

# Weight Control Behaviors among Overweight, Normal Weight and Underweight Adolescents in Palestine: Findings from the National Study of Palestinian Schoolchildren (HBSC-WBG2004)

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## ABSTRACT

**Objective:** The objective of the study is to examine the relationship between weight-control behaviors and self-reported sociodemographic characteristics, weight status, and perception of body weight in a large, representative sample of adolescents in the West Bank and Gaza Strip territories of Palestine.

**Method:** Self-report measures of socio-demographic characteristics, body weight perception, height and weight, and weight-control behaviors were completed by 8,885 male and female students aged 12–18 years from 405 randomly selected schools as part of the 2003/2004 Palestinian Health Behavior in School-aged Children Study (HBSC).

**Results:** In both genders, dieting to lose weight was common among adolescents and significantly higher among overweight than among underweight or normal weight adolescents. Extreme weight-control behaviors (vomiting, diet

pills, or laxatives) and smoking were more common among boys than girls, and extreme weight-control behaviors were particularly common among underweight boys. Older adolescents were less likely than younger adolescents to engage in weight-control behaviors. Perception of body weight as too fat was an influential factor in following an unhealthy diet to lose weight.

**Discussion:** Practices to control weight, particularly extreme and unhealthy weight-control behaviors, are common among adolescents in the Palestinian territories. These findings suggest the need to design appropriate prevention and early intervention programs for adolescents in Palestine. © 2009 by Wiley Periodicals, Inc.

**Keywords:** weight control; overweight; underweight; adolescents; Palestinian

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## Introduction

Weight control strategies range from healthy behaviors, such as moderate dieting and exercise,<sup>1–3</sup> which

can provide potential health benefits to adolescents, to unhealthy eating practices including skipping meals, fasting, restricting intake of certain foods, and chronic dieting behaviors<sup>1,3,4</sup> as well as potentially harmful behaviors such as self-induced vomiting, laxatives, and diet pills.<sup>1,3</sup> Smoking is also found to be associated with unhealthy dietary practices in adolescents.<sup>5,6</sup> Excessive harmful and unhealthy weight-control behaviors have potential serious consequences due to their impact on physical, emotional, and psychosocial health.<sup>7,8</sup> Specifically, dieting is considered a major risk factor for eating disorders.<sup>9</sup> Unhealthy dieting can also decrease intake of energy and essential nutrients and may be associated with a variety of symptoms including fatigue, anxiety, and constipation and irregular menstrual cycles among girls.<sup>4</sup>

The high prevalence of abnormal eating patterns and unhealthy weight-control behaviors in adolescents has become a major public health concern<sup>8,10–13</sup> worldwide. These practices have been

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shown to be related to sociodemographic and personal characteristics of adolescents.<sup>14</sup>

Sociodemographic factors include gender, age, socio-economic status (SES), and parental education. Concerns about weight status and dieting are more common among girls than boys.<sup>9,14–18</sup> Among boys, the weight concerns are associated with high BMI levels and body-building,<sup>14</sup> whereas among girls, weight concerns have been marked across all BMI levels.<sup>19</sup> Girls are more likely than boys to consider themselves as overweight and to be concerned about their physical attractiveness.<sup>1</sup> Weight concerns can start at a young age,<sup>20</sup> but older girls are more likely than younger girls to be worried about weight gain and to have attempted weight-control.<sup>16</sup> Although clinical populations with eating disorders tend to come from higher socioeconomic backgrounds, some population-based studies have suggested that disordered eating behaviors are more prevalent among adolescents from lower socioeconomic backgrounds.<sup>14</sup>

Personal factors associated with weight-control practices include body dissatisfaction, perception of body weight, and weight status; these factors are potentially modifiable and therefore of interest in terms of their association with extreme weight-control behaviors. The perception of being overweight is a key factor in adolescents' decision to diet<sup>7,17,21–25</sup> and attempts at weight loss, regardless of whether they are actually overweight.<sup>9,23,24,26</sup> Adolescents who feel overweight are more likely to be actively trying to lose weight and may be at risk for using harmful weight-control behaviors.<sup>25</sup> Moreover, distorted weight perception can lead to negative psychological outcomes and adoption of unhealthy weight-control strategies such as unhealthy eating habits and cigarette smoking to regulate weight.<sup>27</sup> Thus, perception of overweight is a key determinant of nutritional habits and weight management.

Dieting occurs not only in overweight adolescents but also in normal weight<sup>1,7,18,28,29</sup> and underweight adolescents.<sup>28,30</sup> An alarming problem is that many underweight and normal weight adolescents engage in unhealthy weight-control practices.<sup>8</sup> Underweight or normal weight adolescents who perceive themselves to be overweight are at an increased risk for eating disorders such as anorexia nervosa and bulimia nervosa.<sup>2</sup> In addition, the self-esteem of dieting adolescents is lower than that of nondieters.<sup>9,31</sup> Therefore, it is important to understand what provokes weight-control behaviors in adolescents.

Studying Palestinian adolescents' health behavior is important, since the Palestinian population is young with 47% under 15 years.<sup>32</sup> To the best of our knowledge, no studies have been conducted in Pal-

estine investigating the prevalence rates of weight-control behaviors used by Palestinian adolescents. This study investigates the prevalence rates of weight-control behaviors in normal weight, overweight, and underweight Palestinian adolescents. In addition, this study examines the associations between weight-control behaviors and sociodemographic characteristics (region, grade, parents' educational level, and family affluence), weight status, and perception of body weight among adolescents in Palestine to provide insights into these behaviors and identify the high-risk subgroups of adolescents that could benefit from future interventions.

## Method

The Health Behavior in School-Aged Children (HBSC) cross-national survey, conducted in collaboration with the World Health Organization (WHO), is an international study of health behaviors and lifestyle of adolescents across more than 35 countries.<sup>33</sup> The standard HBSC questionnaire contains mandatory questions for all countries and optional questions that are of interest to participating countries. In 2003/2004, a similar survey using the 2001/2002 HBSC questionnaire was conducted in Palestine for the first time. The 2003/2004 Palestinian HBSC survey was approved by the Al-Quds University ethical committee and Research Ethics Board of the Palestinian Ministry of Education. Details of the study population and methods have been described elsewhere.<sup>34</sup>

### Sample Selection

The sample was drawn based on the 2003–2004 list of schools and classrooms (which included the number of students per classroom) provided by the Palestinian Ministry of Education. Schools ( $n = 405$ ) were selected randomly throughout the two regions (West Bank and Gaza). A stratified random sample of 17,817 schoolchildren, Grades 6, 8, 10, and 12, age range 12–18 years, was selected in these schools. All students agreed to participate. After excluding 102 questionnaires that were not correctly completed, a final total of 17,715 questionnaires (48% boys; 52% girls), 53% from the West Bank and 47% from Gaza, were input for further analyses.

### Instrument

The questionnaire was developed using the WHO international HBSC questionnaire (2001–2002) including all mandatory HBSC questions.<sup>33</sup> It contained additional optional packages: half of the optional components of the questionnaire (Form A) contained optional questions on violence, injuries, and social inequalities; and the other half of the questionnaire (Form B) contained optional questions on physical activity, eating, dieting,

and mental and physical health. Equal numbers of Form A and Form B were randomly distributed in each school class.

This article presents data from 8,885 (Form B) questionnaires, which included the mandatory HBSC questions as well as optional questions on eating, dieting, physical activity, mental health, and physical health. Of the 8,885 (Form B) adolescent questionnaires received, 2,977 (33.5%) were excluded because of missing data on weight or height and/or values exceeding the possible limits for age and gender subgroups. A total of 5,908 adolescents were included in the analysis for weight status (2,887 boys; 3,021 girls). Students with missing BMI ( $n = 2,977$ ) were compared with those not missing ( $n = 5,908$ ) in terms of gender, grade, region, and family affluence scale (FAS). There was no difference on gender or FAS between students with missing values versus those with data on BMI, however; more missing values for BMI were noted in younger adolescents, Grades 6 and 8 (41%), than older adolescents (24%) and among adolescents living in Gaza (36%) compared to those living in West Bank (31%).

### Measures

**Family Affluence Scale.** A four-item measure of material affluence (owning a car, owning a computer, sharing a bedroom, and travel away on holiday) was employed. This scale was developed by the WHO HBSC study as an alternative measure of family wealth.<sup>35–37</sup> A total Family Affluence Scale (FAS) score was calculated for each student based on his or her responses to these four items; responses were categorized as follows: (1) low FAS (score = 0–2); (2) medium FAS (score = 3–5); and (3) high FAS (score = 6–9).<sup>35,36,38</sup>

**Parents' Educational Level.** Parents' educational level was based on adolescents' self-reports and categorized as follows: (1) low education: graduated from high school or less and (2) high education: continued studies after high school.<sup>34</sup>

**Weight Status.** Information on height and weight were collected by asking, 'How much do you weigh without clothes?'; and 'How tall are you without shoes?' Self-reported weight and height were used to calculate the students' body mass index ( $\text{kg}/\text{m}^2$ ). Adolescents' weight status was categorized by cutoffs corresponding to the international age- and gender-specific BMI reference values defined by Cole et al.<sup>39</sup> into three categories, namely underweight, normal weight, and overweight. In this study, the category 'overweight' included obese children.

**Body Weight Perception.** Self-perceived weight was examined by asking adolescents the following question: 'Do you think your body is...' 'much too thin,' 'a bit too thin,' 'about the right size,' 'a bit too fat,' or 'much too fat?' Responses were categorized as follows: (1) too thin; (2) right size; and (3) too fat.

**Current Dieting Status.** To identify adolescents who were currently dieting or felt a need to diet to lose weight at the time of the survey, students were asked: 'At present, are you on a diet or doing something else to lose weight?' Possible responses were: 'no, my weight is fine'; 'no, but I should lose some weight'; 'no, because I need to put on weight'; and 'Yes.'

**Weight-Control Behaviors.** In addition to the current dieting status question students were asked if they had gone on a diet, changed their eating habits, or done something else to control their weight during the last 12 months. Response options included the following: 'exercising'; 'eating less food'; 'eating fewer sweets'; 'eating less fat'; 'eating more fruit and/or vegetables'; 'drinking fewer soft drinks'; 'drinking more water'; 'restricting food groups (i.e., eat only fruit and vegetables, drink only, eat only bread and water, ...)'; 'diet under supervision of a professional'; 'skipping meals'; 'fasting (i.e., not for religious purposes)'; 'self-induced vomiting'; 'using diet pills or laxatives'; and 'smoking more.' These behaviors were grouped under the following: healthy, unhealthy, or extreme weight-control behaviors.

**Healthy Behaviors.** Healthy behaviors included exercise, healthy dieting behaviors (eating less food, eating fewer sweets, eating less fat, eating more fruit and/or vegetables, drinking fewer soft drinks, drinking more water) and supervised diet.

**Unhealthy behaviors.** Unhealthy behaviors included unhealthy dieting behaviors (skipping meals, fasting, restricting food groups) and smoking.

**Extreme weight-control behaviors.** Extreme weight-control behaviors included induced vomiting, use of diet pills, and laxatives.

### Statistical Analysis

Chi-Square test was used to compare differences in underweight, normal weight, and overweight adolescents by sociodemographic characteristics and weight-control behaviors. Logistic regression (binary) was used to investigate the effect of sociodemographic characteristics, perception of body weight, and weight status on weight-control behaviors. Weight-control behaviors were used as the dichotomous outcome variables (0 = No; 1 = Yes) and sociodemographic characteristics, weight status, and perception of body weight as independent variables. Analyses were performed separately for boys and girls using SPSS version 15. A significance level of .05 was used.

## Results

### Sociodemographic Characteristics

**Table 1** shows that 20% of the boys and 11% of the girls were classified as overweight and 8.6% of

TABLE 1. Sociodemographic characteristics by gender and weight status in adolescents in Palestine in 2004

Characteristics	Boys' Weight Status (n = 2,887)						Girls' Weight Status (n = 3,021)						p*
	Underweight		Normal		Overweight		Underweight		Normal		Overweight		
	N	%	N	%	N	%	N	%	N	%	N	%	
Total	248	8.6	2,068	71.6	571	19.8	279	9.2	2,415	79.9	327	10.8	—
Region													
West Bank	139	8.3	1,217	72.9	313	18.8	172	10.9	1,247	78.9	161	10.2	.003
Gaza	109	8.9	851	69.9	258	21.2	107	7.4	1,168	81.1	166	11.5	
Grade													
6th grade (12 years)	100	14.8	472	69.7	105	15.5	104	16.3	474	74.4	59	9.3	
8th grade (14 years)	52	9.1	414	72.8	103	18.1	90	11.8	585	76.5	90	11.8	
10th grade (16 years)	55	6.8	580	72.0	171	21.2	39	4.8	697	84.9	85	10.4	<.001
12th grade (18 years)	41	4.9	602	72.1	192	23.0	46	5.8	659	82.6	93	11.7	
Mother education													
Low education	184	8.3	1,609	72.9	413	18.7	213	8.9	1,915	80.2	261	10.9	.813
High education	51	8.6	403	67.6	142	23.8	55	9.6	456	80.0	59	10.4	
Father education													
Low education	159	8.9	1,284	71.5	352	19.6	175	8.8	1,591	80.2	219	11.0	.649
High education	75	7.4	734	72.6	202	20.0	96	9.8	782	79.7	103	10.5	
FAS													
FAS 1 (low)	168	8.2	1,495	73.0	386	18.8	207	8.9	1,860	80.0	257	11.1	
FAS 2 (moderate)	60	10.0	416	69.0	127	21.1	45	8.8	417	81.4	50	9.8	.076
FAS 3 (high)	9	7.0	85	66.4	34	26.6	21	15.9	96	72.7	15	11.4	

\* Chi-squared analysis.



TABLE 3. Healthy weight-control behaviors by gender, sociodemographic characteristics, weight perception, and weight status in adolescents in Palestine in 2004

Characteristics	Exercise				Healthy Dieting <sup>a</sup>				Supervised Diet			
	Boys		Girls		Boys		Girls		Boys		Girls	
	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)
Region												
West Bank (reference)	72.4	1.00	68.6	1.00	90.4	1.00	92.7	1.00	20.7	1.00	13.6	1.00
Gaza	77.9	1.54 (1.28–1.86)***	65.3	0.97 (0.82–1.15)	93.3	1.42 (1.06–1.89)*	92.3	0.96 (0.71–1.29)	26.3	1.63 (1.32–2.01)***	15.5	1.14 (0.90–1.45)
Grade												
6 <sup>th</sup> grade (12 years) (reference)	80.7	1.00	71.6	1.00	94.3	1.00	90.2	1.00	34.2	1.00	18.1	1.00
8 <sup>th</sup> grade (14 years)	79.6	0.97 (0.72–1.31)	73.5	0.99 (0.77–1.28)	94.5	0.88 (0.53–1.44)	94.7	1.64 (1.05–2.56)*	25.9	0.63 (0.48–0.84)**	17.6	0.98 (0.72–1.33)
10 <sup>th</sup> grade (16 years)	73.8	0.66 (0.51–0.86)**	65.7	0.77 (0.61–0.98)*	90.7	0.54 (0.35–0.82)**	92.5	1.27 (0.84–1.91)	18.6	0.43 (0.32–0.56)***	12.0	0.77 (0.56–1.07)
12 <sup>th</sup> grade (18 years)	65.7	0.43 (0.33–0.55)***	55.9	0.47 (0.37–0.60)***	87.4	0.42 (0.28–0.64)***	92.2	1.11 (0.74–1.66)	14.2	0.34 (0.25–0.45)***	9.7	0.48 (0.34–0.68)***
Mother education												
Low education (reference)	73.4	1.00	66.1	1.00	91.0	1.00	92.5	1.00	22.1	1.00	14.4	1.00
High education	79.8	1.47 (1.14–1.90)**	71.1	1.17 (0.92–1.48)	94.1	1.68 (1.12–2.51)*	92.5	1.01 (0.66–1.54)	25.3	1.07 (0.82–1.41)	15.1	1.30 (0.95–1.77)
Father education												
Low education (reference)	74.7	1.00	66.3	1.00	92.5	1.00	92.2	1.00	24.3	1.00	14.9	1.00
High education	75.2	0.87 (0.71–1.07)	68.6	1.01 (0.83–1.23)	90.4	0.60 (0.45–0.81)**	93.1	1.21 (0.84–1.73)	20.3	0.69 (0.54–0.87)**	13.3	0.77 (0.59–1.02)
FAS												
FAS 1 (low) (reference)	73.6	1.00	64.1	1.00	91.4	1.00	92.5	1.00	20.7	1.00	13.7	1.00
FAS 2 (moderate)	76.4	1.07 (0.85–1.33)	77.3	1.57 (1.24–1.98)***	92.0	1.09 (0.77–1.54)	93.3	0.98 (0.66–1.47)	27.9	1.56 (1.23–1.98)***	17.0	1.32 (0.98–1.77)
FAS 3 (high)	78.7	1.79 (1.08–2.97)*	81.5	1.90 (1.19–3.01)**	91.6	1.00 (0.51–1.99)	91.7	0.99 (0.46–2.13)	28.3	1.66 (1.05–2.61)*	17.6	1.47 (0.89–2.44)
Perception of weight												
Right size (reference)	76.4	1.00	69.9	1.00	91.4	1.00	92.3	1.00	22.0	1.00	13.6	1.00
Too thin	69.5	0.70 (0.56–0.88)**	57.6	0.48 (0.39–0.59)***	90.3	0.81 (0.58–1.14)	89.7	0.68 (0.48–0.96)*	23.6	1.01 (0.77–1.32)	14.3	0.88 (0.64–1.21)
Too fat	75.2	0.91 (0.69–1.20)	68.1	0.87 (0.69–1.09)	94.5	1.48 (0.91–2.40)	96.0	1.42 (0.87–2.32)	25.7	1.12 (0.83–1.51)	16.6	1.22 (0.90–1.66)
Weight status												
Normal (reference)	74.3	1.00	66.5	1.00	90.3	1.00	92.0	1.00	17.1	1.00	11.4	1.00
Underweight	72.4	0.78 (0.56–1.09)	66.5	0.99 (0.74–1.32)	88.4	0.65 (0.41–1.04)	90.4	0.91 (0.56–1.47)	25.6	1.32 (0.93–1.87)	16.2	1.41 (0.96–2.05)
Overweight	75.3	0.99 (0.77–1.27)	70.5	1.21 (0.91–1.60)	92.5	1.00 (0.67–1.49)	96.3	2.44 (1.17–5.13)*	23.0	1.34 (1.02–1.76)*	17.1	1.55 (1.10–2.20)*

OR = odds ratio; CI = confidence interval.

\*  $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .<sup>a</sup>Healthy dieting behaviors includes the following: eating less food; eating fewer sweets; eating less fat; eating more fruit and/or vegetables; drinking fewer soft drinks; drinking more water.

extreme weight-control behaviors to control their weight than boys living in West Bank. Moreover, boys living in Gaza were less likely to smoke than boys living in West Bank. In contrast, weight-control behaviors were not significantly different between girls living in Gaza and girls living in West Bank. Older adolescents were less likely than younger adolescents to exercise, to diet (unhealthy and supervised), and to report extreme weight-control behaviors. Moreover, older boys were more likely than younger boys to smoke to control their weight (Tables 3 and 4).

Education of the mother and the father had different effect on boys' weight-control behaviors; boys who had highly educated mothers were more likely than boys who had lower educated mothers to exercise, whereas boys who had highly educated fathers were less likely than boys who had fathers who were less educated to diet. On the contrary, parents' educational level had no effect on girls' weight-control behaviors. Furthermore, boys living in highly or moderately affluent families were more likely to follow a supervised diet and to smoke than boys living in less affluent families, whereas among girls, family affluence was related to exercise; girls from highly or moderately affluent families were more likely to exercise than girls from less affluent families (Tables 3 and 4).

#### ***Weight Status, Perception of Body Weight, and Weight-Control Behaviors Used by Adolescents Over the Past 12 Months***

Perception of body weight had similar effects for both genders on exercising and following an unhealthy diet. Adolescents who perceived their body as too thin were less likely than adolescents who perceived their body as normal size to exercise, whereas adolescents who perceived their body as too fat were more likely than adolescents who perceived their body as average size to follow an unhealthy diet. Boys who perceived their body as too thin were more likely than boys who perceived their body as average size to smoke (Tables 3 and 4).

## **Discussion**

This study has provided valuable insights into weight-control behaviors among adolescents in Palestine. Weight-control behaviors are common and linked to sociodemographic factors, weight status, and perception of body weight. This study

found that overweight adolescents were currently dieting more than underweight and normal weight adolescents; in particular, higher percentages of overweight girls reported dieting. Extreme weight-control behaviors were common in both genders, surprisingly higher in boys than in girls, and unexpectedly high in underweight boys. Older adolescents were less likely than younger adolescents to engage in weight-control behaviors. The perception of body weight as too fat was an influential factor in following an unhealthy diet to lose weight.

#### ***Prevalence of Weight-Control Behaviors by Weight-Status, Perception of Body Weight, and Gender***

Among girls in particular, current dieting was more prevalent among overweight than normal- or under-weight students. Research shows that overweight adolescents, especially girls, are more concerned about their weight, more dissatisfied with their bodies, and more likely to diet than their non-overweight peers.<sup>1,40,41</sup>

An interesting result in this study was that the prevalence rate of extreme weight-control behaviors over the past 12 months prior to the survey was significantly higher in boys than in girls, and the highest percentage was found among underweight boys; more than one-third (37.3%) of the underweight boys engaged in extreme weight-control behaviors. This is inconsistent to results from other studies indicating that extreme weight-control behavior is higher among girls than boys.<sup>8,13,14,42</sup>

Studies have found that the perception of being overweight is one reason that adolescents decide to attempt weight loss, regardless of whether they are truly overweight.<sup>26,27</sup> Consistent with results from previous studies,<sup>42,43</sup> this study found that adolescents who perceived their body weight as too fat were more likely to follow an unhealthy diet. Studies indicate that most of the overweight adolescents are motivated to reduce their weight, use unhealthy weight-control behaviors,<sup>1,4,44</sup> and engage in disordered eating.<sup>4</sup>

Consistent with previous studies,<sup>1,4,44</sup> we found that overweight girls were more likely than normal weight and underweight girls to engage in a range of weight-control behaviors, including extreme and healthy weight-control behaviors, and diets supervised by health professionals during the past 12 months prior to the survey. Neumark-Sztainer<sup>4</sup> indicated that overweight adolescents engaged in disordered eating to cope with stressful social situations, such as being teased about their weight or

**TABLE 4. Extreme weight-control behaviors, unhealthy dieting, and smoking by gender, sociodemographic characteristics, weight perception, and weight status in adolescents in Palestine in 2004**

Characteristics	Extreme Weight-Control Behaviors <sup>a</sup>						Unhealthy Dieting <sup>b</sup>						Smoke More					
	Boys			Girls			Boys			Girls			Boys			Girls		
	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)		
Region																		
West Bank (reference)	28.8	1.00	20.2	1.00	58.3	1.00	57.8	1.00	14.6	1.00	3.0	1.00	1.00	1.00	3.0	1.00	1.00	
Gaza	36.0	1.64 (1.36–1.97)***	24.7	1.25 (1.02–1.54)*	62.6	1.30 (1.10–1.54)**	59.5	1.06 (0.91–1.25)	12.6	0.66 (0.51–0.86)**	3.8	1.13 (0.68–1.87)						
Grade																		
6th grade (reference)	41.9	1.00	27.5	1.00	68.9	1.00	60.0	1.00	11.0	1.00	4.5	1.00	1.00	1.00	4.5	1.00	1.00	
8th grade	39.2	0.72 (0.55–0.93)*	27.3	1.34 (1.02–1.76)*	63.2	0.75 (0.58–0.96)*	62.8	0.98 (0.78–1.24)	13.6	1.32 (0.87–2.02)	3.5	0.52 (0.26–1.02)						
10th grade	25.9	0.46 (0.35–0.59)***	17.2	0.70 (0.52–0.94)*	57.4	0.61 (0.49–0.77)***	57.2	0.81 (0.64–1.01)	12.2	1.46 (0.99–2.16)	1.9	0.35 (0.16–0.75)***						
12th grade	21.8	0.39 (0.30–0.50)***	16.6	0.65 (0.48–0.87)**	52.0	0.52 (0.41–0.66)***	54.0	0.64 (0.51–0.81)***	18.1	2.71 (1.88–3.91)***	3.7	0.67 (0.36–1.26)						
Mother education																		
Low education (reference)	31.1	1.00	22.9	1.00	59.4	1.00	59.2	1.00	13.2	1.00	3.3	1.00	1.00	1.00	3.3	1.00	1.00	
High education	34.7	1.09 (0.86–1.39)	18.0	0.79 (0.59–1.06)	62.1	1.07 (0.86–1.33)	55.2	0.82 (0.66–1.03)	14.5	0.98 (0.69–1.38)	3.4	0.77 (0.39–1.53)						
Father education																		
Low education (reference)	32.9	1.00	23.5	1.00	61.7	1.00	58.8	1.00	14.2	1.00	3.2	1.00	1.00	1.00	3.2	1.00	1.00	
High education	29.5	0.78 (0.63–0.96)*	18.8	0.80 (0.63–1.02)	57.2	0.66 (0.55–0.80)***	57.1	1.05 (0.87–1.26)	12.2	0.69 (0.51–0.92)*	3.9	1.26 (0.72–2.20)						
FAS																		
FAS 1 (low) (reference)	30.2	1.00	21.9	1.00	58.7	1.00	58.4	1.00	11.9	1.00	3.1	1.00	1.00	1.00	3.1	1.00	1.00	
FAS 2 (moderate)	34.5	1.13 (0.90–1.41)	22.4	1.10 (0.84–1.44)	62.0	1.02 (0.83–1.24)	59.2	1.02 (0.83–1.26)	15.0	1.38 (1.03–1.86)*	3.7	1.38 (0.74–2.59)						
FAS 3 (high)	35.0	1.24 (0.81–1.89)	24.7	1.07 (0.66–1.75)	63.3	1.40 (0.94–2.10)	57.9	0.85 (0.58–1.25)	22.5	2.13 (1.29–3.50)**	4.3	1.92 (0.71–5.15)						
Perception of weight																		
Right size (reference)	30.1	1.00	20.8	1.00	57.6	1.00	57.0	1.00	12.0	1.00	2.9	1.00	1.00	1.00	2.9	1.00	1.00	
Too thin	35.5	1.29 (1.02–1.62)*	24.6	1.23 (0.95–1.59)	58.9	0.98 (0.80–1.21)	54.9	0.91 (0.74–1.11)	17.5	1.59 (1.18–2.15)**	3.5	1.31 (0.71–2.43)						
Too fat	33.6	1.23 (0.94–1.62)	24.7	1.33 (1.02–1.74)*	71.3	1.88 (1.45–2.44)***	67.4	1.60 (1.28–2.00)***	15.5	1.37 (0.95–1.98)	4.2	1.12 (0.57–2.21)						
Weight status																		
Normal (reference)	25.9	1.00	17.7	1.00	55.3	1.00	55.5	1.00	12.4	1.00	2.2	1.00	1.00	1.00	2.2	1.00	1.00	
Underweight	37.3	1.59 (1.16–2.17)**	21.4	1.02 (0.72–1.45)	62.3	1.28 (0.94–1.74)	54.8	0.94 (0.71–1.24)	9.6	0.79 (0.47–1.33)	3.4	1.05 (0.46–2.40)						
Overweight	28.7	1.06 (0.83–1.37)	26.6	1.58 (1.16–2.14)**	63.9	1.15 (0.92–1.44)	63.9	1.25 (0.96–1.64)	13.8	1.01 (0.72–1.42)	3.5	1.52 (0.73–3.19)						

OR = odds ratio; CI = confidence interval.

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

<sup>a</sup> Extreme weight-control behaviors: Self-induced vomiting and pills/laxative.

<sup>b</sup> Unhealthy dieting behaviors: Skip meals, fasting, restrict food groups.

being excluded from friendship groups, and with difficult emotions associated with high levels of body dissatisfaction. In addition, overweight adolescents are more likely to diet, possibly because of increased stigmatization against being overweight, which perhaps motivates them to use unhealthy weight-control methods to lose weight faster.<sup>44</sup> However, an unexpected finding in this study is that being underweight was associated with extreme weight-control behaviors among boys. In addition, perception of being too thin was associated with smoking among boys.

### ***Effects of Sociodemographic Characteristics on Weight-Control Behaviors***

Regional variations in weight-control behaviors were noted. More adolescents living in Gaza than in West Bank had engaged in extreme weight-control behaviors, findings that were the reverse to what we expected. Adolescents in the West Bank are exposed more to modern/Western culture, and the emergence of eating disorders has been shown to depend upon the degree of exposure to Western body ideals and the presence of conflict between modern and traditional values.<sup>45</sup> A possible explanation for these results may be related to other problems experienced by people living in Gaza, of which extreme weight-control behavior is just a symptom. Adolescents in Gaza are often exposed to more stressors and difficulties than their peers in West Bank. Our findings concerning the occurrence of extreme weight-control behavior in Palestine are similar to that in Western countries. Data from Project EAT in Minnesota, USA, showed that extreme weight-control practices (taking diet pills, laxatives, or diuretics or vomiting) were reported by 18% of overweight adolescent girls, compared with 6% of overweight adolescent boys.<sup>8</sup> Another study in the United States found that disordered eating (vomiting, diet pills, laxatives, or diuretics) over the previous week was 7.8% among girls and 3.1% among boys.<sup>14</sup>

Findings from this study suggest that parents' educational level and the family affluence can have an important role in weight-control behaviors among Palestinian adolescents. No clear pattern was found in the relationship between different SES indicators and weight-control behaviors of boys and girls in this study. Family affluence and mothers' educational level had positive effects on reported exercise. Father's education had a positive effect on unhealthy dieting in boys; boys who had highly educated fathers were less likely than boys who had lower educated fathers to engage in unhealthy dieting, while no effect was found for

maternal education on these behaviors. Other studies also found no clear effect of parental SES indicators on weight-control behaviors of young people.<sup>14,42</sup> In one study, youth from low socioeconomic background were at greater risk for disordered eating than youth from high socioeconomic background,<sup>14</sup> whereas another study found no association between SES and disordered eating among girls while it was highest among those with low SES boys.<sup>42</sup>

### ***Limitations***

Some limitations of this study should be noted. Firstly, the study is limited by its cross-sectional design and it is not possible to establish cause-effect relationships. Therefore, future studies using a longitudinal design will be required to clarify the direction of these associations.

Secondly, data were collected from students using self-report questionnaires, which could be subject to socially desirable reporting bias (e.g., overweight people underreporting their weight). However, the questionnaires were completed anonymously; therefore, students had no reason to deliberately misrepresent the truth in their responses or misreport their height or weight. Moreover, studies have shown that self-reported weight and height data are suitable for identifying valid relationships in epidemiological studies.<sup>46,47</sup> Another disadvantage of self-report assessment is the potential for misinterpretation of the question and the inability to clarify participants' responses. For example, it could be speculated that the question on vomiting was misunderstood and adolescents responded positively when they were vomiting as a consequence of an infection, rather than deliberate induced vomiting.

Thirdly, although a high proportion of missing data on height and weight is common in this age group and has been found in other countries (60% among 13 years old in some countries),<sup>48</sup> the fact that one-third of the participants did not report their height and weight also needs to be considered. However, no differences were observed between participants who reported height and weight and those who did not on key sociodemographic variables.

Finally, it could be speculated that some of the findings may be related to chance as multiple tests were carried out in the study. However, when  $p < .01$  was used as level of significance, the chief findings of the study remained significant.

## Conclusion

Weight-control behaviors are common among adolescents in Palestine and are influenced by sociodemographic characteristics, weight status, and perception of body weight. The high prevalence rates of extreme and unhealthy weight-control behaviors among adolescents suggests the need for preventive programs encouraging the adoption of appropriate eating and dieting behaviors through provision of consistent messages about healthy weight-control methods to adolescents. Health professionals and parents should encourage adolescents to accept a realistic weight for themselves. Qualitative and longitudinal research may be important to investigate why underweight boys engage in extreme weight-control behaviors, as compared to normal weight and overweight boys, to control their weight.

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