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INTERNATIONAL ARTICLE

The Weight-Conscious Adolescent:

Body Image, Food Intake, and Weight-Related Behavior

MADELEINE NOWAK

Purpose: **To explore how adolescents who try to lose weight differ from those who do not in relation to body image, food intake, knowledge about food, and sources of information about food, nutrition, and weight loss.**

Methods: **Data were collected from 12–15-year-old school students in North Queensland, Australia by questionnaire.**

Results: **Boys who attempted weight loss reduced sweet foods and snacks, while concurrently increasing healthy foods such as fruit, yogurt, and low-fat milk. Girls who attempted weight loss ate breakfast, lunch, snacks, milk, bread, meat, and many sweet and fatty foods less often than other girls. Some reduction in meals, snacks, core foods, and sweet fatty foods, but not savory fatty foods, remained after the weight loss attempt. Boys attempting weight loss had better knowledge about high-fat and high-sugar foods than other boys, but there was no difference for girls. Girls attempting weight loss were more likely than other girls to think that core foods such as bread, potatoes, and dairy products should be reduced, whereas boys were more likely to think that sweet foods should be reduced. The majority of students who had attempted weight loss during the previous year considered themselves overweight, while few weight-conscious students were satisfied with their bodies.**

Conclusions: **The weight-conscious adolescents in this study, especially the girls, exhibited restrictive eating practices and a preoccupation with a slim image. Adolescents need a food culture based on foods to eat rather than foods to avoid, and an understanding of suitable weight-control measures. © *Society for Adolescent Medicine, 1998***

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Despite widespread concerns among people in most developed countries with weight and weight loss, their actual weight has been steadily increasing in recent years (1–3). Expectations of thinness, especially for women (4), have led to concern about weight among adolescent girls for more than 20 years in the United States and Sweden (5). There are many health (6) and social (7) consequences of being overweight, but there are also health concerns related to striving for thinness (8). In emphasizing the consequences of being overweight, the health sector may have contributed to the growing number of people (especially women) who attempt weight loss unnecessarily (9).

Many studies have examined body image, dissatisfaction with weight and shape, eating attitudes, and weight loss behaviors including dieting, exercise, purging, smoking, and frequency of meals and snacks (10–15). Dieting is frequently used for weight loss, especially among females, and is a significant health concern as it may contribute to eating disor-

From the Department of Public Health and Tropical Medicine, James Cook University of North Queensland, Townsville, Queensland, Australia.

Address correspondence to: Madeleine Nowak, Department of Public Health and Tropical Medicine, James Cook University, Townsville Qld 4811, Australia.

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ders in susceptible individuals (5,16). A recent study of nutrient intake in Australian adolescents showed that those with a strong desire for thinness had lower intakes of calcium, iron, zinc, and retinol (17). Contento et al. (18) found no differences in the mineral and vitamin intake of American adolescent dieters, with all nutrients reaching the required dietary allowances (RDA) except calcium and iron, which averaged two thirds of the RDA for both dieters and nondieters. Although there is speculation that low intakes of calcium and iron in dieters may result from the belief that meat and dairy products are fattening, there has been little examination of the foods eaten by adolescent dieters (19).

This study was conducted to explore how adolescents who try to lose weight differ from those who do not in relation to their body image, food intake, knowledge about food, and sources of information about food, nutrition, and weight loss.

Methods

Information about food intake, knowledge and beliefs, and weight- and shape-related beliefs and behaviors was collected by questionnaire from 791 12–15-year-old students (first year of secondary school) from private schools in one rural and two coastal towns in North Queensland, Australia. All 15 major private schools in these towns were invited to be involved in the survey; 12 participated. The populations of the coastal towns are 137,000 in Townsville and 120,000 in Cairns, and that of the rural town, Charters Towers, is 13,000. The study group included 379 girls and 412 boys, with a mean age of 12.9 years (median 13 years) and age range of 12–15 years. The questionnaire, which has been previously described (15,20), was administered by one researcher and completed voluntarily and anonymously during one school period between May and November 1992. Ethics approval was obtained from the James Cook University Ethics Committee, as was clearance from the Department of Education. Information on the occupation of the parents was collected from the students, but was not sufficiently specific to be useful. The lowest socioeconomic group is probably underrepresented in this private school population.

The data were subjected to three separate analyses depending on the methods of weight loss used and the time of the weight loss behavior. Weight loss methods include the use of exercise, weight loss pills and powders, diuretics, laxatives, and vomiting to control weight, as well as using food to manipulate weight. The first question was, "Are you trying to lose weight at the moment?"; students answering "yes" formed the wtlossN group (90 boys, 126 girls), while students answering "no" formed the nonwtlossN group (314 boys, 239 girls). WtlossN represents attempting weight loss now. The second question was, "Have you tried to lose weight during the past year?"; students answering "yes" formed the wtlossP group (81 boys, 167 girls), while students answering "no" formed the nonwtlossP group (318 boys, 201 girls). WtlossP represents attempted weight loss during the previous year. The third question was, "Over the past year, have you been on a diet to lose weight?"; students answering "yes" formed the dietP group (65 boys, 129 girls), while students answering "no" formed the nondietP group (301 boys, 207 girls). DietP represents dieting during the previous year. There was some overlap among these groupings, with 31 boys and 68 girls being involved in all three behaviors, and 242 boys and 143 girls being involved in none of the behaviors. Not all students answered all questions.

A knowledge score was produced by adding the appropriate answers for the 17 questions about foods to reduce when attempting weight loss. Data were analyzed using the statistical package STATA (Stata Corporation, College Station, TX) (21). Differences between those who had attempted weight loss during the previous year and those who had not were analyzed using Chi-square tests. Where expected values were <5, Fischer's exact test was used in the analysis. p values are for Chi-square tests unless otherwise stated.

Differences in food intake and food habits were analyzed using the Wilcoxon rank sum test (WRS). Logistic regression results are given as odds ratios (OR) and 95% confidence intervals (CI). Multiple testing increases the likelihood of obtaining a statistically significant result; however, food intake is complex and includes many items. Rather than adjusting the alpha level, complete data are given together with exact p values, as some results may be false positives at the 0.05 level.

Results

Weight-Conscious Adolescents Focused on Their Weight

The majority of wtlossP students thought they were overweight, with 51% of the boys and 61% of the

girls holding this view compared to 18% of nonwtlossP boys and 24% of nonwtlossP girls ($p = 0.0005$). More girls than boys in the wtlossP group considered themselves overweight or very overweight ($p = 0.04$), but within this group, similar numbers of boys and girls considered themselves very overweight.

Students who had attempted weight loss during the previous year frequently thought about their weight, knew how much they wanted to weigh (males 72%, females 70%), and were more likely to be attempting weight loss at the time of the survey than nonwtlossP students (60% wtlossP, 15% nonwtlossP; $p = 0.0005$). More girls than boys had attempted to lose weight during the previous year (males 20%, females 45%; $p = 0.0005$), and within the wtlossP group, more girls than boys thought about their weight most of the time or all the time (males 31%, females 53%; $p = 0.002$).

The frequency of exercise was similar for students who had tried to lose weight and those who had not. Within the wtlossP group, boys exercised more often than girls (WRS; $p = 0.031$), with 77% of boys and 65% of girls exercising on at least 4 days during the previous week ($p = 0.033$).

Weight-Conscious Adolescents Ate Differently

Students who had attempted weight loss ate differently from those who had not attempted weight loss. WtlossP, wtlossN, and dietP girls were more likely than the boys in these groups to reduce food intake, but less likely to eat more food, even healthy foods. Boys who attempted to lose weight reduced predominantly sweet foods and snacks, while concurrently increasing foods they considered to be healthy, such as fruit, yogurt, and low-fat milk (Table 1).

Girls who attempted to lose weight reduced intake of a wide range of sweet fatty foods, some savory fatty foods, some meals, and snacks. The only apparent food increases were for replacement foods such as wholemeal products and low-fat milk. These girls also reduced some core foods such as milk, bread, and meat. While some reduction in sweet fatty foods, meals, snacks, and core foods was evident when these girls were no longer actively engaged in weight loss behavior, the reduction in savory fatty foods did not persist after the weight loss attempt (Table 1).

The intake of core foods was low in this adolescent population, with only 20% of students eating bread, fruit, vegetables, and dairy products daily. There were no significant differences in daily consumption of all of these foods for the wtlossP group, the wtlossN group, or the dietP group compared to their appropriate "non" group. However, fewer dietP girls than nondietP girls ate bread (55% vs. 64%; $p = 0.03$) or dairy products (65% vs. 83%; $p = 0.0005$) daily.

Within the dietP group, more boys than girls ate bread, fruit, vegetables, and dairy products daily (boys 27%, girls 15%; $p = 0.035$). The foods responsible for this gender difference were bread (boys 69%, girls 51%; $p = 0.004$) and dairy products (boys 81%, girls 66%; $p = 0.008$). There were no significant gender differences for the percentage of students in wtlossP or wtlossN who ate all four of these food groups daily.

Girls who did not eat bread daily were almost three times more likely to have dieted during the previous year than girls who ate bread daily. This relationship held when controlling for those attempting weight loss at the time of the survey (OR: 0.3709; CI: 0.1894–0.7262). DietP girls were much less likely to consume dairy products daily than nondietP girls, irrespective of whether they were attempting weight loss at the time of the survey (OR: 0.27; CI: 0.0968–0.7969) or not (OR: 0.3715; CI: 0.1806–0.7642).

The Food Habits of Weight-Conscious Adolescents Were Different

There were differences in food patterns between wtlossP students and nonwtlossP students. WtlossP girls ate breakfast less often (WRS; $p = 0.009$) and lunch less often (WRS; $p = 0.018$) than nonwtlossP girls, whereas wtlossP boys ate snacks less often than nonwtlossP boys (WRS; $p = 0.032$). Most boys and girls ate an evening meal every day. There were no significant gender differences for frequency of consumption of main meals within wtlossP; however, wtlossP boys ate between meal snacks more often than wtlossP girls (WRS; $p = 0.005$).

There were major differences between the food-associated behavior of both boys and girls in the wtlossP group compared to the nonwtlossP group. Guilt was associated with food by wtlossP students compared with nonwtlossP students, irrespective of gender. On the other hand, more wtlossP boys than nonwtlossP boys tried to select healthy foods, while more wtlossP girls than nonwtlossP girls ate when depressed or bored (Table 2).

More wtlossP girls than wtlossP boys reported sometimes eating from boredom (boys 56%, girls 75%; $p = 0.002$), and more wtlossP boys than wtlossP

Table 1. Food intake of adolescents

	WtlossP/NonwtlossP Analysis			WtlossN/NonwtlossN Analysis			DietP/NondietP Analysis		
Food	Within Males	Within Females	Gender Diffs	Within Males	Within Females	Gender Diffs	Within Males	Within Females	Gender Diffs
Bread			0.0046[b]			0.0195[b]		0.0446 ↓	0.0124[b]
Cereal			0.0001[b]			0.0001[b]			0.0001[b]
Fruit	0.0139 ↑						0.0357 ↑		
Fruit juice					0.0411 ↓			0.0195 ↓	
Green veg			0.0275[g]			0.0254[g]			0.0124[g]
Milk								0.0433 ↓	
Yogurt	0.0276 ↑								
Ice cream		0.0030 ↓	0.0362[b]		0.0029 ↓	0.0271[b]		0.0001 ↓	0.0011[b]
Eggs			0.0204[b]						0.0466[b]
Chicken									0.0255[b]
Fish									0.0180[b]
Meat		0.0040 ↓						0.0008 ↓	
Sausages						0.0040[b]			0.0008[b]
Cakes/cookies		0.0072 ↓	0.0384[g]		0.0022 ↓		0.0432 ↓	0.0012 ↓	
Candy/chocolate	0.0045 ↓		0.0070[g]	0.0013 ↓	0.0223 ↓	0.0259[g]		0.0182 ↓	
Crisps/twisties	0.0369 ↓								
Sugar drinks	0.0343 ↓		0.0030[b]			0.0001[b]			0.0011[b]
WM/WG								0.0103 ↑	
Low-fat milk	0.0221 ↑			0.0301 ↑	0.0239 ↑			0.0393 ↑	
Meat fat									0.0380[b]
Chicken skin			0.0130[b]			0.0464[b]			0.0310[b]
Fried food			0.0008[b]		0.0239 ↓	0.0002[b]			0.0001[b]
Takeaways			0.0236[b]		0.0325 ↓	0.0063[b]			0.0029[b]
Vitamins	0.0158 ↑								
Eat b'fast		0.0091 ↓						0.0459 ↓	
Eat lunch		0.0182 ↓			0.0029 ↓			0.0032 ↓	
Eat snacks	0.0316 ↓		0.0050[g]	0.0031 ↓	0.0147 ↓	0.0194[g]	0.0047 ↓	0.0020 ↓	
Exercise			0.0310[b]			0.0045[b]			

p values are for the Wilcoxon rank sum test. Absent values denote $p > 0.05$.
[b] Boys ate these foods more frequently than did girls.
[g] Girls ate these foods more frequently than did boys.
↑ Those who had attempted weight loss or dieted ate these foods more frequently.
↓ Those who had attempted weight loss or dieted ate these foods less frequently.
Green veg = green vegetables; sugar drinks = soft drink or cordial; fried food = fries, fried fish, fried chicken, dim sims, chicko rolls, etc; takeaway = other takeaway food e.g., hamburgers, pizza, pies, pastries, sausage rolls, hot dogs, etc.; eat b'fast = eat breakfast; eat snacks = eat between-meal snacks; exercise = exercise or play sport continuously for ≥30 min; wm/wg = wholemeal or whole-grain foods which are less-refined cereal products; twisties = extruded cheese snack (10 g fat, 351 mg sodium/35 g serving). Differences within males or females are between those who have or have not attempted weight loss during the previous year (wtlossP & nonwtlossP); were attempting weight loss at the time of the survey (now) (wtlossN & nonwtlossN); or had dieted during the previous year (dietP & nondietP). There were no significant differences in frequency of intake of rice, pasta, yellow vegetables, potatoes, cheese, water, muesli bars, nuts, or added salt or for frequency of eating dinner for those who had attempted weight loss during the previous year, those who had dieted during the previous year, or those who were attempting weight loss at the time of the survey, compared to those who were not.

girls reported limiting their food intake to "less than I want" (boys 37%, girls 23%; $p = 0.017$).

Weight-Conscious Adolescents Had Poor Body Image

WtlossP students were generally dissatisfied with their bodies, with only 36% of boys and 19% of girls being satisfied with "the way my body looks" compared to 60% of nonwtlossP boys and 52% of nonwtlossP girls ($p = 0.0005$). Significantly more wtlossP boys than wtlossP girls were satisfied with their bodies ($p = 0.0005$). Girls, but not boys, who were satisfied with their bodies exercised more frequently than those who were dissatisfied with their bodies (WRS; $p = 0.002$).

WtlossP students were significantly more likely than nonwtlossP students to report that various body parts were too fat (Table 3). In the wtlossP group, more girls than boys thought their calves ($p = 0.016$), thighs ($p = 0.0005$), buttocks ($p = 0.0005$), hips ($p = 0.005$), and shoulders ($p = 0.027$) were too fat; however, boys were as likely as girls to think that their waist, stomach, chest, and arms were too fat.

Table 2. Food-associated behavior

Behavior	Males wtlossP (%)	Males nonwtlossP (%)	*p*	Females wtlossP (%)	Females nonwtlossP (%)	*p*
I try to select foods that are good for me	80	56	0.0005	72	70	0.535
Sometimes I eat because I am bored	57	49	0.196	75	63	0.016
I eat more when I feel depressed	29	21	0.154	39	22	0.0005
I often eat too much and feel guilty	49	19	0.0005	56	31	0.0005
I feel guilty when I eat junk food	43	21	0.0005	48	35	0.009
I often eat low-fat or low-calorie food	45	22	0.0005	44	28	0.0005
I often eat less than I want	36	25	0.035	22	17	0.209

wtlossP = attempted weight loss during the previous year; nonwtlossP = did not attempt weight loss during the previous year. *p* values are for Chi-square tests.

Where Do Weight-Conscious Adolescents Obtain Information About Weight Loss?

These adolescents received weight loss information from a number of sources. More wtlossP boys than nonwtlossP boys obtained information about weight loss from their parents (70% vs. 35%; $p = 0.0005$), other family members (32% vs. 20%; $p = 0.041$), friends (29% vs. 16%; $p = 0.01$), a doctor (17% vs. 8%; $p = 0.032$), magazines (13% vs. 6%; $p = 0.045$), or a book (12% vs. 5%; $p = 0.037$). Similarly, more wtlossP girls than nonwtlossP girls received such information from their parents (66% vs. 37%; $p = 0.0005$), other family members (35% vs. 22%; $p = 0.01$), friends (36% vs. 24%; $p = 0.032$), magazines (47% vs. 22%; $p = 0.0005$), and books (19% vs. 10%; $p = 0.028$). Doctors appeared to give information about weight and weight loss to about 8% of girls irrespective of their weight-loss attempts.

Magazines were used as a source of weight-loss information by more wtlossP girls than wtlossP boys ($p = 0.0005$).

Dieting Knowledge of Weight-Conscious Adolescents

Overall, knowledge about which foods to reduce when attempting weight loss was higher for girls than boys (WRS; $p = 0.0001$). There was no difference in total knowledge score for girls irrespective of dieting or attempts at weight loss. DietP boys had

Table 3. Percentage of students who perceived that specific body parts were too fat

Body Part	Males wtlossP (%)	Males nonwtlossP (%)	*p*	Females wtlossP (%)	Females nonwtlossP (%)	*p*
Calves	7	1	0.002	18	6	0.0005
Thighs	32	11	0.0005	70	36	0.0005
Buttocks	29	8	0.0005	53	24	0.0005
Hips	28	6	0.0005	45	18	0.0005
Waist	43	6	0.0005	48	19	0.0005
Stomach	57	18	0.0005	58	28	0.0005
Chest	19	1	0.0005	13	3	0.0005
Lower arms	5	1	0.012	9	1	0.0005
Upper arms	11	2	0.0005	19	3	0.0005
Hands	4	1	0.119	11	4	0.012
Neck	9	0	0.0005	11	2	0.0005
Shoulders	1	0	0.197*	8	2	0.005

wtlossP = attempted weight loss during the previous year; nonwtlossP = did not attempt weight loss during the previous year. *p* values are for Chi-square tests.

* *p* value is for Fisher's exact test.

Table 4. Percentage of students who correctly identified the foods to reduce when attempting weight loss

Food		WtlossP/NonwtlossP Analysis			WtlossN/NonwtlossN Analysis			DietP/NondietP Analysis		
		Male (%)	Female (%)	Gender Diffs	Male (%)	Female (%)	Gender Diffs	Male (%)	Female (%)	Gender Diffs
Soft drinks	−	64	80	0.013	63	81	0.046	64	81	0.008
	+	76	89		77	88		78	89	
	p	>0.05	0.035		0.018	>0.05		0.034	>0.05	
Potatoes	−	77	80	>0.05	76	81	>0.05	77	80	>0.05
	+	69	69		73	66		75	69	
	p	>0.05	0.019		>0.05	0.003		>0.05	0.034	
Meat pies and sausage rolls	−	77	85	0.036	77	88	>0.05	77	87	0.038
	+	84	93		85	89		85	93	
	p	>0.05	0.034		>0.05	>0.05		>0.05	>0.05	
Bread	−	80	86	>0.05	79	86	>0.05	79	87	>0.05
	+	74	78		80	75		78	78	
	p	>0.05	0.041		>0.05	0.008		>0.05	0.045	
Fish and fries	−	73	86	>0.05	74	87	>0.05	74	89	>0.05
	+	86	96		82	91		84	91	
	p	0.029	>0.05		>0.05	>0.05		>0.05	>0.05	
Cakes and pastries	−	72	90	>0.05	73	92	>0.05	76	90	0.0005
	+	90	93		83	89		81	93	
	p	0.002	>0.05		>0.05	>0.05		>0.05	>0.05	
Butter and cream	−	69	82	0.025	68	81	0.010	70	82	0.003
	+	75	87		77	89		71	90	
	p	>0.05	>0.05		>0.05	0.046		>0.05	>0.05	
Crisps and twisties	−	77	88	>0.05	78	89	>0.05	77	88	>0.05
	+	93	93		85	90		88	94	
	p	0.002	>0.05		>0.05	>0.05		>0.05	>0.05	
Candy and chocolate	−	78	87	>0.05	78	89	>0.05	77	87	>0.05
	+	91	92		88	89		90	92	
	p	0.014	>0.05		>0.05	>0.05		0.035	>0.05	
Milk and yogurt	−	75	84	>0.05	77	82	>0.05	76	84	>0.05
	+	81	77		73	76		80	74	
	p	>0.05	>0.05		>0.05	>0.05		>0.05	0.043	

p values are for the Chi-square test. + = those who had undertaken the behavior; − = those who had not undertaken the behavior. twisties = extruded cheese snack (10 g fat, 351 mg sodium/35 g serving). wtlossP/nonwtlossP = Students who had and had not attempted weight loss during the previous year; wtlossN/nonwtlossN = students who were and were not attempting weight loss at the time of the survey (now); dietP/nondietP = students who had and had not dieted to lose weight during the previous year. There were no significant differences between those who had attempted weight loss during the previous year, were attempting weight loss at the time of the survey, or had dieted to lose weight for knowledge whether breakfast cereal, fruit, meat, chicken, meat fat, chicken skin, or deep-fried takeaways were appropriate foods for someone who was attempting weight loss.

better knowledge about food for weight loss than nondietP boys (WRS; $p = 0.039$), but dietP girls scored higher than dietP boys (WRS; $p = 0.013$).

When examining the knowledge about individual foods, dietP boys were more likely than nondietP boys to recommend reducing sweet foods, whereas dietP girls were more likely than nondietP girls to recommend reducing core foods such as bread, potatoes, and dairy products (Table 4). Nevertheless, more dietP girls than dietP boys correctly identified a number of high-fat foods which should be reduced by those attempting weight loss (Table 4). This is consistent with the finding that more girls than boys use food to manipulate their weight.

Some Weight-Conscious Adolescents Put Their Knowledge Into Practice

There was some agreement between knowing whether foods were fattening and eating behavior when attempting weight loss, although this was more common among boys than girls. Weight-conscious boys tended to eat foods they knew were fattening less often and foods they knew were not fattening more often, whereas weight-conscious girls only reduced the foods they knew were fattening.

Weight-conscious students reduced the intake of some foods that they considered fattening. For example, wtlossP girls ($p = 0.024$) and dietP girls

($p = 0.016$) who knew that the fat on meat is fattening ate it less often than those without this knowledge, and wtlossP boys who knew that candy and chocolates are fattening ate them less often than wtlossP boys without this information ($p = 0.003$). An interesting deviation from this concordance of knowledge and behavior for weight-conscious adolescents was that wtlossN girls who knew that potato crisps and twisties (high-fat extruded cheese snack) are fattening nevertheless ate them more often than wtlossN girls without that information ($p = 0.047$).

Some weight-conscious students also increased their intake of foods they considered not fattening, although this behavior was more common among the boys. For instance, wtlossN boys who identified milk and yogurt as not fattening ate yogurt more often than boys without this knowledge ($p = 0.036$); wtlossP boys who thought bread was not fattening ate bread more often than wtlossP boys without this information ($p = 0.037$); and dietP boys who knew that potatoes are not fattening ate them more often than dietP boys without this knowledge ($p = 0.008$).

Both wtlossN girls ($p = 0.043$) and wtlossP boys ($p = 0.001$) who knew that meat was not fattening ate meat more often than those without that knowledge.

Weight-Conscious Adolescents' Sources of Information About Food and Nutrition

Parents (86% vs. 74%; $p = 0.026$) and the radio (32% vs. 19%; $p = 0.01$) provided more information about food and nutrition to wtlossP boys than nonwtlossP boys, whereas more wtlossP girls than nonwtlossP girls obtained such information from magazines (67% vs. 51%; $p = 0.002$). This pattern was also reflected in the gender differences within the wtlossP group, with more boys than girls using the radio ($p = 0.024$), and more girls than boys using magazines ($p = 0.0005$) as sources of food and nutrition information.

Within the dietP group, more dietP boys than nondietP boys obtained information about food and nutrition from parents (89% vs. 73%; $p = 0.008$), friends (33% vs. 20%; $p = 0.019$), and the radio (33% vs. 18%; $p = 0.011$), and more dietP girls than nondietP girls obtained such information from magazines (67% vs. 51%; $p = 0.001$). Newspapers ($p = 0.009$) and the radio ($p = 0.002$) were more common sources of such information for dietP boys than dietP girls, whereas more dietP girls than dietP boys obtained their information from magazines ($p = 0.0005$).

What Do Weight-Conscious Adolescents Believe About Food?

Of the students who had an opinion, 94% of wtlossP girls thought that foods eaten were important to weight, compared to 84% of nonwtlossP girls ($p = 0.005$); however, wtlossP boys and nonwtlossP boys felt similarly about the relationship between food and weight. There were no differences in the opinions of wtlossP students and nonwtlossP students about the relationship of food to "the way you feel generally," "how energetic you feel," "your fitness," "your overall appearance," "the shape of your body," "your chance of getting sick later in life," "your chance of getting heart disease when you are older," "your chance of getting high blood pressure when you are older," or "your chance of getting diabetes when you are older."

There were gender differences in beliefs about the importance of foods eaten to health, energy, and looks in the wtlossP group. More wtlossP girls than wtlossP boys believed foods were important to general wellbeing ($p = 0.001$), future illness (becoming sick, $p = 0.0005$; developing hypertension, $p = 0.0005$; developing heart disease, $p = 0.0005$), and weight ($p = 0.02$).

More differences in beliefs about food occurred between girls who did and did not attempt to manipulate their weight than between boys who did and did not attempt to manipulate their weight. Most gender differences for questions exploring beliefs about food were in the dietP group (Table 5).

Discussion

Body image and weight and food-associated beliefs and behaviors of 12–15-year-old students who had attempted weight loss were significantly different from those of students who had not. A large proportion of both boys and girls in this study were not satisfied with their bodies. Although those who are overweight might be expected to want to lose weight, in this population 52% of the girls and 27% of the boys wanted to lose weight, while 9% to 15% could be expected to be overweight (22,23). The body dissatisfaction may have different origins for boys and girls, reflecting societal attitudes.

The boys' dissatisfaction may reveal a desire for an adult male body: muscular with wide shoulders, slim waist, slim hips, and flat stomach. The girls' concern about the size of their lower bodies reflects the current fashion in which models (hence desirable, successful figures) maintain an almost prepu-

Table 5. Beliefs about food and weight

Question	WtlossP/NonwtlossP Analysis			WtlossN/NonwtlossN Analysis			DietP/NondietP Analysis		
	Within Males	Within Females	Gender Diffs	Within Males	Within Females	Gender Diffs	Within Males	Within Females	Gender Diffs
Q1: Eating fried food is bad for your health.	0.037 ↑							0.042 ↑	
Q2: Skipping meals is a good way to lose weight.		0.005 ↓			0.0005 ↓				
Q3: Eating sugary food before exercise will improve performance.			0.013[g]						0.008[g]
Q4: Following diets in popular magazines is a good way to lose weight.									0.038[g]
Q5: Raw sugar is better for you than white sugar.		0.041 ↓						0.047 ↓	0.009[b]
Q6: Everyone needs to add salt to their food.			0.002[g]			0.006[g]			0.0005[g]
Q7: Carob bars are better for you than chocolate bars.									
Q8: You should not eat the fat on meat.								0.046 ↑	0.012[g]
Q9: It is better to eat grilled fish than battered fish.		0.006 ↑			0.012 ↑			0.001 ↑	
Q10: I should only worry about the food I eat if I am fat.		0.020 ↑				0.017[b]			0.008[b]

[b] More boys than girls held these beliefs.
[g] More girls than boys held these beliefs.
↑ More students who had attempted weight loss or dieted held these beliefs.
↓ Fewer students who had attempted weight loss or dieted held these beliefs.
p values are for the Chi-square test. Analyses are for agreeing with statements for Q1, Q8, and Q9 and for disagreeing with statements for other questions. Only 10% of students held the desired belief to Q5. Differences within males or females are between those who have or have not attempted weight loss during the previous year (wtlossP & nonwtlossP), were attempting weight loss at the time of the survey (now) (wtlossN & nonwtlossN), or had dieted during the previous year (dietP & nondietP). There were no significant differences for the following beliefs: the food I eat plays a role in my overall health; eating fried foods is bad for sports performance; steak and eggs and a glass of milo [a chocolate flavoring for milk (7 g sugar/10 g serving] would be a good pregame breakfast for a young athlete; too much fat in the diet may lead to heart disease; most people need to take vitamin and mineral pills; most takeaway foods contain a lot of fat; sportspeople should eat a lot of bread, rice, potatoes, and pasta; red meat is bad for you.

bescent shape with slim thighs, buttocks, waist, and stomach. Thus, it follows that as girls pass through puberty they may become dissatisfied with their body as it undergoes normal changes (24). Although other physiological changes associated with puberty are discussed in the school curriculum, little mention is made of hormone-induced changes to body shape. The data from this study suggest that these changes, which are natural, desirable, and associated with maturity in women, should be emphasized in education programs.

Girls use food to manipulate their weight more frequently than do boys. Boys who use food for weight reduction reduce high-fat foods, high-sugar foods, and snacks, and increase some low-fat foods. However, not only do girls reduce high-fat foods, they also reduce bread, meat, and dairy products, and skip meals when dieting. The lower intake of these core foods and the tendency to skip meals frequently outlast the diet.

The persistence of such behavior may have long-term detrimental effects. The intakes of calcium and iron of Australian teenage girls and adult women are low (25,26). Dietary targets have been set for the Australian population for the year 2000 which include increasing the intake of core cereal foods (bread, cereals, rice, and pasta) (27). The tendency for girls to diet, to eat less bread while they are dieting, and to continue to eat less bread after the diet will make it even more difficult to achieve this target.

Anecdotal evidence suggests that the general public (including adolescents) is aware that bread is not fattening, but is unaware of an acceptable quantity of bread. The data presented here support this view. Although the message that bread is not fattening is acknowledged intellectually, this information is still not being internalized and used by those attempting weight loss. A similar situation exists for other core foods. Since so many 12–15-year-olds are concerned about their weight and are attempting weight loss, and eating habits of adolescents are subject to a variety of influences including family (28) and peers (29), desirable food intake on a weight loss program is an important message for nutrition education.

The current increase in average weight in developed countries has been linked to the reduction in exercise in adults (3), and it is likely that this is mirrored in adolescents. There were three principle

methods used for weight loss: exercise, inappropriate methods (vomiting, diuretics, laxatives, weight loss pills, and weight loss powders), and food manipulation (dieting or regularly skipping meals) (15), with exercise being the most common weight loss method reported by those attempting to lose weight. However, these students were relatively inactive, with only 70% (boys 77%, girls 63%) doing at least 30 min of exercise on 4 days of the week (the exercise level set by the Australian Heart Foundation for cardiac fitness in adults). Moreover, there was no difference in exercise frequency between those who were attempting weight loss and those who were not. Contento et al. (18) also found that adolescent dieters did not exercise more than nondieters.

In a Sydney study, 92% of the adolescent girls surveyed believed they did lots of exercise (30). If their exercise level was similar to these North Queensland adolescents, then concepts of adequate exercise may be insufficient for both weight control and good health. While it is possible that many girls, especially those who exercise infrequently, are unaware of exercise recommendations for adolescents, it is important to identify the reasons why adolescents exercise less and to develop strategies to reverse this trend. Guidelines may need to be established and this information incorporated into education programs.

One of the reasons that people attempt weight loss is that they are overweight; another is poor body image. The girls who were satisfied with "the way my body looks" exercised more frequently than those who were not satisfied with their bodies. Whether adolescents who are satisfied with their bodies exercise more frequently, or whether regular exercise results in higher body satisfaction is unknown.

The girls in this study had better knowledge of foods to reduce when dieting than did boys. However, girls who attempted weight loss were more likely to think that core foods should be reduced when dieting than did girls who did not attempt weight loss. Girls' higher knowledge scores for reduction of high-sugar and high-fat foods when attempting weight loss is in line with their greater interest in food and their higher likelihood of using food to manipulate their weight. However, the tendency for girls to suggest the reduction of starches and dairy products for weight loss, to reduce their intake of core foods when dieting, and to maintain this lower intake after the diet indicates that further education about minimal food intake for health is required.

As so many girls who diet obtain food, nutrition, and weight loss information from magazines, this is an area where educators and magazine editors should further concentrate their efforts. Parents are also a major source of information about food, nutrition, and weight, and at least a proportion of their information is derived from magazines (31).

Food, nutrition, and desirable weight and shape are not only education and public health issues, they are also sociocultural issues (32). As well as providing role models, parents are a major source of information about food, nutrition, and weight. Parental weight loss methods affect the behavior of their children (33). When mothers diet, this behavior will be seen as normal by their children. When minimal energy expenditure interspersed with exercise to lose weight is routine among parents, this behavior will be seen as normal by their children. Students in this study, particularly those attempting weight loss, had already begun to use food to alleviate boredom and depression, and associated guilt with food, as many adults do in our society (34). While food is used as a solution to problems, many of these obstacles to healthy eating practices will remain.

The limitations of this study were that the adolescents were from the two largest coastal towns 300 km apart, and a smaller rural town 100 km inland, in North Queensland, Australia. As the total population of these towns is $<$300,000, and the majority of Australians live in metropolitan cities, the results cannot be extrapolated to all Australian adolescents. In addition, these students were from private fee-paying schools and consequently not representative of all socioeconomic groups. Although there was provision for self-reporting of height and weight in the questionnaire, too few students answered these questions for the data to be usable. Therefore, the weight status in this population is unknown; however, from other Australian data, between 9% and 15% of these students would be expected to be overweight (22,23).

As adolescents are attempting weight loss in such large numbers and using inappropriate methods to do so, education should include information about sensible weight loss and the detrimental effects of inappropriate weight loss methods. Although it is well established that good nutrition knowledge does not equate to desirable food intake (35), the fact that weight-conscious students with better food knowledge ate core foods more often than those with less food knowledge suggests an important role for nutrition education. Education should concentrate on

foods to eat, as well as those to avoid, when attempting weight loss.

Social change is required to remove the concept of dieting and to encourage acceptance of healthy eating and regular exercise as normal. Some of the factors which could provide this cultural shift are a change in attitude to food and exercise, eating in response to hunger, and a defined meal structure. In our population, such a cultural shift can best occur using a combination of health and fitness messages with major contributions from the fashion industry and the media.

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