

Pursuit of Thinness and Onset of Eating Disorder Symptoms in a Community Sample of Adolescent Girls: A Three-Year Prospective Analysis

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Community-based prospective studies are needed to shed light on mechanisms that may influence development of eating disorders and identify variables that could serve as potential targets for prevention efforts. In this paper we examine level of weight preoccupation and other variables prospectively associated with age of onset of eating disorder symptoms over a 3-year interval in a community sample (N = 939) of young adolescent girls. 3.6% (32/887) experienced onset of symptoms over the interval. Only one factor, a measure of Weight Concerns, was significantly associated with onset ($p < .001$). Girls scoring in the highest quartile on the measure of Weight Concerns had the shortest survival time (12% incidence by age 14.5) and those scoring in the lowest quartile had the highest survival time (2% incidence by age 14.5; $p < .001$). This finding is consistent with both theoretical and clinical perspectives and represents one of the first prospective demonstrations of a linkage between weight and body shape concerns and later onset of eating disorder symptoms. An understanding of the independent variables that predispose girls to development of symptoms is a useful step towards the

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establishment of a rational basis for the choice of a prevention intervention target. © 1994 by John Wiley & Sons, Inc.

Eating disorders have become an important public health concern (Herzog & Copeland, 1985). As a result, organizations such as the American College of Physicians (ACP) and several groups of investigators have called for public education and early intervention to prevent the acquisition of disordered eating behaviors and to promote healthful weight regulation practices among children and adolescents (ACP, 1986; Shisslak & Crago, 1987; Striegel-Moore, Silberstein, & Rodin, 1986; Wadden & Stunkard, 1985). However, our current appreciation of the variables and mechanisms that may influence the development of eating disorders is limited (Agras & Kirkley, 1986; Fairburn & Beglin, 1990; Strober, 1986). Longitudinal research with community samples is needed to shed light on mechanisms that may influence development of eating disorder symptoms and to identify variables that could serve as potential targets for prevention efforts (Fairburn & Beglin, 1990).

Social learning accounts of the processes governing development of eating disorders have become increasingly prominent (Agras & Kirkley, 1986; Strober, 1986). In general, the line of reasoning suggested by social learning explanations implicates prevailing social and cultural norms in the development of eating disorders. In particular, it is suggested that the current cultural preoccupation with thinness may promote the expression of symptoms in adolescents who are vulnerable (Garner & Garfinkle, 1980; Kog, Vandereycken, & Vertommen, 1985; Pike & Rodin, 1991; Striegel-Moore et al., 1986).

A diverse body of evidence can be marshalled in support of the assertion that a thin body type has been embraced as the cultural ideal for females (Garner, Garfinkle, & Olmstead, 1983). For example, Gray (1977) found that although 38% of her sample of college females were statistically underweight, only 5% believed their weight to be below average. In our own research, 33% of 10th-grade females judged themselves to be overweight or very overweight when in fact their weight was well within normal parameters for their height and age (Killen et al., 1986). In a recent report, 30% of 9-year-olds reported worrying that they were too fat now or feared becoming fat in the future (Mellin, Irwin, & Scully, 1992). However, as Strober (1986) has suggested, although weight preoccupation and attendant behaviors such as dieting may be pandemic among girls and women, comparatively few go on to develop severe, full-blown, eating disorders. At present, it is unclear whether or how culturally induced preoccupations with thinness may serve as important precursors of eating disorders.

This paper presents our efforts to explore in prospective fashion potential precursors of eating disorder symptoms in a community sample of young adolescent girls. Specifically, we relate the onset of eating disorder symptoms over a 3-year period to level of weight preoccupation and additional variables that are both of theoretical and clinical interest in aiding our understanding of the processes that influence the development of eating disorders.

METHOD

Subjects

All sixth and seventh-grade girls ($N = 967$) enrolled in four northern California middle schools were eligible to participate in the study. A subset also participated in an exper-

imental prevention intervention. The study was approved by the Standard University School of Medicine Committee for the Protection of Human Subjects in Research. Demographic characteristics are presented in Table 1. Of those eligible, 939 (97%) participated. Of those not participating, 19 students refused and the remainder were absent during scheduled assessments.

Procedure

Baseline and follow-up assessments were carried out by staff trained by the principal investigators. In order to ensure confidentiality, students were assigned a special identification number for tracking purposes. Each survey contained two cover sheets, the first with a label printed with the student's name and ID number and the second with a label containing only the ID number. Students were instructed to destroy the first cover sheet once they received the survey so that only the cover with the ID number alone would remain.

Independent Variables Assessed at Baseline and Follow-ups

Weight Concerns

A social learning analysis suggests that our society's preoccupation with thinness may promote the expression of eating disorder symptoms in adolescents who are vulnerable. We therefore chose to develop items that might tap various aspects of individuals' preoccupation with thinness and body shape. Specifically, items designed to ascertain subjects' fear of weight gain, worry over weight and body shape, importance of weight, diet history, and perceived fatness were developed and included in the set of independent variables used in the analyses.

Eating Disorder Inventory (EDI)

The EDI is designed to assess a variety of psychological and behavioral characteristics common in anorexia nervosa and bulimia nervosa (Garner, Olmstead, & Polivy, 1983). The self-report instrument consists of eight subscales. Two of the scales (Drive for Thinness, Body Dissatisfaction) are designed to characterize the level of preoccupation with weight, excessive concern with dieting, dissatisfaction with body shape, and pursuit of thinness. The Bulimia subscale assesses tendencies to think about and to engage in binge eating; the Interpersonal Distrust subscale assesses reluctance to express

Table 1. Characteristics of the study sample at baseline

Mean age at baseline	12.4 (SD = .72)
Ethnicity	
White	40.6%
Hispanic/Latino	22.8%
Asian (Cambodian, Vietnamese, Chinese, Japanese, Thai)	19.7%
Pacific Islander	3.2%
Black	3.6%
Native American	2.6%
Other	7.5%
Parental education (% receiving at least some college)	
Mother	49.7%
Father	58.3%

thoughts or feelings and to form personal relationships; the Ineffectiveness subscale taps feelings of worthlessness and insecurity; the Perfectionism scale assesses the eating disorder sufferers' tendency to set unrealistic performance standards; Interoceptive Awareness measures inability to recognize emotions; and the Maturity Fears subscale measures the degree to which one wishes to avoid adulthood and its attendant demands. For the analyses reported in this paper, we transformed the EDI scores to provide uniform score ranges for the subscales.

Dietary Restraint

Dietary restraint was measured using the revised Restraint scale developed by Herman, Polivy, Pliner and Threlkeld (1978). The instrument yields a total score and two subscale scores: Weight Fluctuation (WF) and Concern for Dieting (CD).

Pubertal Development

Research indicates that at each successive stage of pubertal development in females there is increasing dissatisfaction with one's body and increasing desire to be thinner (Brooks-Gunn & Peterson, 1983). Disordered eating practices may be adopted, in part, in an attempt to combat weight gain and changes in body shape and fat distribution associated with pubertal development (Killen et al., 1992).

Stage of sexual maturation was determined using the method of Duke, Litt, and Gross (1980). Students were given line drawings (with accompanying written descriptions) of the five stages of pubic hair and breast development described by Tanner (1962; Tanner stages). Girls were instructed to choose drawings that most accurately reflected their own stage of development. Among the subjects reported here, pubic hair and breast stages were closely correlated at baseline (Spearman correlation coefficient = 0.62, $p < .001$) and the mean (rounded up to the next integer) of the two stages, defined as the sexual maturity index (SMI) used for data analyses (Wilson, Kraemer, & Ritter, 1987).

Height

Standing height was measured to the nearest millimeter using a portable direct reading stadiometer. Students were measured with shoes removed and the body positioned such that the heels and buttocks were against the vertical support of the stadiometer and the head aligned so that the auditory canal and the lower rim of the orbit were in a horizontal plane. Two measures of height were obtained and the average used in data analyses.

Weight

Body weight was determined to the nearest 0.1 kg using digital scales with the subjects wearing light indoor clothing without shoes or coats. Two measures of weight were obtained and the average used in data analyses.

Body Mass Index

BMI was computed from the formula kg/m^2 , which is generally considered to be the preferred index of relative body weight as a reflection of adiposity (Kraemer, Berkowitz, & Hammer, 1990). Other weight-to-height ratios tend to be highly correlated with height and thus are contaminated measures of obesity. Unlike body density, total body water, total body potassium, and other laboratory measures, BMI is obtained noninvasively and is therefore more accessible. Unlike skinfold measures, height and weight are measured routinely in medical practice.

Behavior Problem Scales

Students completed items comprising the Aggressive and Unpopular subscales of the Youth Self-Report Inventory (YSR). The YSR is an empirically based assessment designed to obtain self-reports from youths aged 11 to 18 years on a variety of personal competencies and problem behaviors (Achenbach & Edelbrock, 1987). The subscales chosen for inclusion in this study are of theoretical and practical interest in the study of eating disorders.

Principal Components Analysis with Independent Variables

Principal components analysis was conducted to reduce redundancy in the set of independent variables described above. The analysis revealed that the Drive for Thinness and Body Dissatisfaction subscales of the EDI were highly correlated. Therefore these subscales were combined and treated as one independent variable that we designated as the combined Drive for Thinness/Body Dissatisfaction scale. The Ineffectiveness, Interpersonal Distrust, and Interoceptive Awareness subscales of the EDI were also associated and thus treated as one independent variable that we designated as the combined IN/ID/IA scale. The items developed to tap cultural preoccupation with thinness and body shape and weight (i.e., fear of weight gain, worry over weight and body shape, importance of weight, diet history, perceived fatness) were highly correlated as well, and were combined into one variable that we designated as Weight Concerns (see Table 2).

In summary, the following set of independent variables were used in subsequent analyses: (1) EDI: combined Drive for Thinness/Body Dissatisfaction scales; (2) EDI: Bulimia scale; (3) EDI: Perfectionism scale; (4) EDI: Maturity Fears scale; (5) EDI: combined IN/ID/IA; (6) Restraint: Concern for Dieting; (7) Restraint: Weight Fluctuation; (8) Weight Concerns; (9) YSR: Unpopular; (10) YSR: Aggressive; (11) BMI; (12) SMI.

Although Restraint, the combined Drive for Thinness/Body Dissatisfaction scale, and our measure of Weight Concerns were appreciably correlated (r s range from .43 to .72) all were retained as independent variables in subsequent analyses. Restraint and the combined Drive for Thinness/Body Dissatisfaction variables were retained because extensive research has been conducted with these variables. The Weight Concerns variable was included because, compared with the others, it has been demonstrated in previous research to be an optimally efficient measure of high risk status for eating disorder symptoms (Killen et al., 1993) and is far simpler to administer and score than the EDI.

Stability of Independent Variables

Stability coefficients (Spearman) for the EDI subscales were obtained 18 weeks apart. Excellent stability was obtained for the combined Drive for Thinness/Body Dissatisfaction scale ($r = .74$) and for the combined IN/ID/IA ($r = .69$). Moderate stability was obtained for Perfectionism ($r = .57$), Maturity Fears ($r = .47$), and Bulimia ($r = .45$).

Excellent stability was obtained (7-month interval) for the measure of Weight Concerns ($r = .71$), Restraint: Concern for Dieting subscale ($r = .61$), and the Aggressive subscale of the YSR ($r = .63$). Moderate stability was obtained for Restraint: Weight Fluctuation ($r = .48$) and the Unpopular subscale of the YSR ($r = .54$). A 7-month interval to assess stability for these variables was used because these variables were not administered at 18 weeks.

Table 2. Weight concerns

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1. How much more or less do you feel you worry about your weight and body shape than other girls your age?
 1. I worry a lot less than other girls
 2. I worry a little less than other girls
 3. I worry about the same as other girls
 4. I worry a little more than other girls
 5. I worry a lot more than other girls
 2. How afraid are you of gaining 3 lbs?
 1. Not afraid of gaining
 2. Slightly afraid of gaining
 3. Moderately afraid of gaining
 4. Very afraid of gaining
 5. Terrified of gaining
 3. When was the last time you went on a diet?
 1. I've never been on a diet
 2. I was on a diet about 1 year ago
 3. I was on a diet about 6 months ago
 4. I was on a diet about 3 months ago
 5. I was on a diet about 1 month ago
 6. I was on a diet less than 1 month ago
 7. I'm now on a diet
 4. Compared to other things in your life, how important is your weight to you?
 1. My weight is not important compared to other things in my life
 2. My weight is a little more important than some other things
 3. My weight is more important than most, but not all, things in my life
 4. My weight is the most important thing in my life
 5. Do you ever feel fat?
 1. Never
 2. Rarely
 3. Sometimes
 4. Often
 5. Always
-

Dependent Variable: Classification of Girls as Symptomatic

Girls were classified as symptomatic based on their response to questions that were developed to assess binge eating, compensatory behaviors for the prevention of weight gain, overconcern with weight and bodyshape, and loss of control during episodes of binge eating.

Binge eating was assessed with the following question: How often do you go on an eating binge? [response choices ranged from (1) I don't binge eat to (7) I binge eat about once per day or more].

The following compensatory behaviors, employed specifically for the prevention of weight gain, were assessed: dieting and diet pill use, fasting and exercise, vomiting, laxative use, diuretic use, and ipecac use. Response choices ranged from (1) I never to (7) Every day.

Overconcern with weight and body shape was assessed with the following question:

Compared to other things in your life, how important is weight to you? [response choices ranged from (1) My weight is not important compared to other things in my life to (4) My weight is the most important thing in my life].

Perceived loss of control during binge eating episodes was assessed with the question: When you go on an eating binge, how confident are you that you can stop eating whenever you want to stop? [response choices ranged from (1) I don't binge eat to (5) I usually feel totally out of control].

Girls classified as symptomatic based on responses to the questions described above satisfied *all* of the following criteria: (A) Recurrent binge eating (binge eating at least once per month), (B) compensatory behavior specifically to prevent weight gain: vomiting or laxatives or diuretics at least once per month or fasting (skipping at least two meals almost every day or every day) or exercise (at least two times per week), and (C) overconcern and preoccupation with body weight and shape ("my weight is more important than most things in my life" or "my weight is the most important thing in my life") or a feeling of lack of control of eating during a binge episode ("I'm usually not very confident that I can stop an eating binge" or "I usually feel totally out of control").

Statistical Analysis

The analysis was focused on the prospective identification of factors associated over a 3-year interval with the onset of eating disorder symptoms as defined above. The analysis is presented in three stages:

Univariate Analysis

We first present descriptive statistics comparing each of the proposed predictor variables between the group that experienced onset during follow-up and the group that did not. The two groups were compared using *t* tests.

Multivariate Testing

All the proposed predictors were then entered into a stepwise Cox proportional hazards model. The model seeks the best combination of variables to predict hazard of onset when the duration of follow-up for the subjects varies as it does in this study. To control for false positive results, a $p < .01$ criterion to enter each additional variable was used.

Multivariate Descriptives

The results of multivariate testing were used to stratify the sample into subgroups likely to show differential age of onset. Survival curves derived using the Kaplan-Meier method were plotted for each stratum. From these curves incidence figures can be obtained within the age span of the subjects in the study.

Of the total sample ($N = 939$), 887 girls were available for our analyses. Of the 52 girls not available, 19 did not provide enough information for classification and 33 were already symptomatic at entry. Because the age of onset of symptoms for these 33 subjects was unknown at study entry they were excluded from longitudinal analyses. For the multivariate testing (which requires complete data on predictor variables) 600 of the 887 available girls provided data. For the multivariate descriptives (which requires complete data only on the significant predictors) 743 of the 887 available girls provided data.

RESULTS

Univariate Analysis

Over the 3-year interval, 3.6% (32/887) became symptomatic as previously defined (13/32 met all DSM-III-R criteria for bulimia nervosa; American Psychiatric Association, 1987). Table 3 presents the frequency distributions of binge eating and compensatory behaviors for the 32 symptomatic girls. Baseline scores on the predictor variables of those who became symptomatic and those who did not are compared in Table 4. It can be seen that there is statistically significant differentiation on the majority of the study variables.

Multivariate Testing

All the factors in Table 2 were considered for inclusion in a stepwise Cox proportional hazards model. Only the measure of Weight Concerns met the standard for statistical significance (parameter estimate = $.03 \pm .01$, $\chi^2 = 12.3$, $p < .001$).

Multivariate Description

Separate survival curves, using the Kaplan-Meier method to handle different follow-up times per subject, were then generated for each quartile of the measure of Weight Concerns. Curves for each quartile are shown in Figure 1. As expected from the statistical significance reported above (Table 2) the groups show different survival [log-rank $\chi^2 = 26.5$, $p < .001$]. Those scoring in the highest quartile on the measure of Weight Concerns ($n = 185$) had the shortest survival time (88% survival rate or 12% incidence by age 14.5 years) whereas those with scores in the lowest quartile ($n = 230$) had the highest survival time (98% survival rate or 2% incidence by age 14.5 years).

DISCUSSION

The measure of Weight Concerns was significantly associated with onset of eating disorder symptoms over a 3-year period in this community sample of young adolescent

Table 3. Frequency distributions of binge eating and compensatory behaviors for symptomatic girls ($N = 32$)

	(4) One to three times every month	(5) Once a week	(6) Two to six times a week	(7) Once a day or more
Binge eating	13	7	5	7
Vomiting to prevent weight gain	1	0	1	1
Use of laxatives or diuretics to prevent weight gain	1	1	0	1
Fasting to prevent weight gain	2	4	1	2
Exercise to prevent weight gain	1	0	17	13

Note. N for compensatory behaviors exceeds 32 because some girls used more than one compensatory behavior to prevent weight gain.

Table 4. Baseline scores for girls who became symptomatic over the study interval and for girls who remained asymptomatic

Variable (range)	Symptomatic (<i>n</i> = 32) ^a <i>M</i> (<i>SD</i>)	Asymptomatic (<i>n</i> = 855) ^a <i>M</i> (<i>SD</i>)	<i>p</i>
Weight Concerns (0–100)	52.4 (27.1)	32.0 (23.1)	<.001
EDI (Drive for Thinness/Body Dissatisfaction) (0–3)	1.3 (0.7)	0.8 (0.6)	<.001
EDI: Bulimia (0–3)	0.2 (0.3)	0.1 (0.3)	<.05
EDI: Perfectionism (0–3)	1.1 (0.7)	0.8 (0.6)	<.01
EDI: (IN/ID/IA) (0–3)	0.6 (0.5)	0.5 (0.4)	<.05
EDI: Maturity Fears (0–3)	0.9 (0.8)	0.7 (0.5)	.06
Body mass index	21.6 (4.1)	20.1 (3.8)	<.05
SMI	3.6 (1.0)	3.5 (0.9)	.50
Restraint (CD) (0–19)	9.1 (3.9)	6.9 (3.3)	<.001
Restraint (WF) (0–16)	3.9 (3.3)	2.9 (2.4)	<.05
YSR: Unpopular (0–22)	6.9 (3.5)	5.6 (3.2)	<.05
YSR: Aggressive (0–34)	10.6 (6.0)	8.4 (5.0)	<.05

Note. EDI = Eating Disorders Inventory; IN = Ineffectiveness; ID = Interpersonal Distrust; IA = Interceptive Awareness; SMI = Sexual Maturity index; CD = Concern for Dieting; WF = Weight Fluctuation; YSR = Youth Self-Report Inventory.

^aMaximum possible *ns*. The *ns* change for each variable due to missing data (range for symptomatics = 29–32; range for asymptomatics = 748–787).

girls. This finding appears consistent with both theoretical and clinical perspectives and represents one of the first prospective demonstrations of a linkage between weight and body shape concerns and later onset of eating disorder symptoms. Patients with eating disorders are characterized by disturbed body image, preoccupation with weight, excessive concern with dieting, dissatisfaction with body shape, and pursuit of thinness. Indeed, these features have been characterized as the core features of both anorexia nervosa and bulimia nervosa (Bruch, 1962; Fairburn, 1987).

Given that weight and shape concerns are core features there is necessarily some overlap between the independent variable and the dependent variable in this study. However, in order to be classified as symptomatic, girls in this study must manifest not only weight and shape concerns but also recurrent binge eating, regular compensatory behaviors, and loss of control. A relatively high proportion of adolescent girls show evidence of some level of weight or shape concerns and even occasional binge eating. However, few go on to develop the full or partial syndrome, which is our focus. In our study, girls who scored highly on the measure of weight concerns but did not otherwise manifest the syndrome at baseline are more likely to develop the syndrome over time. This finding is useful because an understanding of the independent variables that predispose girls to development of the full or partial syndrome provides a rational basis for the choice of a prevention intervention target.

It is interesting that the measure of weight concerns, although substantially correlated with both Restraint and relevant EDI subscales, proved superior in accounting for the onset of symptoms in this study. Although it has been argued that the EDI represents a nonspecific assessment of general psychological dysfunction there is evidence from clinical samples that the subscales that tap core features (Drive for Thinness, Body Dissatisfaction, Bulimia) are specific to those suffering from eating disorders (Cooper, Cooper, & Fairburn, 1985). The task of identifying those at risk for eating disorder symptoms may be substantially enabled if the utility of this simple assessment of weight concerns is upheld in subsequent evaluations.

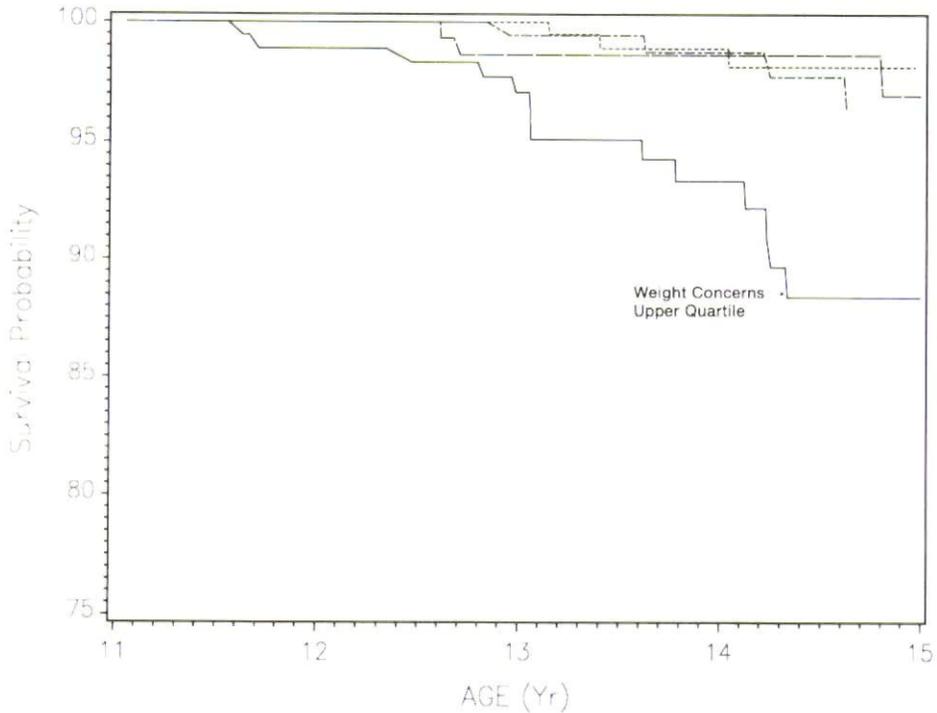


Figure 1. Onset of eating disorder symptoms.

On appearance, it is curious that the Bulimia subscale from the EDI was not associated with onset of symptoms. Certainly, binge eating is a defining feature of bulimia nervosa and frequently manifests as a symptom in anorexia nervosa. At baseline, those in our sample who later became symptomatic did score significantly higher on the Bulimia subscale than their asymptomatic peers. However, some researchers have argued that it is important to determine the quantity or amount of food eaten during a binge when assessing for the presence of eating disorders (Fairburn, 1987). This is because many people will report having overeaten or stuffed themselves when, objectively, their intake would not be considered large (Rosen, Leitenberg, Fisher, & Khazam, 1986). The Bulimia subscale of the EDI does not yield precise estimates of binge eating. Also, by virtue of its assessment of additional dimensions including thoughts about overeating and eating in response to distress, the Bulimia subscale may capture a broader range of phenomena that may have a limited role to play in the development of the full range of eating disorder symptomatology.

The girls in this study are relatively young and only just now entering the age of greatest hazard of eating disorders. For example, few met the full set of DSM-III-R criteria for bulimia nervosa. However, we believe that such symptomatic groups as identified in our sample are deserving of serious examination. Recently, Fairburn and Beglin (1990) argued that a broad spectrum of eating disorders exists in the community. They suggested that there is difficulty in applying accepted diagnostic criteria to subjects in the community because the existing criteria have been derived from the experience of clinicians who see only the small subset of persons who seek treatment for an eating disorder. Further, they emphasized the importance of longitudinal research with com-

munity samples for the identification of risk factors that may serve as targets for prevention and the enhancement of our understanding of psychopathological mechanisms. We quote, “. . . it is our view that it is time for a shift in emphasis away from prevalence per se toward studies of the nature, course, and etiology of the full spectrum of disturbance that exists in the community. Research of this type should broaden and deepen our currently limited understanding of eating disorders” (Fairburn & Beglin, 1990, p. 407).

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