

Disordered Eating and Psychological Well-Being in Overweight and Nonoverweight Adolescents: Secular Trends from 1999 to 2010

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ABSTRACT

Objective: In this research study, we examine how both overweight and nonoverweight adolescent girls and boys fared from 1999 to 2010 in terms of disordered eating behaviors and psychosocial well-being.

Method: A repeated cross-sectional design was used. Participants were recruited from public schools in 1999 ($n = 3072$, mean age = 14.6 ± 1.8) and 2010 ($n = 2793$, mean age = 14.4 ± 2.0). Secular trends were examined by weight status and gender using inverse probability weighting to control for changes in socio-demographics.

Results: In general, the prevalence of disordered eating behaviors and markers of psychosocial well-being among overweight girls and boys remained the same from 1999 to 2010. In contrast, among nonoverweight girls, chronic dieting, unhealthy weight control behaviors, and extreme weight control behaviors decreased, and body satisfaction

improved during this time period. Further, among non-overweight boys, the prevalence of unhealthy and extreme weight control behaviors decreased, as did mean depression scores.

Discussion: Overall, findings indicate a strong need to ensure that messages about the dangers of disordered eating behaviors are reaching overweight youth. Obesity prevention interventions should not overlook the comorbid nature of obesity, disordered eating and poor psychosocial health; prevention programming should address shared risk factors, including dieting, media use, body dissatisfaction, and weight-related teasing. © 2015 Wiley Periodicals,

Keywords: obesity; secular trends; weight control; psychosocial well-being; disordered eating; dieting; adolescents

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Introduction

Disordered eating behaviors^{1,2} and markers of poor psychosocial health, including depression, poor self-esteem, and low body satisfaction are prevalent among adolescents.¹ Further, evidence suggests that the prevalence of disordered eating and markers of poor psychosocial health are higher among overweight adolescents as compared with their nonoverweight peers.^{2–5} Two recently published studies, including one conducted on the

sample analyzed for this study, have explored how adolescents' use of disordered eating behaviors changed over time (i.e., secular trends).^{1,2} Both studies found that the overall prevalence of disordered eating behaviors decreased over observed time periods (trends examined from 1999 to 2009 in one study and from 1999 to 2010 in the other) among adolescent girls, with less consistent trends in boys. While the prevalence of adolescents engaging in disordered eating behaviors remains high, findings from these two studies paint an encouraging picture, suggesting a decrease in the overall prevalence of these behaviors among adolescents over time.

However, these studies did not examine secular trends by weight status. Given the strong public health messages regarding obesity over recent years, it is crucial to determine if and how disordered eating behaviors and psychosocial well-being have changed among overweight youth. In this research study, we examine how both overweight and nonoverweight adolescent girls and

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TABLE 1. Socio-demographic characteristics of 1999 and 2010 nonoverweight (<85th percentile) and overweight (>85th percentile) adolescent study participants

	NonOverweight (<85th percentile)							Overweight (>85th percentile)						
	1999 (n = 1784)		1999 Weighted (n = 1784)		2010 (n = 1646)		<i>p</i> values ^a	1999 (n = 896)		1999 Weighted (n = 896)		2010 (n = 1101)		<i>p</i> values ^b
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%		<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	
Gender	0.942													
Male	887	49.7	812	45.5	747	45.4		423	47.2	436	48.7	535	48.6	
Female	897	50.3	972	54.5	899	54.6		473	52.8	460	51.3	566	51.4	
Ethnicity/race	0.999 ^c													
White	626	35.1	400	22.4	366	22.2		298	33.3	128	14.3	155	14.1	
Black	380	21.3	501	28.1	465	28.3		216	24.1	260	29.0	325	29.5	
Asian	480	26.9	369	20.7	339	20.6		188	21.0	174	19.4	209	19.0	
Hispanic	121	6.8	271	15.2	253	15.4		86	9.6	175	19.5	215	19.5	
Native American	65	3.6	39	2.2	38	2.3		53	5.9	49	5.5	59	5.4	
Mixed/Other	86	4.8	166	9.3	180	10.9		55	4.7	86	9.6	134	12.2	
Not reported	26	1.5	36	2.0	5	0.3		13	1.5	25	2.8	4	0.4	
Socio-economic status	0.999													
Low	373	20.9	633	35.5	586	35.6		212	23.7	375	41.9	472	42.9	
Low-middle	326	18.3	373	20.9	346	21.0		194	21.7	195	21.8	235	21.3	
Middle	441	24.7	308	17.3	282	17.1		233	26.0	149	16.7	182	16.5	
High-middle	316	17.7	251	14.1	229	13.9		147	16.4	95	10.7	116	10.5	
High	241	13.5	163	9.2	151	9.2		76	8.5	41	4.6	49	4.5	
Not reported	87	4.9	56	3.2	52	3.2		34	3.8	40	4.4	47	4.3	
	<i>N</i>	Mean (SD)	<i>N</i>	Mean (SD)	<i>N</i>	Mean (SD)	<i>p</i> values	<i>N</i>	Mean (SD)	<i>N</i>	Mean (SD)	<i>N</i>	Mean (SD)	<i>p</i> values
Age in years	1784	14.7 (1.8)	1784	14.6 (1.8)	1646	14.5 (2.0)	0.455	896	14.5 (1.8)	896	14.3 (1.8)	1101	14.3 (2.0)	0.718

^a*p*-values are presented for differences between the weighted 1999 nonoverweight sample and the 2010 nonoverweight sample; based on χ^2 tests for gender, ethnicity/race, and socio-economic status and *t*-tests for age.

^b*p*-values are presented for differences between the weighted 1999 overweight sample and the 2010 overweight sample (similar tests as above).

^cTest for race combines the "mixed/other" and "not reported" groups.

boys fared from 1999 to 2010 in terms of disordered eating behaviors and psychosocial well-being.

Method

Study Design and Population

A repeated cross-sectional study design was used to compare weight-related variables among adolescents using data collected from in 1999 (Project EAT-I; $n = 3,072$)⁵⁻⁷ and from a new cohort of adolescents in 2010 (EAT 2010; $n = 2,793$).^{2,8,9} Study procedures were approved by the University of Minnesota's Institutional Review Board Human Subjects Committee and by the research boards of the participating school districts. Additional details on data collection have been previously described.^{6,8}

Measures

Survey development was guided by a theoretical framework,^{10,11} expert review, qualitative input from adolescents,¹² and pilot testing. Test-retest reliability was assessed in diverse adolescents at EAT-I ($n = 161$) and at EAT 2010 ($n = 129$); psychometric properties from 2010 are reported below. The subsample utilized for test-retest at EAT 2010 was 70% non-Hispanic white and equally divided on gender.

Disordered Eating Behaviors. Chronic dieting was assessed by asking participants: "How often have you gone on a diet during the last year?". Responses were dichotomized to distinguish chronic dieters indicating, "I am always dieting" from others selecting one of the other response options (Test-retest agreement = 97%).

Unhealthy and extreme weight control behaviors were assessed by asking participants: "Have you done any of the following things to lose weight or keep from gaining weight during the past year?" Endorsement of behaviors (any vs. none) were divided into two categories, unhealthy (fasted, ate very little food, used a food substitute, skipped meals, smoked more cigarettes) and extreme (took diet pills, made myself vomit, used laxatives, used diuretics). (Test-retest agreement = 85% for unhealthy behaviors and 95% for extreme behaviors).

Binge eating was assessed with up to two yes/no questions: (1) "In the past year, have you ever eaten so much food in a short period of time that you would be embarrassed if others saw you (binge eating)" (Test-retest agreement = 90%) and, if yes, "During the times when you ate this way, did you feel you could not stop eating or control what or how much you were eating?" (Test-retest agreement = 75%).

Psychosocial Well-Being. Depressive symptoms were assessed using a six-item scale developed by Kandel and Davies.¹³ Higher scale values were indicative of more

TABLE 2. Trends in disordered eating behaviors and related psychosocial health/attitudes among nonoverweight and overweight adolescents in Minneapolis/St. Paul from 1999 to 2010 (percents and means)

	Nonoverweight girls (BMI <85 th percentile)			Overweight girls (BMI ≥ 85 th percentile)			Nonoverweight boys (BMI <85 th percentile)			Overweight boys (BMI ≥ 85 th percentile)			
	1999 ^a	2010	ES ^b	1999 ^a	2010	ES ^b	1999 ^a	2010	ES ^b	1999 ^a	2010	ES ^b	<i>p</i> values
	n = 972 ^c	n = 899 ^c		n = 460 ^c	n = 566 ^c		n = 812 ^c	n = 747 ^c		n = 436 ^c	n = 535 ^c		
Disordered eating behaviors (%)		%diff		%diff		%diff		%diff		%diff		%diff	
Chronic dieting	7.4	2.7	-4.7	10.1	12.9	2.8	3.3	1.9	-1.4	10.9	6.9	-4.0	0.03
Less extreme weight control behaviors	47.7	38.7	-9.0	68.1	72.8	4.7	29.0	23.9	-5.1	58.3	57.9	-0.4	0.90
Extreme weight Control behaviors	8.9	4.0	-4.9	13.9	11.3	-2.6	5.1	3.0	-2.1	5.8	5.4	-0.4	0.81
Binge eating With loss of control	8.9	7.8	-1.1	12.3	12.1	-0.2	3.1	4.2	1.1	7.6	9.1	1.5	0.39
Psychosocial well-being (mean)		Mean diff		Mean diff		Mean diff		Mean diff		Mean diff		Mean diff	
Depressive symptoms	18.1	17.9	-0.04	18.0	18.5	0.10	15.9	15.4	-0.10	16.2	16.3	0.02	0.74
Self-esteem	17.6	17.7	0.03	17.2	17.3	0.03	18.5	18.8	0.08	18.0	17.6	-0.11	0.06
Body satisfaction	34.7	35.7	0.10	30.3	29.4	-0.09	38.7	37.4	-0.13	32.7	30.9	-0.18	0.01
Weight concerns	2.5	2.2	-0.30	3.1	3.0	-0.10	1.9	1.7	-0.20	2.8	2.6	-0.20	0.01
BMI (SD=3.0 for non overweight, 4.7 for overweight)	20.5	20.3	-0.07	29.1	29.4	0.06	20.3	20.0	-0.10	28.6	28.8	0.04	0.59

^aThe 1999 sample was weighted to allow for an examination of secular trends in weight-related outcomes independent of demographic shifts in the population.

^bES = Effect size for dichotomous outcomes is difference in proportions and for continuous outcomes is standardized mean difference (i.e., mean diff is scaled by the full sample standard deviation). For BMI a different standard deviation was used to standardize the nonoverweight and overweight since the groups differed greatly by BMI by design.

^cNumbers may vary slightly due to missing values for specific variables.

severe depressed mood (Cronbach's $\alpha = 0.83$; Test-retest $r = 0.79$).

Self-esteem was measured with six items from the Rosenberg Self-esteem Scale.¹⁴ Responses were summed with higher scores indicative of greater self-esteem (Score range: 6–24; Cronbach's $\alpha = 0.77$; Test-retest $r = 0.69$).

Body satisfaction was assessed with a modified version of the Body Shape Satisfaction Scale.¹⁵ Responses were summed with higher scores indicative of greater body satisfaction (Score range: 10–50; Cronbach's $\alpha = 0.93$; Test-retest $r = 0.67$).

Weight concerns were assessed by asking adolescents to indicate their agreement with two statements: (a) "I think a lot about being thinner" and (b) "I am worried about gaining weight". Item responses were summed with higher scores indicative of greater weight concern (Score range: 2–8; Cronbach's $\alpha = 0.83$; Test-retest $r = 0.77$).

Weight Status. BMI values were calculated from measured heights and weights obtained by trained research staff using standardized protocols. Sex- and age-specific cutoff points used to classify respondents as not overweight (BMI < 85th percentile) or overweight (BMI ≥ 85th percentile).¹⁶

Statistical Analysis

To test for secular changes in disordered eating and psychological well-being outcomes, we first controlled for demographic shifts in the study population from 1999 to 2010 but utilizing inverse probability weighting.¹⁷ Details on this approach have been previously published.² Proper control of the demographic shift using the weights was achieved as evidenced by the nonsignificant differences in the weighted 1999 sample compared to the 2010 sample of both nonoverweight and overweight youth (Table 1).

Tests for secular trends in continuous and dichotomous outcome variables were conducted using two sample t-tests and χ^2 tests, respectively, with the inverse probability weights incorporated for the 1999 sample. All analyses were stratified by overweight status and gender. Reported *p*-values were not adjusted for multiple testing. All analyses were performed in SAS 9.2.

Results

Overweight girls: Small decreases in the percentage of overweight girls engaging in disordered eating behaviors were observed between 1999 and 2010; however, none of these observed decreases reached statistical significance (Table 2). Further, no statistically significant secular changes in the level of weight concern, body satisfaction, depressive

symptoms, or self-esteem reported by overweight girls were observed.

Nonoverweight girls: The percentage of nonoverweight adolescent girls engaging in chronic dieting, unhealthy and extreme weight control behaviors, decreased significantly from 1999 to 2010 (Table 2). A decrease in weight concerns was seen among nonoverweight girls ($ES = -3.0, p < 0.01$). Body satisfaction improved among nonoverweight girls ($ES = 0.10, p = 0.03$).

Overweight boys: The percentage of overweight boys who reported chronic dieting decreased significantly from 1999 to 2010 ($ES = -4.0, p = 0.03$) (Table 2). A small, but statistically significant, decrease in weight concerns was seen among overweight boys ($ES = -0.20, p = 0.01$). Finally, body satisfaction decreased among overweight boys ($ES = -0.18, p = 0.01$).

Nonoverweight boys: The percentage of nonoverweight boys engaging in unhealthy and extreme weight control behaviors decreased significantly from 1999 to 2010 (Table 2). A small, but statistically significant, decrease in depressive symptoms among nonoverweight adolescent boys was seen ($ES = -0.10, p = 0.04$). Body satisfaction decreased slightly from 1999 to 2010 ($ES = -0.13, p < 0.01$).

Discussion

This study examined secular trends in disordered eating behaviors and psychosocial well-being from 1999 to 2010 among adolescents by weight status. This study's main finding is that although significant secular decreases in the percentage of nonoverweight girls engaging in disordered eating behaviors were observed between 1999 and 2010, parallel significant decreases were not observed among overweight girls. Similarly, more significant secular decreases in use of disordered eating behaviors were observed among nonoverweight boys as compared with overweight boys; however, overall patterns were not as consistent among boys. Findings suggest a strong need to ensure that messages about the dangers and ineffectiveness of disordered eating behaviors are reaching overweight adolescents.

Several noteworthy secular trends were observed among nonoverweight adolescents from 1999 to 2010, including a decrease in disordered eating and improvement in psychosocial well-being. Specifically, chronic dieting and unhealthy and extreme weight control behaviors decreased and body satisfaction improved among nonoverweight girls.

While these changes are encouraging, it is important to note that the percentages of girls engaging in disordered eating behaviors remains high and the prevention of these behaviors should continue to be a top public health concern. Among nonoverweight boys, there were decreases in unhealthy and extreme weight control behaviors, and mean depression scores, between 1999 and 2010. It was also encouraging that, in general, among overweight adolescents, disordered eating and psychosocial well-being did not appear to worsen from 1999 to 2010, despite the increased attention on obesity-related issues in the media during this time period. Unfortunately, the overall trends of decreased use of disordered eating behaviors and improvement in psychosocial well-being observed in nonoverweight youth were not reflected in the youth who were overweight. Further, a decrease in the mean level of body satisfaction among overweight boys was observed between 1999 and 2010.

Study strengths and limitations should be taken into account when interpreting study results. The unique repeated cross-sectional study design allowed for the study of secular trends from 1999 to 2010, a period during which much media attention was directed to weight-related topics. The large and diverse study population, measured heights and weights, and breadth of questions are additional study strengths. However, all study data were collected from participants in one urban area in Minnesota, limiting the overall generalizability of study findings.

Overall, findings indicate a need to ensure that messages about the dangers of disordered eating behaviors are reaching overweight youth. Interventions aimed at obesity prevention should not overlook the comorbid nature of obesity, disordered eating, and markers of poor psychosocial health; prevention programming should focus on addressing shared risk factors.^{18–20}

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