and accepted standardized self-report measures of symptoms and concerns characteristic of eating disorders and have been shown to be reliable and valid screening measures for eating disorders.<sup>18-21</sup> The EDI is the most widely used standardized self-report instrument for the assessment of specific eating attitudes and behaviour. Reliability as well as construct, convergent and discriminant validity have been demonstrated for the EDI in its use on repeated occasions, which have included use with adolescent populations.<sup>18,21</sup> The 3 core subscales of the EDI (Drive for Thinness, Body Dissatisfaction and Bulimia) were used for this study. The EAT-26 assesses a broad

range of symptoms and provides a total score for disturbed eating attitudes and behaviour. The EAT-26 has acceptable criterion-related validity by significantly predicting group membership; the reliability (internal consistency) of the EAT-26 is high ( $\alpha = 0.90$  for the anorexia nervosa group).<sup>19</sup> Total scores on the EAT-26 are derived as a sum of the composite items, ranging from 0 to 78. Scores that are greater than or equal to 20 on the EAT-26 are frequently associated with abnormal eating attitudes and behaviour and may identify those with an eating disorder.<sup>19</sup> The DSED is a self-report questionnaire that allows the frequency of disturbed behaviour to be quantified.<sup>20</sup> The DSED was not developed as a scaled instrument but, rather, to provide a standardized format for the collection of information, including information about eating and purging behaviours. Despite having been widely used, the reliability of the DSED has not been reported, in part, because the self-reported eating and purging behaviours that are assessed can be relatively changeable over time.

## Statistical analysis

$\chi^2$  analyses with the Yates correction for continuity were used to compare the prevalence of disordered eating behaviour among the 3 city sites and the 2 age groups (of girls aged 12-14 years and those aged 15-18 years). Normally distributed continuous variables (e.g., age, BMI) were compared using Student's *t*-test and ANOVA. Nonnormal data (EDI subscales, and EAT-26 scores) were transformed logarithmically and compared using independent *t*-tests and ANOVA. Post hoc tests (Scheffé's method) were conducted when significant effects were found. Multiple linear regression models were tested for each disordered-eating variable (EDI subscales, EAT-26, bingeing, purging, dieting) with BMI quartiles, age and SES as predictors of disordered eating.

## Results

Of the 2483 eligible girls, 1829 (74%) returned signed consent forms and agreed to take part in the study; 301 refused to participate (12%) and 353 (14%) did not return their consent forms and were considered to be nonparticipants. Ninety girls were absent or could not participate because of school tests on the day we administered the self-report survey. Screening data were collected from 1739 girls (70%) (Toronto  $n = 655$ ; Ottawa  $n = 680$ ; Hamilton  $n = 404$ ).

Characteristics of the sample are presented in Table 1. The mean age of subjects in the sample was 14.6 (standard deviation 1.9) years. As expected, BMI increased with age, and most subjects were postmenarcheal (86%). There were no significant differences among the 3 sites in the demographic characteristics of the subjects or in their responses on the self-report measures.

## Disordered eating attitudes

The breakdown of the mean EAT-26 and EDI subscale scores according to age is presented in Table 2. There were significant increases in the Drive for Thinness ( $p < 0.001$ ), Body Dissatisfaction ( $p < 0.001$ ), and Bulimia ( $p = 0.004$ )

subscales with age. EDI subscale and EAT-26 total scores were significantly higher in the teens aged 15–18 years compared with those aged 12–14 years ( $p < 0.001$ ). Fourteen percent of the total sample, 13% of those under age of 15 years and 16% of those aged 15–18 years ( $p = 0.05$ ) had scores above the recommended cut-off of 20 on the EAT-26 (Fig. 1).

Subjects who completed the DSED were asked to rate how they felt about their weight on a 5-point scale. In total, 38% of the respondents reported feeling a bit or very overweight, including 33% of girls under 15 years of age and 44% of the older girls ( $p = 0.01$ ). Forty-seven percent of the girls reported feeling a bit or very unhappy about their

weight, including 43% of girls under 15 years and 52% of girls aged 15 years and over ( $p = 0.01$ ).

### Disordered eating behaviour

The disordered eating behaviour reported on the DSED is presented in Table 3. Current dieting to lose weight was reported by 23% of participants. Binge eating, with associated loss of control, was reported by 15% of participants, self-induced vomiting by 8.2%, diet pills by 2.4%, laxative misuse by 1.1% and diuretics by 0.6%. Dieting ( $p < 0.001$ ), binge eating ( $p = 0.001$ ) and purging ( $p = 0.014$ ) increased significantly with age. Binge eating or purging was reported by 18.8% of girls under the age of 15 years and 26.3% of those aged 15 years and older. A total of 4.9% of the total sample reported currently engaging in binge eating or purging, or both, at a frequency of twice a week or more, which is a frequency consistent with a diagnosis of bulimia nervosa, as described in the *Diagnostic and Statistical Manual for Mental Disorders (DSM-IV)*.<sup>22</sup>

Respondents who were currently on a diet were 3.3 times more likely to report binge eating than girls who were not dieting and were 5.7 times more likely to report purging. Only 1.6% of the total sample reported having ever received an evaluation or treatment, or both, for disordered eating attitudes or behaviours, or both. Furthermore, only 4% of the girls who reported current binge eating and 6% of girls who were purging had ever received any assessment or treatment for these problems.

### Multivariate associations of symptoms of eating disorders

In a model that included BMI quartiles, age and SES, very small, yet significant, positive main effects were found for BMI quartiles and age independently for all EDI subscales: Drive for Thinness ( $R^2 = 0.09$ ,  $p < 0.001$ ); Body Dissatisfaction ( $R^2 = 0.43$ ,  $p < 0.001$ ) and Bulimia ( $R^2 = 0.02$ ,  $p < 0.001$ ). BMI quartile was the only significant predictor of EAT-26 scores ( $R^2 = 0.02$ ,  $p < 0.001$ ). In

**Table 1: Characteristics of the study participants (n = 1739)**

Characteristic	No. (and %) of study participants	Mean BMI* (and SD)
Age, yr		
12	266 (15.3)	19.1 (3.5)
13	344 (19.8)	19.8 (3.0)
14	327 (18.8)	20.3 (3.1)
15	232 (13.3)	21.2 (3.3)
16	195 (11.2)	21.1 (3.2)
17	191 (11.0)	21.7 (3.5)
18	184 (10.6)	21.4 (2.9)
Socioeconomic status†		
I (\$15 000–24 999)	10 (0.7)	
II (\$25 000–34 999)	107 (7.2)	
III (\$35 000–49 999)	422 (28.3)	
IV (\$50 000–74 999)	649 (43.5)	
V (\$75 000–99 999)	247 (16.5)	
VI ( $\geq$ \$100 000)	58 (3.9)	
Pubertal status		
Prepubertal	247 (14.2)	
Postpubertal	1492 (85.8)	

Note: BMI = body mass index, SD = standard deviation.

\*BMI was calculated as weight (kg) divided by height (m)<sup>2</sup>.

†Socioeconomic status (SES) was based on Statistics Canada Income Tax and Postal Code data about family income for the 1493 subjects who returned the forms pertaining to demographic information.

**Table 2: Participants' scores for EAT-26 and EDI subscales, by age**

Scale	Age, yr; mean score (and SD)							Total
	12	13	14	15	16	17	18	
<b>EAT-26*</b>	8.5 (9.0)	9.5 (10.9)	9.4 (9.4)	11.3 (11.3)	9.9 (9.9)	10.6 (11.3)	9.7 (9.6)	9.7 (10.2)
<b>EDI subscale†</b>								
Drive for thinness	3.8 (5.0)	4.5 (5.7)	4.5 (5.5)	5.8 (6.1)	5.2 (6.2)	5.0 (6.0)	5.0 (6.0)	4.8 (5.8)
Body dissatisfaction	7.9 (7.9)	9.0 (8.3)	9.4 (8.1)	12.8 (8.7)	10.8 (8.7)	11.6 (9.0)	10.8 (8.2)	10.1 (8.5)
Bulimia	0.7 (1.9)	1.3 (2.6)	1.3 (2.2)	1.7 (2.8)	1.4 (2.2)	1.6 (2.9)	1.3 (2.2)	1.3 (2.4)

Note: EAT-26 = Eating Attitudes Test-26,<sup>19</sup> EDI = Eating Disorder Inventory.<sup>18</sup>

\*EAT-26 measures eating and attitudes related to dieting, food preoccupation, bulimia and oral control. It produces scores that range between 0 and 78. A score of 20 or greater, the recommended cut-off for the EAT-26, is frequently associated with abnormal eating attitudes and behaviours and may identify those with an eating disorder.

†The 3 core subscales of the EDI measure specific attitudes related to eating and weight pathology. Scores range from 0 to 21 on the Drive for Thinness and Bulimia subscales and 0 to 27 on the Body Dissatisfaction subscale. The EDI does not have cutoff scores that are used to indicate abnormal behaviours.

addition, age and BMI quartile were significantly associated with dieting ( $R^2 = 0.05$ ,  $p < 0.001$ ) and binge eating ( $R^2 = 0.03$ ,  $p = 0.001$ ). Age, but not BMI quartile, was associated with purging behaviour ( $R^2 = 0.003$ ,  $p = 0.05$ ). SES did not improve reliably the coefficient of determination for multivariate analysis ( $R^2$ ) for any attitudinal or behavioural variables.

## Interpretation

Our data indicate that an alarming number of Ontario schoolgirls report disordered attitudes about food and weight and unhealthy weight loss behaviour. Significant symptoms of eating disorders, reflected in EAT-26 scores of above 20 and bingeing or purging, or both, were reported by 27% of girls aged 12–18 years. Whereas dieting was the most prevalent weight loss behaviour, other unhealthy weight loss behaviours such as self-induced vomiting were also common. In addition, dieting, binge eating and purging overlapped significantly.

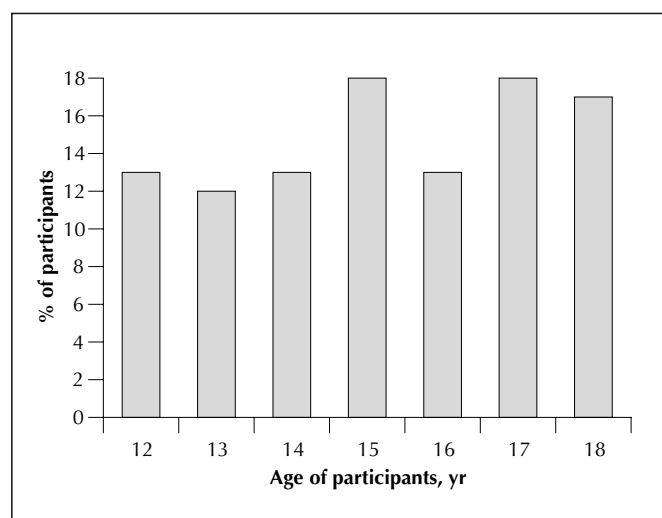


Fig. 1: Percentage of participants with an EAT-26 score above the recommended cut-off of 20.<sup>19</sup>

In the present study, disordered eating attitudes (as measured by the EDI and EAT-26) and behaviours such as dieting, bingeing and purging were found to increase gradually throughout adolescence, which is a finding consistent with other studies.<sup>23</sup> However, the number of girls who were already engaging in severely disordered behaviours at the ages of 12, 13 and 14 years was striking. Twelve percent of girls aged 12–14 years reported binge-eating episodes in the previous month, and almost 7% of this age group reported self-inducing vomiting to lose weight. By the age of 15 years, disordered eating attitudes and behaviours were as frequent as those reported in older high-risk groups, such as college and university students.<sup>24</sup>

The present study indicates that most teenaged girls with disordered eating behaviours, even those who are inducing vomiting or taking diet pills, are not evaluated or treated for these problems. Current treatment programs for established eating disorders are not a realistic or adequate response to this widespread public health problem, in view of the limited resources available to treat “full-syndrome” eating disorders and the tendency for such disorders to become chronic and resistant to treatment.<sup>25</sup>

Over the past several decades, researchers and clinicians have argued for the need to shift away from the traditional medical treatment model to a public health model that focuses on primary and secondary prevention and the development and implementation of appropriate public policies.<sup>26</sup> However, until recently, very little empirical research on prevention has been reported, and many of the programs have typically consisted of curriculum-based didactic sessions focused on giving girls information about eating disorders, warning about the dangers of unhealthy weight loss behaviours and encouraging healthy eating and exercise. Although providing information does appear to increase knowledge, these programs do not engage participants emotionally and appear to do little to change or prevent unhealthy attitudes and behaviours.<sup>27–29</sup> New interactive and student-centred approaches, which focus on self-esteem and are based on contemporary theories of female development, appear to be promising. These interventions

Table 3: Participants' self-reported behaviour using the DSED, by age

DSED variable	Age, yr; no. (and %) of participants							Total
	12	13	14	15	16	17	18	
Dieting for weight loss	41 (16)	57 (17)	76 (24)	76 (33)	47 (24)	50 (27)	44 (24)	391 (23)
Binge eating (loss of control)	25 (9)	37 (11)	51 (16)	52 (22)	29 (15)	33 (17)	34 (19)	261 (15)
Self-induced vomiting	15 (6)	29 (8)	19 (6)	26 (11)	19 (10)	21 (11)	13 (7)	142 (8)
Use of diet pills	3 (1.1)	7 (2.0)	9 (2.8)	9 (3.9)	6 (3.1)	5 (2.6)	2 (1.1)	41 (2.4)
Use of laxatives	1 (0.4)	4 (1.2)	0 (0)	5 (2.2)	3 (1.5)	2 (1.0)	4 (2.2)	19 (1.1)
Use of diuretics	1 (0.4)	3 (0.9)	1 (0.3)	2 (0.9)	1 (0.5)	2 (1.0)	1 (0.5)	11 (0.6)

Note: DSED = Diagnostic Survey for Eating Disorders.<sup>20</sup> The DSED is a standardized instrument used to gather information on dieting, binge eating and purging behaviours.



focus on the positive aspects of the self and validate girls' experiences and feelings, while providing them with an understanding of the societal pressures that they face.<sup>30,31</sup>

Although there is no clearly established effective method of prevention, it is essential that we increase awareness in professionals so that every opportunity is taken to screen or intervene, or both, and to promote positive feelings about the body. Family practitioners and pediatricians can play an important role in the prevention and detection of unhealthy eating attitudes and behaviours and associated complications.<sup>10,32</sup> Nonjudgemental questions regarding body image and eating attitudes and behaviour can allow these problems to be detected in the primary care setting. Unfortunately, most physicians do not regularly screen for eating disorders,<sup>33</sup> although the present study suggests that disordered eating attitudes and behaviours are sufficiently common, at least in Canadian adolescent females, to warrant such routine inquiry.

In the present study, SES was not significantly associated with disturbed eating attitudes or behaviour. This finding, which is consistent with reports from the past 2 decades,<sup>34,35</sup> probably reflects the pervasive influence of the media on all SES groups. Age and BMI were independently associated with disturbed eating attitudes and behaviours, as has been found in previous studies.<sup>35,36</sup> This association between BMI and eating disturbances suggests a potential link between disordered eating and overweight. In a recent Canadian study, the prevalence of obesity in children was shown to have doubled over the past 20 years.<sup>37</sup> This growing disparity between what is considered to be the "ideal" body shape and the reality of the body shape of most girls may be responsible for the increased prevalence of dieting in Western cultures. Although weight loss strategies may seem desirable for overweight females, they are often ineffective and may actually result in weight gain and eating disturbances. Indeed, dietary restraint, exercise, diet pills and the use of laxatives to achieve weight loss are all associated with an increased risk of obesity.<sup>38</sup> Binge eating has also been shown to result in weight gain and increased risk of obesity,<sup>39</sup> suggesting that disordered eating and increased BMI may be mutually exacerbating.

Limitations of the present study include its cross-sectional design that cannot assess the progression of symptoms over time and the absence of structured diagnostic interviews to diagnose eating disorders. Self-report measures, which have been used in the present study, may lead to underreporting or to underestimation of symptoms of eating disorders. BMI was assessed using self-report data, which, it has been suggested, may result in an underestimation of BMI in adolescent females. Although this self-report bias may have underestimated BMI in the present study, we expect that the magnitude of overreporting or underreporting of height or weight, or both, would probably be small. SES was derived from Statistics Canada postal walk income data that are considered to be a fairly good estimate of SES, however, they are based on averages within neighborhoods

and are not specific to each household. Finally, although the response rate of 70% in the present study is relatively high, the possibility of volunteer bias cannot be excluded.

The present study indicates that disordered eating attitudes and behaviours are present in more than one-quarter of Ontario schoolgirls, particularly those with higher BMI values. Although these attitudes and behaviours were more common in older teenaged girls, they were also reported by 20% of those aged 12–14 years. The latter represent a group, in addition to those with high BMI values, who may benefit from primary prevention and early intervention measures. The data from this study suggest that girls should be screened for eating disturbances before they enter middle school and targeted for primary and secondary preventive interventions.

*Competing interests:* None declared.

*Contributors:* Dr. Jones was the lead investigator and headed the development of the project, collected and analyzed the data, and drafted the manuscript. Dr. Bennett assisted in the development of the project, collection of the data and revisions of the draft manuscript. Drs. Olmsted and Lawson contributed to the development of the study, reviewed the statistical analyses and made revisions to the draft manuscript. Dr. Rodin supervised Dr. Jones and helped with the development of the project and the writing of the manuscript.

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