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EATING HABITS, PHYSICAL ACTIVITY AND RISKY BEHAVIORS OF YOUTH PRACTICING WEIGHT CONTROL

By

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A THESIS

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ABSTRACT

EATING HABITS, PHYSICAL ACTIVITY AND RISKY BEHAVIORS OF YOUTH PRACTICING WEIGHT CONTROL

By

Julie Lynn Chmielewski

This secondary data analysis was conducted to: 1) evaluate a nationally representative sample of adolescents to determine the prevalence of weight control methods according to youth's weight status and 2) examine if overweight youth are using the recommended methods of weight control according to Healthy People 2010. The data were from the National Longitudinal Study of Adolescent Health of pubescent adolescents (N=13,570) ages 11 to18 yr. Health behaviors were examined by weight categories of under- (UW), average (AW) and overweight (OW) using Body Mass Index (kg/m^2). Analyses showed youth of all weight categories used some form of weight control; the highest percentage were OW youth (89%), then AW youth (55%), and even UW youth (30%). AW youth used the most extreme methods of weight control e.g. laxatives, vomiting and diet pills. The adolescents most likely to use weight control were young, white and female. Boys and girls most frequently reported the use of "exercise for weight control" (45% & 52%). Weight control was associated with positive health behaviors of increased exercise (OR=1.59) and eating less fast food (OR=1.54), but with the negative behaviors of skipping breakfast (OR=1.56) and consuming more alcohol (OR=1.58). Those using weight control were not more likely to eat five fruits and vegetables, unfortunately, or to drink milk once a day or to eat a variety of food. The findings suggest the importance of assessing weight control use in all adolescents to ensure that health is not being compromised.

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INTRODUCTION

The weight control methods used by youth in our society are raising concerns among health professionals and parents. The increase in use of weight control is due in large part to the increasing prevalence of obesity in all age groups, the media portrayal of a thin ideal body image and myriad of "quick fixes" available to consumers to help them emulate this manufactured idea of the ideal body. Adolescents fall prey to these "quick fixes, and this may be contributing to the high prevalence of inappropriate weight control practices in this age group. In addition, studies show dieting and weight control tends to begin during adolescence (Richards, Casper & Larson, 1990). Many studies to date have centered on weight control among young adults, omitting the critical group of adolescents. The current lack of adolescent studies may be due, in part, because it is difficult to involve adolescents directly without permission from a parent or guardian. Secondary data analysis of adolescent national databases is one way to investigate youth and adolescent health behaviors.

The emphasis on thinness in contemporary America is thought to play a key role in the development and maintenance of eating disorders (Neumark-Sztainer, Story, Dixon & Murray, 1998a; Stettler, 1999), and weight concern and dieting have become a social norm for youth (Huon & Strong, 1996). In fact, there are more adolescents trying to lose weight than there are actually overweight (CDC, 2000). The 1997 Youth Risk Behavior Surveillance (YRBS) indicated over one-third of the youths surveyed were, "dieting to lose weight", or "dieting to keep from gaining weight", and girls were more likely to use weight control than boys were (CDC, 2000). Over 10% of these girls and 4% of these boys tried to lose or maintain weight through dangerous methods such as use of diet pills,

laxatives or vomiting (Kann, Kinchen, Williams, Ross, Lowry, Hill, Grunbaum, Blumson, Collins & Kolbe, 1997). There are a wide variety of diet pills and weight loss gimmicks on the market today; some have been proven harmful and others not harmful. Diet pills are partially considered a dangerous form of weight control in adolescents, because past research findings have associated adolescent diet pill use with more harmful drug use such as amphetamines (Gritz & Crane, 1991). Amphetamines can cause neurological complications such as seizures, stroke and psychic alterations (Dietz, Tejedor, Tejada & Frank, 1989). Also, different forms of diet pills may be harmful themselves or may take the place of meals in an adolescent's diet.

Extreme weight control has serious mental and physical health consequences for youth. Growth retardation may result from prepubescent children who intentionally restrict their nutrition intake and their fat intake (Pugliese, Lifshitz, Grad & Marks-Katz, 1983; Lifshitz & Moses, 1989). Another problem for youth are those with parents who restrict their diets, particularly fat intake, because the increased awareness of adolescent obesity has frightened the parents. Other physical health problems associated with excessive weight control behaviors include acute gastric dilation and/or rupture, metabolic alkalosis, cardiac arrhythmia, or even death (Huon & Strong, 1996). Mental health consequences resulting from extreme weight control involve depression, which could be associated with suicide (Neumark-Sztainer et al. 1998a; Richards et al., 1990), smoking initiation (Tomeo, Field, Berkey, Colditz & Frazier, 1999), substance abuse and development of eating disorders (Neumark-Sztainer et al. 1998a). Youth with eating disorders may intentionally restrict their food intake out of fear of weight gain (Levine, Smolak, Moodey, Shuman & Hessen, 1994b; Pugliese et al., 1983).

Allan (1998) reported that twenty percent of all children and adolescents are overweight as defined by a Body Mass Index (kg/m^2) exceeding the 85^{th} percentile of the old National Center for Health Statistics (NCHS) growth charts. Body weight is a function of genetic predisposition, stage of physical maturity, and partially a result of health behaviors such as eating and activity patterns (Garn, LaVelle & Piklinton, 1984). Healthy guidelines state that a balance of eating and exercise will aid in decreasing the prevalence of obesity in adolescents. However, these guidelines are not always interpreted correctly and this may be a factor contributing to eating disorders and dangerous weight control behaviors in adolescents.

There are some research studies on the cause of dieting in adolescents, but a scarcity of data on how dieting and weight control impact eating and physical activity behaviors in youth. In the only study located to date, the impact of weight control methods on dietary intake and on physical activity was examined. Adolescents in this study were divided into three groups signifying extreme, moderate or no weight loss methods practiced (Story, Neumark-Sztainer, Sherwood, Stang & Murray, 1998). The researchers used self-reported data from the cross-sectional 1993 Youth Risk Behavior Survey (YRBS) on 16,296 adolescents in grades 9 through 12. Extreme weight control included adolescents using vomiting or diet pills to lose weight. Health-promoting behaviors were divided into two categories of dietary and physical activity behaviors. Diet-related health-promoting behaviors included eating the appropriate five fruits and/or vegetables to meet the "Five-A-Day" requirements and/or eating less than two high fat foods during the previous day. Physical activity health-promoting behaviors included some exercise seven days a week and vigorous exercise four or more days a week. Story

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et al., (1998) showed extreme dieters were significantly less likely to eat fruits and vegetables and were more likely to have consumed two or more servings of high–fat foods during the previous day than moderate dieters and non-dieters. Moderate dieters consumed a diet more healthful than even the non-weight controllers did. Some limitations are apparent in this study by Story et al (1998). Researchers categorized some individuals as moderate dieters, even if they used laxatives. Also, the questions were self-reported in a setting with peers present, which may have led to over or under-reporting of both weight control behaviors and health-promoting behaviors. Pubertal status of individuals was not considered, and adolescent body weight was not controlled in the analyses. It is important to control for weight, because current studies show that weight is partially responsible for weight control behaviors practiced by adolescents.

One method now recommended for use to assess overweight in adolescents is to compare a calculated Body Mass Index (BMI) of weight in kilograms divided by height in meters squared to the new NCHS growth charts, which can be found at http://www.cdc.gov/nchs/about/major/nhanes/growthcharts/clinical_charts.htm (Dietz, 1998). Health care providers and nutritionists sometimes use a combination of more appropriate measures than BMI to assess obesity in adolescents. Such measures include body fat and fitness. Measures to assess body fat are bioelectrical impedance and/or skinfold thickness (Sardinha, Going, Teixeira & Lohman , 1999; Malina & Katzmarzyk, 1999). When available, a combination of measures is preferred to BMI alone, because BMI fails to consider the sexual maturation stage of an adolescent (Yalcin & Kinik, 1999; Daniels, Khoury & Morrison, 1997), race (Daniels et al., 1997), growth stunting (Schroeder & Martorell, 1999) muscle mass (Garn, Leonard & Hawthron, 1986) or bone

density. BMI alone is appropriate to describe a population, but not to clinically diagnose an individual adolescent as overweight. However, health professionals often resort to using BMI alone, because BMI is routinely obtained in the clinical setting, is relatively inexpensive and is easy to measure (Dietz, 1998).

In this study, data were used to examine adolescents (N=11,414) practicing weight control from Wave II of the Longitudinal Study of Adolescent Health (Add Health) out of the Carolina Population Center at the University of North Carolina at Chapel Hill. Also, determined was how BMI of these adolescents relate to health behavior patterns of eating, physical activity and risky behaviors such as smoking, drug use, alcohol consumption and/or suicide. Because family influences may have an impact on what and how an adolescent eats and exercises, variables concerning the family were also addressed. The study was unique in that: 1) the sample was representative of non-institutionalized US adolescents enrolled in regular schools, 2) factors affecting weight such as puberty status were determined, 3) heights and weights were measured by trained interviewers in the targeted group rather than self-reported, 4) detailed nutrition information was collected on food items eaten, meals eaten, beverages consumed and vitamin/mineral supplementation, 5) family influences on eating are present in the variables of Add Health.

Adolescents may interpret "weight loss" terminology negatively. This could potentially lead to inappropriate health behaviors. Adolescence is a time of radical physical and mental growth and social changes. Such changes are difficult for many youth to handle, and this difficulty is manifested in a number of ways, some of which result in the use of dangerous weight control practices and poor eating habits. Results of

weight control practices may be deterioration in physical and mental development, which could potentially lead to serious long-term health consequences. This study may provide useful information for professionals who counsel adolescents on appropriate weight status and health behaviors.

RESEARCH QUESTIONS

1. a. What is the frequency of weight control use among adolescents who have already started puberty and are grouped as underweight, average weight or overweight /obese using measured heights and weights to calculate Body Mass Index?

   b. Are there differences in frequency of weight control use among pubescent youth by weight category, grade, race, and age category?

   c. Of the pubescent youth using weight control, what weight control methods are most frequently used in the weight categories of underweight, average weight and overweight/obese? Weight control methods include dieting, exercise, use of diet pills, laxatives and vomiting.

2. a. Are pubescent youth, who use weight control methods, at an increased risk for participating in other risky health behaviors such as cigarette smoking, drug use, alcohol consumption and/or suicide attempts compared to those who do not use weight control?

   b. Is there a difference in risky behaviors among pubescent youth using weight control and grouped by underweight, average weight and overweight/obese?

3. Do underweight, average weight and overweight pubescent youth who use weight control have healthy eating and exercise behaviors?

HYPOTHESES

1. Pubescent youth using weight control are more likely to be overweight/obese, White and younger in age.
2. Pubescent youth who use dangerous and non-dangerous weight control methods are at a higher risk for participating in risky health behaviors of tobacco use, drug use, alcohol consumption and suicide thoughts than those pubescent adolescents who do not use weight control.
3. Underweight, average weight and overweight/obese youth are more likely to use risky health behaviors when they are using weight control behaviors.
4. Youth of any weight category using weight control have unhealthy eating/exercise behaviors as depicted by a lack of frequent exercise, a decreased consumption of fruits, vegetables, milk and breakfast, and an increased consumption of fastfood.

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GLOSSARY

1. **Average weight** = Based on the National Center for Health Statistics (NCHS 2000) growth charts, a BMI above the 5th percentile and below the 85th percentile by age and gender.
2. **Dangerous weight control** = Based on any of the following methods in the previous seven days including vomiting, laxatives and use of diet pills to lose weight or keep from gaining weight.
3. **Healthy eating** = Eating a variety of foods from all food groups, consuming fruits and vegetables at least five times a day, consuming at least one glass of milk daily, eating fast food less than two times a week and consuming all food types in moderation.
4. **Healthy exercise** = Participating in exercise three to five times a week for at least thirty minutes.
5. **Overweight/obese** = Based on the NCHS 2000 growth charts, a BMI above the 85th percentile by age and gender.
6. **Pubescent boys** = Boys who have reached a level or three or higher on the sexual maturation stages as defined by self-reported secondary sex characteristics.
7. **Pubescent girls** = girls who have started menstruation prior to the Add Health interview.
8. **Risky health behaviors** = Any behavior that puts the health of an individual at risk including smoking, alcohol use, suicide and drug use.
9. **Sexual maturation stage** = the stage of sexual maturation for youth defined by a number of secondary sex characteristics previously researched by Tanner (1984).

10. **Underweight** = Based on the NCHS 2000 growth charts, a BMI below the 5th percentile by age and gender
11. **Weight category** = Using BMI measures and the NCHS 2000 growth charts to categorize adolescents by underweight, average weight and overweight or obese.
12. **Weight Control Methods** (Non-dangerous and dangerous)= using any of the following methods in the previous seven days including dieting or restrictive eating, exercising, use of diet pills, laxatives, or vomiting to try and lose weight or keep from gaining weight

LITERATURE REVIEW

The literature reviewed includes a comparison of adolescent health databases to the Longitudinal Study of Adolescent Health (Add Health). A general description of weight control and the health consequences of and health behaviors associated with weight control in adolescents are also examined. Finally, reviewed are puberty and weight category as they relate to weight control.

Selected adolescent health databases

Adolescent health surveys are collected periodically and some are nationally representative of youth in the United States. Such local, regional and national surveys of adolescent health issues are an important resource for research, because conducting research on adolescents can involve high costs and parental/guardian consent. **Table 2.1** gives a brief description of sample research foci of the large adolescent health surveys within the last five years. These databases were selected from searches on the US Department of Commerce Technology Administration (http://www.ntis.gov/index.html), Combined Health Information Databases (CHID) web site (http://chid.nih.gov/subfile/subfile.html) and Michigan State University Medline using the key variables adolescent, health, survey and database. Each database has unique components, which will be compared to the Add Health database. These databases are comparable to Add Health in that they are large samples of adolescents, they ask questions on health behaviors and/or are nationally representative of non-institutionalized US adolescents.

Table 2.1 Large, recent databases of Adolescent Health

Database	Demographics	Categories of Interest
Longitudinal Study of Adolescent Health (Add Health) http://www.cpc.unc.edu/projects/addhealth	n = 20,745 Ages 11-23 yr Ethnicity Gender **National**	▪ eating habits ▪ physical activity ▪ tobacco use ▪ substance abuse ▪ measured ht. & wt.
Youth Risk Behavior Surveillance (YRBS) http://www.cdc.gov/ncsh/about/about.htm	n= 16,262 Ages 12-21 yr Ethnicity Gender **National**	▪ weight control ▪ tobacco use ▪ alcohol ▪ drug use ▪ physical activity ▪ self-reported ht. & wt.
Minnesota Adolescent Health Survey (MAHS)	n=30,000 Ages 12-20 yr Ethnicity Gender SES Self-reported height and weight **State**	▪ health status ▪ health behaviors: use of tobacco, alcohol, illicit drug use, suicide attempts, weight control ▪ psychosocial factors ▪ self-reported ht. & wt.
National Longitudinal Surveys of Youth 1997(NLSY97) http://stats.bls.gov/NLSY97.htm	n = 9,000 Ages 12-16 yr **National**	▪ self-reported onset of puberty ▪ cigarettes ▪ drugs ▪ alcohol ▪ self-reported ht. & wt.
National Health and Nutrition Examination Survey (NHANES) http://www.cdc.gov/nchsww/about/major/nhanes/hanesgols.htm	n= 7,344 Ages 2-16 yr **National**	▪ tobacco use ▪ illicit drug use ▪ suicide thoughts ▪ eating behaviors ▪ measured ht. & wt.

The Longitudinal Study of Adolescent Health (Add Health) is a nationally representative database of non-institutionalized adolescents of the US population and was developed by researchers at the University of North Carolina at Chapel Hill, North Carolina (Bearman, Jones & Udry, 1998). Over 20,000 adolescents were interviewed during 2 periods, Wave I and Wave II of the survey, from 1994 to 1996, in both a school

and home setting respectively. The results were divided up into public- and private-use databases. Health behaviors of the database include diet, physical activity, health service use, injury, violence, sexual behavior and substance abuse to name a few. The National Institute of Child Health and Human Development and 17 other federal agencies funded the project. The public-use data set can be requested at the web address http://www.cpc.unc.edu/projects/addhealth/. To obtain the private-use data set, which doubles the sample size, researchers must follow rigorous security procedures for access. Unlike Wave I, Wave II questions were modified to contain more detailed nutrition information, risky health behaviors and measured heights and weights for the adolescents along with the self-reported heights and weights. The same adolescent sample was used for both waves of the interviews with the exception of those seniors who graduated from Wave I.

A slight disadvantage of using Add Health for this study is that some sensitive weight control questions were not asked in a private setting. The lack of privacy creates the possibility for under-reporting of certain behaviors. The limitation, however, is more than countered by the advantage of using a large data set permitting the ability to examine influences on youth in the US and the cost saving from using already collected data.

The Youth Risk Behavior Surveillance System (YRBSS) was developed by the Centers for Disease Control (CDC) to monitor six categories of behaviors that contribute to the leading causes of morbidity and mortality of US youth (Kann et al., 1998). The categories from YRBSS that relate to this study include tobacco use, alcohol, other drug use, unhealthy dietary behaviors and physical inactivity. The YRBSS includes a "patchwork" of national, state, territorial and local, school-based surveys of high school

students. Surveys are conducted on an annual basis and results are reported on the YRBSS web site at http://www.cdc.gov/ncsh/about/about.htm. The original survey is a convenience sample, but when weights are applied to the database, the information becomes nationally representative of non-institutionalized US students grades 9-12. Anonymous and voluntary participation protects students' privacy. Students complete the self-administered questionnaires in classrooms during regular class periods, often during physical education and health classes. The core questionnaire contains 87 multiple-choice questions, but there are no reports for how many minutes it takes to complete the questionnaire. Local parental permission procedures were followed prior to survey administration.

Limitations of using the YRBSS over Add Health include data collection technique, possible inaccurate self-reports of height and weight by growing children, and the lack of detailed nutrition questions. Distributing questionnaires in a classroom is inexpensive and convenient, because students are readily available and surveys can be collected immediately. This, however, allows for student interaction or teacher influence while filling out a survey. Peer pressure to select certain answers may arise, resulting in over-reporting on some questions and under-reporting on others, especially for sensitive issues such as suicide attempts, weight control by vomiting or laxative use and substance use. In addition, much of this sensitive information may be omitted due to the lack of privacy in the testing environment.

By comparison, Add Health variables of interest were collect via interviews in the respondent's home, and sensitive questions, with the exception of weight control, were asked through headphones and entered directly into a computer without the parent's

knowledge. Add Health, Wave II, also has more detailed questions than YRBS on type of foods consumed, meal consumption and beverage consumption. Also, trained interviewers measured the heights and weights of the adolescents.

In 1986-1987, approximately 30,000 adolescents in the Minnesota public schools completed the Minnesota Adolescent Health Survey (MAHS) to assess adolescent health status, health behaviors and health concerns. Food intake patterns, weight control practices and disordered eating behaviors are some variables of interest. The data for grades 7 through 12 were collected in classroom settings. While this is a good data set to study adolescent nutrition, it is not representative of the US population, unlike the Add Health database. Also, the MAHS questions were asked and answered in a non-private setting, and heights and weights were self-reported. Data from the MAHS can be used to study behaviors reported by adolescents in Minnesota, but the information cannot be generalized to the US adolescent population.

The Bureau of Labor Statistics, US Department of Labor, sponsors the National Longitudinal Surveys of Youth 1997(NLSY97) (Bureau of Labor Statistics, 1999). The purpose of the NLSY survey is to document the transition from school to work on a nationally representative sample of 9,000 US adolescents ages 12-16 years . The data were collected from hour-long personal interviews on both youth and parents of youth. The NLSY asks a variety of questions on adolescent risky behaviors such as tobacco, drug and alcohol use. The data set also contains information on pubertal status of youth, which is self-reported. The fact that the NLSY does not include questions on nutrition and weight control methods is a limitation of its use for those research questions. The

purpose of NLSY was work behaviors, not health behaviors, of adolescents, therefore one would not expect to see these behavioral questions.

The Third National Health and Nutrition Examination Survey (NHANES III), 1988-1994 is a periodic survey conducted by the Centers for Disease Control's National Center for Health Statistics (http://www.cdc.gov/nchs/nhanes.htm) and designed to monitor factors affecting the health and morbidity of the US population (National Center for Health Statistics, 1996). Information was collected by older adults using the Mobile Examination Centers (MEC). The MECs provided a private setting for more sensitive questions. NHANES III includes a nationally representative sample of children in the US with data on 7,344 persons ages 2 months to 17 years. NHANES III is comparable to the Add Health database, because weight and height of the adolescents is measured and sexual maturation stage is assessed during a physical examination. Sensitive questions on tobacco, drug use and alcohol were also asked and answered to protect the respondent privacy through the use of headphones. NHANES III questions cannot be used to determine the detailed weight control methods of all youth, because specific weight control methods were only asked on a sub-sample of adolescents (n~2000).

Add Health was conducted in a more private setting when youth answered questions and produced more detailed nutrition questions than YRBSS or MAHS. NLYS97 has an inadequate amount of questions on health behaviors and nutrition intake of the youth in comparison to Add Health. Although the dietary data from Add Health were less deatiled than those from NHANES III, Add health has questions to examine specific weight control methods on a larger sample of youth. The Add health database contains responses to questions about other risky health behaviors, different weight

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control methods, detailed nutrition information and trained interviewer measurements of weight and height to answer the specific research questions of the study.

Weight control in adolescents

Several researchers have studied weight control behaviors of adolescents using national databases (CDC, 2000; Story, French, Resnick & Blum, 1995; Strauss, 1999). A summary of these studies can be found in **Table 2.2**. Different methods of weight control, as well as, reasons for use of weight control were examined. Studies focused on weight control use by gender and by ethnic groups to see if any differences existed within both of these categories.

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Table 2.2 Recent survey of research on weight control behaviors of adolescents

Author	Sample size	Findings
Youth Risk Behavior Survey – 1999 (CDC,2000)	16,000 boys and girls Ages 12-21 yr	▪ 43% trying to lose weight ▪ 61% females ▪ 25% males ▪ 4% laxative use ▪ 30% dieting ▪ 8% diet pills ▪ 59% exercised
Minnesota Adolescent Health Survey (Story, French, Resnick & Blum, 1995)	36,320 boys and girls Ages 12-20 yr	Weight control behaviors: ▪ males 8-15% ▪ females 27-43% Laxative and diuretic use: ▪ 2% for all ethnic groups Overweight/obese by BMI: ▪ 31% White ▪ 38% African American ▪ 40% Hispanic ▪ 40% American Indian ▪ 23% Asian
NHANES (Strauss, 1999)	1,932 boys and girls Ages 12-16 yr	▪ 24% overweight ▪ 10% obese ▪ No significant racial differences in dieting ▪ No % given for youth using weight control

National surveys have shown that dieting and attempts at weight control most frequently begin during adolescence (Richards et al., 1990). The comprehensive YRBS in 1997 found 30% of youth reported dieting to lose weight or to keep from gaining weight (Kann et al., 1998). Over 10% of girls and 4% of boys tried to control their weight through dangerous methods such as use of diet pills, laxatives or vomiting (Kann et al., 1998). The percentage of youth using weight control has increased in the most recent results of the YRBS from 40% of all youth in 1997 using weight control to 43% in 1999 (CDC, 2000). Risky behavior reported in the YRBS included a serious

consideration of attempting suicide (21%), trying cigarette smoking (70%), regular tobacco use (17%), frequent alcohol use (33%), trial of marijuana (47%), and trial of cocaine (8%). No published reports have been located on the association of weight control with these risky health behaviors.

The Minnesota Adolescent Health Survey, conducted in 1995 on about 17,000 girls and 16,000 boys grades 7 to 12, showed weight behavior patterns and that unhealthy weight control behaviors were not confined to upper socioeconomic status, White females (Story et al., 1995). Researchers reported weight control behaviors were less common in males (8-15%) as compared to females (27-43%). Laxative and diuretic use for weight loss was about 2% for all ethnic groups. Black females were significantly less likely to have dieted frequently in the past year (odds ratio [OR]=0.59) and less likely to view themselves as overweight (OR=0.41) when compared to white females. Asian males were more likely to report binge eating (OR=1.31) compared to white males. Black males were more satisfied with body weight (OR=1.57).

Richard Strauss (1999) reported that 24% of youth aged 12-16 years in 1994 were overweight and 10% were obese based on analyses conducted on the NHANES III database. Of youth who considered themselves overweight, 42% actually were of average weight when their weight for height was compared to growth chart norms from the National Center for Health Statistics NHANES I and II data (Frisancho, 1990). Furthermore, girls were significantly more likely to misclassify their weight category than boys (52% and 25% respectively). White girls who thought they were overweight were three times as likely to have a BMI less than the 85th percentile[1] compared with

[1] 85th percentile – defined as overweight by the 2000 NCHS growth charts. See NCHS 2000 in the appendices.

white boys (OR=3.5), African American boys (OR=3.6) and black girls (OR=3.1). There were no reported differences in self-perceived weight category among African American and White boys. Adolescent White girls were more likely to diet than African American girls, African American boys and White boys. Dieting and weight control was associated with adolescents viewing themselves as overweight, independent of whether they actually were overweight.

The adolescent databases reviewed show from 8-23% of boys and 27-60% of girls used weight control. The method of data collection and the under- or over-reporting of health behaviors by adolescents may explain the large range in these percentages. Weight control methods reported by youth included dieting or exercising to lose weight or keep from gaining weight, as well as, the use of dangerous methods such as diet pills, laxatives and vomiting to lose weight or keep from gaining weight. After determining the percentage of youth using weight control in the Add Health database, other relationships such as weight classification, ethnicity, age, grade and health behaviors can be explored to determine individual characteristics of adolescents using weight control.

Kilpatrick, Ohannessian & Bartholomew (1999) investigated the weight measurement activities and weight perceptions among adolescents using the Add Health database. They examined the relations of school health education to these activities and perceptions by youth. The researchers used the sample of 6,500 adolescents grades 7-12 from Wave I of the public use database, and questions from the in-home interviews and in-school questionnaires. Kilpatrick et al. reported 20% of adolescents trying to gain weight and 33% attempting to lose weight with females more likely than males to be attempting weight loss (47% vs. 20%) and males more likely to attempt weight gain (31%

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vs. 7%). Native Americans were most likely to attempt weight loss and least likely to attempt weight gain. Most adolescents reported receiving education on health issues related to weight management such as the problems associated with being overweight (60%) and underweight (56%).

Adolescents receiving education about the problems of being underweight were significantly more likely to attempt weight loss than to attempt weight gain (x^2=13.3; p<.0.001). Learning about the importance of exercise increased the likelihood of using exercise as a means of weight loss (x^2=13.2; p<0.001). The researchers concluded that adolescents involve themselves in activities that facilitate weight loss and weight gain. Unfortunately, because these investigators failed to statistically account for the clustered sampling design of Add Health during their analyses, these findings are questionnable. In order to get appropriate reportable results, researchers must weight Add Health data by the weighting variable provided in the database. Thus, significance may have been over-reported, because the cluster sample design was not considered using the appropriate weighting variables and software such as SUDAAN.

Jacqueline Pesa (1999) used Wave I public use Add Health database to examine differences in psychosocial factors between female adolescents of different ethnic/racial groups who were attempting weight loss from those not. She focused on normal weight and underweight females, as characterized by her as inappropriate dieters, examining psychosocial factors such as depression, self-esteem, trouble in school, school connectedness, sense of community, grades, autonomy and protective factors.

Of the 2,536 respondents fitting initial criteria, 38% were trying to lose weight (dieters) and 62% were not (nondieters). Self-esteem was the strongest psychological

variable contributing to the difference between dieters and nondieters ($F=5.64$, $p<0.001$) even after controlling for all the covariates of age, grade, race, media exposure, activity level, self-perceived health status, self-image, actual weight, parent's education, public assistance, romantic relationships, employment status, interviewer's opinion on subject's physical attractiveness, and physical maturity.

Problems with the research of Pesa (1999) include failure to account for clustered sample design of Wave I public use data and the use of adult criteria for overweight for youth. Pesa used adult BMI standards for overweight, which is inappropriate for adolescents who should be categorized by BMI using the National Center for Health Statistics (NCHS) growth curves by the Center for Disease Control (CDC) as well as bybody fat and fitness. Furthermore, Pesa failed to differentiate dieters from nondieters, because the results grouped adolescents by the variable of reported weight goal and not by the actual variables reporting action of adolescents to use weight by some means. Adolescents reporting trying to stay the same weight were considered "nondieters" by Pesa, but when looking at the data, it shows that adolescents trying to stay the same weight were actually performing some weight control methods to stay that same weight including dieting, exercise, laxative use, diet pill use and vomiting.

These two recently published studies demonstrated the need to use appropriate statistical software to account for the complex sample design of national survey data. Furthermore, researchers must understand the basis and assumptions of the variable parameters selected for use in their analyses. For example, adolescents should be correctly categorized by BMI using the NCHS growth charts. Most adolescents trying to stay the same weight may be using some form of weight control and should then be

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placed in a weight control category based on their reported behaviors and not on their reported weight goal of losing weight, stay the same weight, gain weight or doing nothing to change weight. The present study takes into consideration the sample design for the analyses, categorizes adolescents by BMI using the new 2000 NCHS growth charts and defines weight control use by identifying the behaviors of different weight control methods.

Health consequences of weight control

Weight control practices may have a potential negative impact on the mental and physical health of youth (Kirkley & Burge, 1989; French & Jeffery, 1994). Eating disorders can develop for girls who think they are too fat, and begin with dieting "at any cost"(Patton, Selzer, Coffey, Carlin, Wolfe, 1999). Besides having an effect on the mental health of adolescents, weight control practices have an impact on physical well-being. Physically, weight control practices have been associated with deficient nutrient intakes and high levels of fatigue and binge eating (French et al., 1994; Kikley et al., 1989; Barr , 1995; Gibbons, Wertheim, Paxton, Petrovich, Szmulker, 1995). Growth retardation sometimes results from prepubescent children who intentionally restrict their nutrition intake (Pugliese et al., 1983). During puberty, the restriction of food can delay or stop menstrual cycles (Pugliese et al., 1983). Other physical health problems associated with weight control include acute gastric dilation and/or rupture, metabolic alkalosis, cardiac arrhythmia or even death (Huon & Strong, 1996; Lindeman, 1998; King, 1987; Harris & Barraclough, 1998). Bulimia can cause dehydration, hormonal imbalance, depletion of vitamins and minerals and damage to vital organs (Psychiatry, 1992).

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Health associations with weight control

Health behavior changes also occur in adolescents using weight control, and such changes can have either positive or negative health consequences for adolescents. For example, Patton et al. (1999) found those practicing severe dieting behaviors were 18 times more likely to develop an eating disorder than those who did not diet among 60,905 14-15 year old students in Victoria, Australia. Three percent of females and 0.3% of males had partial syndromes of eating disorders as determined by using the "Branched Eating Disorder Test" which is a test designed to look at symptoms of eating disorders over the previous three months.

Negative risk factors associated with weight control were also reported by Shisslak et al. (1996) in 523 elementary and middle school girls in a classroom setting in Arizona and California. Fifty percent of elementary school girls and 66% of the middle school girls reported trying to lose weight during the past year using the "McKnight Risk Factor Survey". Methods of weight control reported included eating less (25%), diet pills (1%), exercise (29%), laxatives (2%), skipping meals (14%), starving (11%), eating less fats/sweets (27%) and self-induced vomiting (1%). For middle school girls, higher weight control behavior scores were associated with poorer body image, greater substance abuse and higher BMI. Substance abuse here referred to the use of cigarettes, alcohol and/or illicit drugs. Body mass index and risky health behaviors were linked with weight control in young adolescents, however young adolescent's ages were not defined in the report.

Other studies finding negative health behaviors resulting from extreme weight control to involve depression, which can lead to suicide (Neumark-Sztainer et al., 1998a;

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Richards et al., 1990), smoking initiation (Tomeo et al., 1999) or substance use (Neumark-Sztainer et al., 1998a). Tomeo et al. (1999) reported use of tobacco was explained by a misperception of being overweight (Odds Ratio [OR]=1.65), unhappiness with appearance (OR=2.1) and a tendency to change eating patterns around peers (girls OR=2.8, boys OR=1.8). Experimenting with cigarettes was associated with daily exercise to control weight in boys. Weight control can also promote meal skipping, fasting and the use of diet pills or laxatives (French, Perry et al., 1995; Gibbons et al., 1995; Barr, 1995).

The attempt to control weight can also have a positive impact on health behaviors, such as adopting a low fat eating pattern and increasing physical activity (French et al., 1995; French et al., 1994; Neumark-Sztainer et al., 1996). Other healthful eating patterns which we expect to find associated with weight control include the increased consumption of fruits and dairy products and reduction of sweets and soft drinks.

Weight control has an impact on mental/physical health and other health behaviors of adolescents, and certain individual characteristics lead to both positive and/or negative health behaviors. The negative health behaviors resulting from an adolescent practicing unjustifiable weight control may compromise their health status or put them at risk for developing other risky health behaviors. While this proposed research cannot determine the effect weight control has on an adolescent's health, it seeks to identify if adolescents using weight control are more likely to engage in positive or negative health behaviors.

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Puberty of adolescents

Puberty is defined as the biological process of physical development and sexual maturation (Blondell, Foster, Kamlesh, 1999). Furthermore, adolescence is the period when social, psychological and cognitive maturation occurs. The order of physiological change which occurs during puberty is the same for all youth with respect to their gender. The timing of these pubertal changes, however, varies among individuals by onset, duration, magnitude and velocity (Tanner, 1984). Some of the key changes during puberty are shown in **Table 2.3** and **Table 2.4** for boys and girls.

Table 2.3 Growth patterns and body composition changes in boys and girls.

Ave age (yr)	Boys	Girls
Puberty onset	11 (12-14)	10 (8-15)
Growth spurt	14 (4"/yr)	11.5 (3"/yr)
Tissue gains (kg)		
Adipose	5	15
Lean	14	7.5

Adapted from Tanner (1984)[2].

Girls gain two to three times more fat than boys and have their growth spurts earlier. The growth spurt in girls is usually followed within a year by menarche. Menarche is followed by dramatic gains in fat deposition on the hips, breasts and upper arms of girls. Boys, following their growth spurt gain two times as much lean body mass and only one third the fat as girls.

2 Tanner, J.M. (1984). Physical growth and developments. In J. O. Forfar & G. C. Arneil (Eds.), *Textbook of pediatrics* (pp.278-330). Edinburgh, Scotland; Churchill Livingstone.

Puberty begins at different periods in life for girls and boys, therefore a method to identify pubertal stage and its accompanying body compositional changes is helpful for both youth and health professionals to interpret body weight. It is advisable to determine pubertal status of adolescents when studying weight control use and dietary habits, because the increase in body fat that occurs during puberty accompanied by the heightened body dissatisfaction is partially related to the development of eating problems (Swarr & Richards, 1996). The sexual maturity ratings for boys are based on secondary sex characteristics of under arm hair, facial hair and lower voice and for girls include menarche, pubic hair and breast development. This study used "sexual maturity ratings" to estimate the stage of puberty for boys and used menarcheal status for pubertal status in girls (Tanner, 1984). A summary of the sexual maturation stages for boys and girls are shown in **Table 2.4**.

Table 2.4

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Table 2.4 Sexual maturation stages for boys and girls

	Boys		Girls
Stage 1	▪ Prepubescent		▪ Prepubescent
Stage 2	▪ Pubic hair appears ▪ Genitalia growth ▪ Sweat gland action	Growth Spurt at Stage 2-3 for girls and at Stage 3-4 for boys	▪ Slight pubic hair growth ▪ Breast development begins ▪ Uterus enlargement
Stage 3	▪ Pubic hair extends ▪ Genitalia growth ▪ Acne begins ▪ Voice changes		▪ Breast development continues ▪ Pubic hair is coarser ▪ Acne begins
Stage 4	▪ Pubic hair thickens ▪ Genitalia growth ▪ Acne may be severe ▪ Voice deepens		▪ Menarche ▪ Thigh development ▪ Hair thickens
Stage 5	▪ Hair distribution increases ▪ Genitalia fully mature ▪ Acne may persist or increase		▪ Breast developed fully ▪ Hair distribution like adults ▪ Genitalia fully mature

Blondell, Foster & Kamlesh, 1999

Weight categories of adolescents

Defining and assessing obesity in adolescents is difficult. Different rates of growth in puberty make describing and defining adolescent obesity problematic. Due in part to differences between prepubescent and pubescent youth, the old growth chart of weight-for-height stopped at 95 lb and 54 in, the size of 9-10y old children when they typically enter puberty. The new growth charts for ages 2-20 years replace weight-for-height with Body Mass Index (BMI=wt in kg/ht in m^2) for age and gender (Kuczmarski, Ogden, Grummer-Strawn, Flegal, Guo, Wei, Mei, Curtin, Roche & Johnson, 2000). Thus, the new charts do not reflect the differences between chronological and physiological ages of youth undergoing pubertal changes. The weight categories using the new growth charts are shown in **Table 2.5**.

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Table 2.5 Weight categories of youth as defined by the new NCHS growth charts*.

Weight category	Growth Curve Percentile
Underweight	$<5^{th}$ percentile
Average weight	$>5^{th}$ percentile & $< 85^{th}$ percentile
Overweight	$\geq 85^{th}$ percentile $7 < 95^{th}$ percentile
Obese	$\geq 95^{th}$ percentile

* Age and gender specific.

BMI is a convenient, public health indicator of weight trends, because BMI requires only measures of weight and height and reduces both measures to one number comparable over a range of heights. The interpretation of BMI, however, is based on the assumption that height is stable, obviously not true for growing adolescents whose growth spurts during maturation are preceded by increases in body fatness (Eveluth & Tanner, 1990). Furthermore, children maturing earlier than average would be identified as obese by the 95^{th} percentile of BMI for age and gender[3], just by virtue of their larger than average size compared to average and late maturing peers. The relationship between weight and height and adiposity is dependent upon stage of maturation and varies by race and gender (Eveluth & Tanner, 1990; Troiano & Flegal, 1998), and cannot always be corrected by knowing the sexual maturation stage of the youth (Hoerr et al., 1992). For these reasons, BMI alone is of questionable utility for clinical diagnosis during the most dynamic stage of adolescent development – ages 11-16 years. BMI can still be useful, however, to examine the proportion of the population who are overweight, as long as investigators recognize the indicator's limitations for adolescents and use additional measures of health risk.

In the present research Body Mass Index (BMI) was calculated to categorize a population of adolescents as overweight/obese, underweight or average weight to control for the effect of growth spurts and early pubescent fat. BMI is a convenient, public health indicator of weight trends, and because the CDC promotes the use of BMI growth charts to assess obesity, this study was consistent with what is already being used in society to assess weight category of adolescents.

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3 Using this criteria and NHANES III data, 11% of 6-11yr children and 11% of youth aged 12-17 yr are obese (Troiano and Flegal, 1998).

METHODS

Data source & participants

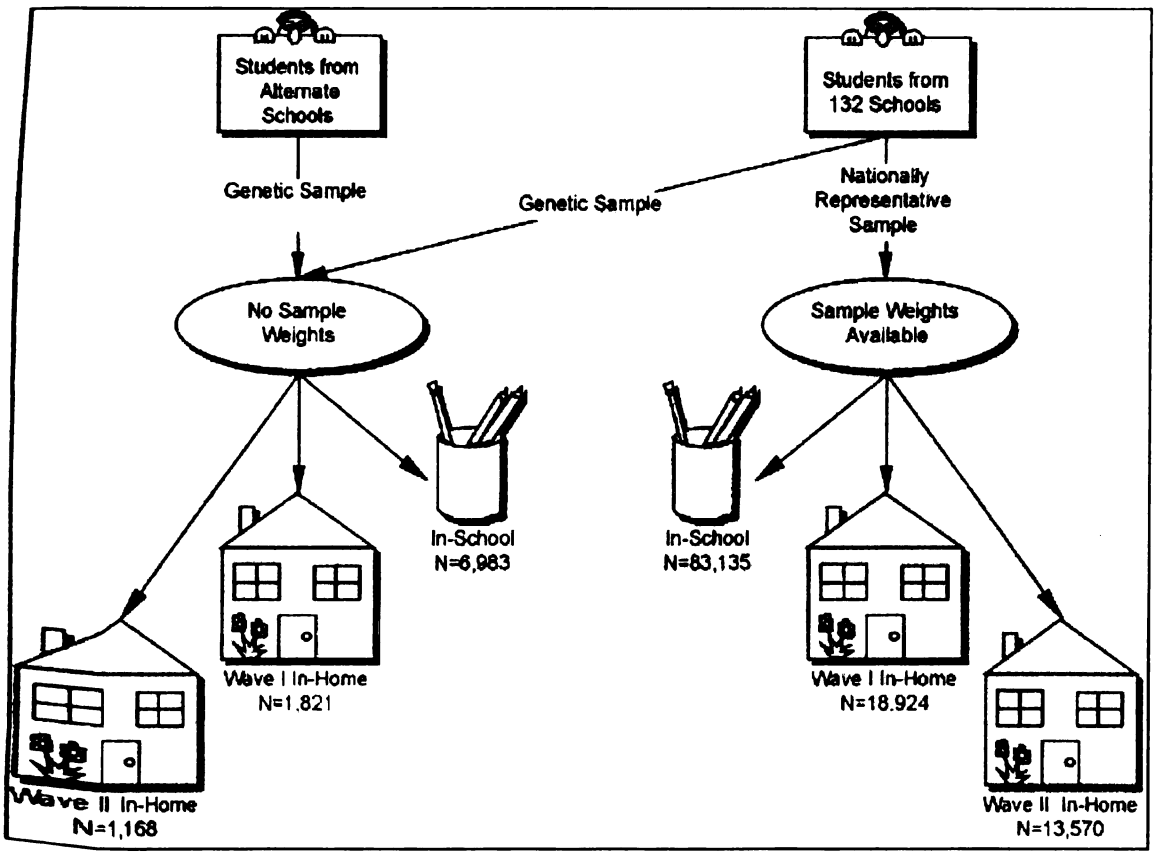
The data used for this study were extrapolated from the National Longitudinal Study of Adolescent Health (Add Health), for which information was collected in all 50 states. A cluster sampling design was used to recruit subjects, and data were collected in a variety of ways and settings. The "In-Home" interview data, collected by interviewers in each adolescent's home, were the focus of this study. One variable was used from the parent interviews to assess parent education. The parent interviews were conducted separately from the adolescents. When investigators use the appropriate weighting, this sample is nationally representative of all non-institutionalized adolescents in the United States. The large sample size (n~11,000) provides statistical power for many important comparisons among adolescents.

Interview data were collected by the National Opinion Research Center of the University of Chicago in two waves: Wave I from September 1994 through December 1995, and Wave II from April 1996 through August 1996. For the current cross-sectional study, only Wave II of the data set was used, because Wave II had more detailed questions on nutrition, and because heights and weights were measured by the interviewers, not self-reported as compared to data in Wave I. The Wave II data was collected during the spring and summer months.

Sampling and weighting

This research used a multistage sample selection in which both clustered selection and stratified selection procedures were applied, **Figure 3.1**[4]. The database from Quality

Figure 3.1 Sampling information from the Add Health data



Education Data, Inc., (QED) was used as the sampling frame for Add Health. In this database a total of 26,666 public and private high schools were listed and was thought to be the most comprehensive list of high schools available in the US (Tourangeau & Hee-Choon 1998).

[4] Bearman, Peter S., Jones, Jo, and Udry, J. Richard. (1997) *The National Longitudinal Study of Adolescent Health: Research Design* [WWW document]. URL: http://www.cpc.unc.edu/projects/addhealth/design.html

A sample of 80 eligible high school clusters was selected by a systematic sampling method by using eight variables to sort the schools including size, type (public/ private/ parochial), urbanicity status, percent of white, percent of black, grade span, census region, and census division[5]. All students in the selected school were asked to complete the In-School Questionnaire. Each participating school provided a roster of its students. For the stratified selection procedures, the adolescents for the In-Home interview were selected from the list of students who completed an In-school Questionnaire plus those who did not complete a questionnaire but were listed on a school roster. The students in the eligible list were stratified by grade and sex and were selected based on 12 sex-by-grade strata.

In sum, a total of 20,745 adolescents in Grades 7 through 12 in the US were interviewed during Wave I (78.9% response rate), while a total of 14,738 adolescents were interviewed during Wave II (88.2% response rate), which was limited to students from Wave I who were still in school. The multistage sample design serves as a basis for inferences from the Add Health sample to the adolescent population in the US (Frankel 1983).

The multi-staged, cluster sample presents a complex experimental design; analyses must take this design into account. Estimates of variance, standard errors, and, therefore, confidence intervals and inferential parametric tests will otherwise be incorrect. Statistical packages such as SAS and SPSS warn not to use their package with such sampling designs, especially for variance estimates or comparisons.

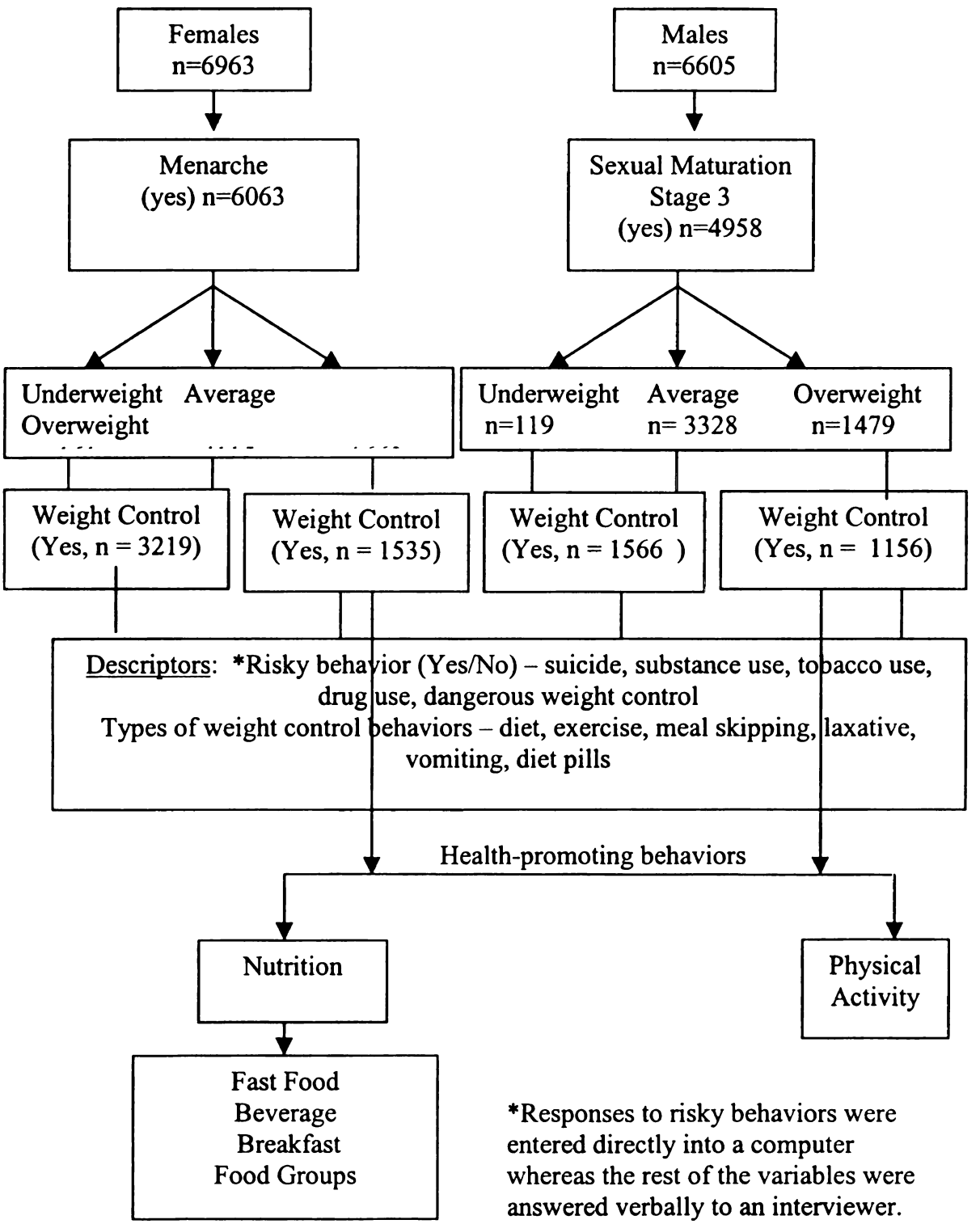
[5]Of the 80 selected schools, 52 were eligible and agreed to participate. The remaining 28 schools were replaced by similar high schools from the initial sample.

Because Add Health was a multiple level sampling design, the proper weight will differ depending on the sampling instruments used. The Add Health group has issued several documents about the weighting appropriate for various studies (Tourangeau & Hee-Choon 1998). Using the proper weights with the necessary special software programs, such as SUDAAN will yield proper point estimates, such as means and regression parameters. SUDAAN is specifically designed for the analysis of cluster-correlated data from studies involving longitudinal data and multistage sample designs (SUDAAN website, http://www.rti.org/patents/sudaan/survey_research.html).

This analysis was conducted with the Wave II data from In-Home interviews. Questions in Wave II included specific nutrition questions related to the topic of this research. The weighted data were used as appropriate in the all analyses (Bearman, Jones, Udry, 1997).

The participants of Wave II were first separated by gender, and then, only those who reported starting puberty were used in the analyses. Next, each participant was categorized by the calculated Body Mass Index and whether they used weight control or not. **Figure 3.2** shows the selection of variables.

Figure 3.2. Selection of subjects based on specific criteria in Wave II of Add Health (N=11,414)



Research instrument

The In-home Interview data were recorded on portable computers during the interviews. This interview included questions on health status, health facility use, foods consumed, psychological well-being, peer networks, family composition and dynamics, educational aspirations and expectations, the ordering of events in the formation of romantic partnerships, sexual partnerships, decision-making processes, employment experience, substance use, puberty status and criminal activities, and the joint occurrence of risk behaviors. In Wave II, heights and weights were both self-reported by the adolescents and measured by the interviewers. Sensitive information, such as that on sexual behavior and risky health behaviors, was asked over headphones and adolescents entered responses directly into the portable computers for privacy.

Definition of Variables

Weight control

Weight control, the outcome variable, is a dichotomous variable of "using weight control methods in the previous seven days" versus "not using any weight control methods". This weight control variable was formed from five questions from the In-Home survey. The questions state "During the past seven days, did you do the following to try to lose weight or to keep from gaining weight? Dieting, exercising, made yourself vomit, took diet pills, took laxatives, other, none". Those individuals who marked "yes" for any of the above weight loss methods were put into the weight control group and those who answered "none" were put into a non-weight control group.

A sub-category of weight control use was created to reflect adolescents using potentially harmful weight control methods, which included vomiting, laxative use and

diet pill use to lose weight or to keep from gaining weight. This variable "dangerous weight control" was a dichotomous variable of "yes" or "no". Weight control behaviors were reported by both adolescents "trying to lose weight" and by adolescents "trying to stay the same weight". Therefore, adolescents trying to "lose weight" /"stay the same weight", and reporting use of any weight control method were included in the "weight control use" variable.

Healthy eating behaviors

Healthy eating measures were dichotomous variables representing the health-promoting behaviors of eating and exercise. Food patterns selected to describe healthy eating included: 1) self-report of amount consumed from each of the five food groups during the previous day; 2) at least one glass of milk consumed during the previous day; 3) breakfast consumption or skipping; 4) self-report of the number of days fast food was consumed. Each of these food pattern questions was modified to represent a dichotomous outcome of healthy eating versus non-healthy eating behavior (Appendix A). The food pattern variables were used in bivariate analyses and in unconditional stepwise logistic regressions to determine the likeliness of healthy eating behaviors of youth using weight control.

The first healthy eating behavior was defined as eating at least one serving from each of the following five food groups: fruit, vegetable, dairy, meat and grain (Schuette, Song, Hoerr, 1996). **Table 3.1** shows the foods selected and categorization of each food group.

Table 3.1 Selected foods categorized into five food groups from Add Health Wave II	
Fruit	Fruit juice, apple, applesauce, pears, pineapple, bananas, grapes, berries, cherries, cantaloupes, melons, mangoes, papayas, oranges, grapefruit, tangerines, kiwis, peaches, plums, nectarines, apricots, raisins, dried fruit
Vegetable	Mixed vegetables, squash, green beans, peas, cabbage, broccoli, carrots, field peas, chick peas, lima beans, kale, greens, lettuce, spinach, tomatoes, yam, potatoes, zucchini, vegetarian pizza
Dairy	Milk, yogurt, cottage cheese, cheese
Meat	Dried beans, lentils, soybeans, tofu, hot dogs, ground meat, steak, pork, meat pizza, chicken, tuna, other fish, eggs, ham, nuts, peanuts
Grain	Cereal, breakfast bars, bread, pasta, bagels, torillas, rice, crackers

The second healthy eating behavior was the consumption of at least one glass of milk during the previous day. The consumption of milk daily is important, because it is very difficult for children to meet their calcium needs without a source of milk in the diet (Kennedy & Goldberg, 1995). The third food pattern variable was "breakfast eating" defined as eating a breakfast of three or more food groups at least five days a week. The definition of adequate breakfast of three or more food groups was taken from the USDA school breakfast program which requires servings from three or more food groups (Devaney & Stewart, 1998). The final variable describing a healthy eating behavior was the consumption of fast food less than two times a week. Research from 1998 Michaelson & Associates showed that adolescents aged 12-17 years ate fast food on average 2.13 times per week (USA Today, 1998), therefore this study focused on adolescents eating fast food less than the average times a week versus those eating it equal to or more than the average times per week.

Healthy exercise behaviors

Healthy exercise was defined as participating in physical activity at least three times a week, but preferably all days of the week, for 30 or more minutes (USDA, 2000). Those adolescents who did not exercise at least three times a week for thirty minutes or more were categorized as having unhealthy exercise behaviors. The physical activity variable was created from the question "In the past week, how many times did you play an active sport or do exercise?". There was no way to determine if this exercise was at a level that would promote unhealthy results instead of leading to health and balance.

Risky Health Behaviors

Participants entered their own risky behavior responses directly into a computer to ensure total privacy and to decrease bias in the response. The risky behavior variables selected here have been associated with weight control behavior in past research studies (Tomeo et al., 1999; Shisslak et al., 1998; Krowchuck, Kreiter, Woods, Sinal & DuPont, 1998; Neumark-Sztainer , Story , Dixon , Murray , 1998). Risky behaviors were any behavior placing the health of a youth at risk and included use of tobacco, alcohol and illicit drugs as well as thoughts of suicide.

Tobacco use was determined by response to the question, "Do you smoke regularly? Yes or no". Substance abuse was analyzed as a single dichotomous variable that combined all responses to illicit drug use. The questions were asked as follows: "Have you tried or do you use drug X? Yes or no". The list of illicit substances included cocaine, inhalants, injected drugs, marijuana, LSD, PCP, ecstasy, ice, speed, heroin and others.

Alcohol use was asked as "Do you regularly consume alcohol?" Those adolescents using alcohol at any time (46%) were considered to be using risky health behaviors, and those not using alcohol at all were considered not to be partaking in risky behaviors.

Sociodemographic Variables

Sociodemographic variables used in the analyses included age, ethnicity and grade. Ethnicity categories included White, African American, Hispanic, Native American, Asian and "Other". For this analysis, Native American, Asian and "Other" were combined as "Other", because of the small number of responses for these categories. The mean age of pubescent adolescents was 16 years, standard deviation 1.6 and ranged from 11 to 23 years for girls and 11 to 21 for boys. Grade levels were categorized into four responses, 9th grade or below, 10th grade, 11th grade, 12th grade or beyond. Age and grade of the adolescents were separated in the final analyses to identify differences in weight control use between these two categories.

Parental variables

Parental education was taken from a separate parental survey performed on the parents instead of the adolescents, because on the "In-Home" adolescent survey less than 10% of the adolescents actually reported their parent's education. By this means, parental education was available for all of the adolescents in Add Health Wave II. This variable was use as an estimate of socioeconomic status of the family because family income was not reported in Add Health. This variable was only used to see if parental education was related to weight control use by adolescents. This was rank order variable

of number of years education of the mother or father. The variable did not specify which parent the information was reported by.

Weight category variable from Body Mass Index

Body mass index (BMI) (kg/m^2) was calculated from measured heights and weights of the adolescents. Youth were measured in clothes without shoes. Weight was taken on a heavy-duty spring scale provided by the interviewer, and height was measured with a fabric tape measure. Interviewers were provided the following research protocol for anthropometric measurements: The procedures are as follows: 1) Before weighing and measuring the respondent have the adolescent remove his/her shoes., 2) Place scale on a hard flat surface and have the adolescent step on the scale. Record the respondent's weight., 3) Using the tape measure record the respondents', measuring him/her from toe to head. Have the adolescents place his/her toe on one end of the tape measure and then unroll the tape measure to measure to the top of his/her head., 4) Enter the respondent's height and weight into the laptop (Goodman, Hinden & Khandelwal, 2000).

Once BMIs were calculated for each adolescent for this analysis, the new 2000 pediatric growth charts from CDC were used to categorize the adolescents as under-, over- and average weight specific for gender and age (http://www.cdc.gov/nchs/about/major/nhanes/growthcharts/clinical_charts.htm). Underweight was defined as a calculated BMI less than or equal to the 5^{th} percentile, average weight was defined as a calculated BMI between the 6^{th} and 84^{th} percentiles, at risk for overweight was defined as a BMI greater than or equal to the 85^{th} percentile and less than the 95^{th} percentiles, and overweight is defined as greater than or equal to the 95^{th} percentile. The variable for BMI classification is called, "weight category". A

crosstabulation of self-reported BMI versus measured BMI was run and confirmed that measured weights and heights were more accurate than self-reported. **Table 3.2** and **Table 3.3** show the crosstabulation of self-report by measured for girls and boys.

Table 3.2 A comparison of pubescent girl's measured versus self-reported heights and weights used to calculate BMI from Wave II weighted data (n=5788).

x^2=398.67 p<0.001		Measured BMI Underwt.	Average	Overwt.	Obese
Self-reported BMI	Underwt.	56%	43%	<1%	1%
	Average	2%	93%	5%	<1%
	Overweight		11%	71%	18%
	Obese		<1%	8%	90%

Table 3.3 A comparison of pubescent boy's measured versus self-reported heights and weights used to calculate BMI from Wave II weighted data (n=4479).

x^2=110.22 p<0.001		Measured BMI Underwt.	Average	Overwt.	Obese
Self-reported BMI	Underwt.	47%	47%		6%
	Average	1%	94%	5%	<1%
	Overweight		17%	47%	47%
	Obese		2%	1%	94%

Those youth of average weight or obese were the most accurate in self-reported heights and weights, whereas those falling in the categories of underweight and overweight had the most difficulty with accuracy of self-reports when compared to measured heights and weights.

Puberty Variable

Puberty status of girls was a dichotomous variable from the question, "Have you ever menstruated? Yes or No". Those girls saying "yes" were considered "pubescent". Puberty status in boys was determined by looking at levels of development of secondary sex characteristics (Tanner, 1984). The variables coincide with the "sexual maturation stages" as show in **Table 3.4.** Sexual maturation of boys was a dichotomous variable with those boys in stage greater than three categorized as "pubescent" and less than three, "prepubescent boys". Thus, only pubescent boys past their growth spurt were selected for analyses in this study.

Table 3.4 How puberty status was determined for boys in Add Health Wave II		
	Sexual Maturation Stage[a]	**Question from Add Health**
Stage 1	▪ Prepubescent	▪ No hair under arms at all. ▪ No hairs on face. ▪ Voice not lower.
Stage 2	▪ Pubic hair appears ▪ Genitalia growth ▪ Sweat gland action	▪ I have little facial and underarm hair. ▪ Yes, voice is a little lower than grade school.
Stage 3	▪ Pubic hair extends ▪ Genitalia growth ▪ Begin acne ▪ Voice changes	▪ I have some underarm hair, but not a lot. ▪ The hair is thick on my face. ▪ My voice is somewhat lower than grade school.
Stage 4	▪ Pubic hair thickens ▪ Genitalia growth ▪ Acne may be severe ▪ Voice deepens	▪ I have lots of hair under my arms and it is thick. ▪ The hair is thick on my face like a grown man's. ▪ Yes my voice is a lot lower than grade school.
Stage 5	▪ Hair distribution increases ▪ Genitalia fully mature ▪ Acne may persist or increase	▪ I have a whole lot of hair that is very thick, as much underarm hair as a grown man. ▪ The hair is very thick, like a grown man's facial hair. ▪ My voice is a whole lot lower than when I was in grade school; it is as low as an adult man's voice.

[a]Tanner, 1984

Seventy-four percent of boys were at or passed stage three of the "Sexual Maturation Stages" in Wave II.

Analyses

Data Management

The process of purchasing, obtaining and getting clearance to use the private-use data of Add Health was complex, frustrating and took six months. First the Institutional Review Boards(IRB) approval was received on March 10, 2000. Then, the Carolina Population Center of the University of North Carolina Chapel Hill sent investigators a

"Use of Sensitive Data Pack" for completion. Some of the requirements to obtain the data included: 1) principal investigator had a Ph.D. or other terminal degree and held a faculty appointment or research position at the receiving institution; 2) receiving institution was for higher education, research or a government agency and demonstrated record of using sensitive data according to commonly accepted standards of research ethics; 3) signed and submitted privacy agreement forms and security pledges; 4) a stand-alone password protected computer; 5)IRB approval of the stand-alone computer and of the project; 6)paper shredder on hand to destroy any unnecessary files relating to private use data; 7) list of public presentations at professional meetings using results based on these data and much more. IRB approval was received on March 10, 2000 and will last for one year. The entire process for obtaining the data took six months.

Once the data were received, the files were unzipped and saved on SPSS 9.0 on a stand-alone password protected computer. The Wave II data set included 2540 variables from which the desired list of variables was selected. The final working database for this study was 270 original and created variables. After the working database was created, descriptive frequencies were run to determine outliers or unreasonable responses to questions. Unreasonable responses to drug questions (i.e. reporting using of any drug greater than 100 times in the last month) were labeled as missing data and not used in the analyses. A total of 30 respondents gave unreasonable responses. Respondents were removed from the database if their file lacked a weighting variable. The final database contained 11, 414 participants.

Subjects included in the analyses were separated by gender and those who had indicated that they were pubescent as defined by the sexual maturation stages. The

separation of genders permitted for controlling differences in weight control use and the different reasons for weight control use by gender. Only pubescent adolescents were included in the study, because of the effect puberty has on weight and eating habits. Descriptive data were generated in SPSS 9.0 to describe the population characteristics. The statistical program SUDAAN (stand-alone version) was required to run statistical analyses to reflect the 2-stage cluster sampling design and to ensure p values did not get artificially deflated, as seen when using SPSS for a cluster sampling design. The statistically significant variables in the descriptive analyses ($p<0.05$) were used in the multivariate analyses of logistic regressions to report odds ratios and confidence intervals. Variables that were not significant, but have been significant in previous research findings, were still be included in the final model.

Logistic regression was used for the multivariate analysis tool, because of its usefulness in predicting the presence or absence of an outcome based on values of a set of predictor variables (Norusis, 1999). The logistic regression analyses generated odds ratios which reported the magnitude of relationships between the outcome and the predictor variables while controlling for all other variables in the model. Reference values used in the logistic regression analyses are given an odds ratio of one, and each are designated in the results tables as such. The variances were estimated by a Taylor linearization method (SUDAAN User's Manual, 1997). Confidence intervals are not significant when they include one. **Table 3.5** shows detail of analyses run for each hypothesis.

Table 3.5 A description of analyses run for each hypothesis

Hypothesis	Analyses
Hypothesis 1 There are differences in frequency of weight control use among pubescent youth by grade, race and age category.	Program: SUDAAN Analysis procedure: crosstabulation and logistic regression Weight control X age, gender, race, weight category Statistics reported: chi-square and significance ($p<0.05$) Results: variables with significant chi-square analyses controlled for in later logistic regressions.
Hypothesis 2 Pubescent youth who use dangerous and non-dangerous weight control methods are at a higher risk to partake in risky health behaviors of tobacco use, drug use, alcohol consumption and suicide thoughts than those pubescent adolescents who do not use weight control.	Program: SUDAAN Analysis procedure: crosstabulation after selecting for gender and puberty status Weight control X risky health behaviors Statistics reported: odds ratios, confidence intervals
Hypothesis 3 There is a difference in risky health behaviors among pubescent youth using weight control classified as underweight, average weight and overweight/obese.	Program: SUDAAN Analysis procedure: crosstabulation after selecting for gender, puberty status and weight control use "yes" Statistics reported: odds ratios, confidence intervals
Hypothesis 4 Youth of any weight category using weight control have unhealthy eating and exercise behaviors.	Program: SUDAAN Analysis procedure: logistic regression after selecting for gender, puberty status and weight control use and including all significant findings from Ho 1-3 Statistics reported: odds ratios, confidence intervals

RESULTS

Eighty-three percent of boys from Wave II were determined to be at sexual maturation stage three or higher and 93% of girls from Wave II had started menstruation; only these pubescent adolescents were included in the analyses. The ages ranged from 11 to 18 years. Eighty percent of pubescent girls and 56% of pubescent boys used weight control methods at the time of the survey (**Table 4.1**). Weight control use existed in every weight category with even 31% of underweight girls and 30% of underweight boys using some form. Characteristics significantly related to weight control use for boys and girls included age, ethnicity, grade and weight category (x^2, $p<0.05$) (Appendix C). Parental education was significant only for boys, with those practicing weight control more likely to have parents of a lower education level than those not practicing weight control. These categories were controlled for in later logistic regressions and further explained there.

Table 4.1 Demographic characteristics for pubescent girls and boys participating in Wave II of Add Health (N=11,414)

Demographic characteristics	Girls[a]			Boys[a]		
	No.	%	Yes, Wt. Control[g]	No.	%	Yes, wt. Control[g]
Adolescent Total	6063	100	80	4958	100	56
Weight category			***			
Underweight[c]	161	3	31	119	2	30
Average weight[d]	4115	69	77	3328	68	46
Overweight[e]	922	15	91	722	15	70
Obese[f]	741	13	94	757	15	86
Age category						***
≤14 years	1120	18	82	769	16	63
15-16 years	2459	41	81	1941	39	56
17-18 years	2484	41	78	2248	45	51
Ethnicity			**			**
White	3315	55	82	2887	58	57
African American	1379	23	78	857	17	46
American Indian	95	2	80	75	2	56
Asian	373	6	71	355	7	58
Hispanic	844	14	77	740	15	59
Other	48	1	74	40	1	57
Grade						*
9th or younger	1903	34	81	1438	31	60
10th grade	1202	21	83	1000	22	57
11th grade	1313	23	78	1183	25	53
12th or beyond	1236	22	79	1010	22	52
Parental education						*
< High school diploma	932	15	77	636	13	56
≥ High school diploma	2088	34	81	1676	34	57
Some college/college grad	2310	38	80	2090	42	52
Parental nutrition control						
No	744	13	79	709	14	61
Yes	5139	87	81	4167	86	55
Weight control						
No	1261	2	0	2275	46	0
Yes	4799	79	100	2683	54	100

Table 4.1 (cont'd).

Fruit and Vegetable Intake						
Inadequate	3535	58	80	2732	55	56
Adequate (5-A-Day)	2522	42	80	2222	45	55
Milk Consumption						
No milk	2230	36.8	81	1172	24	56
At least 1 glass	3831	63.2	80	3786	76	56
Fast Food			**			***
Too much	2043	44	77	1927	20	49
<2 days per week	2606	56	82	1900	50	60
Breakfast Consumption			*			
Skips breakfast	920	15	83	569	12	58
brkfst 1-4x per wk	2425	40	82	1618	33	56
5-7x per w	2718	45	78	2771	56	55
Exercise Behaviors			**			**
Inadequate exercise	2913	48	78	2386	48	58
Adequate exercise	3150	52	82	2571	52	54
Smoking						
No smoking	4825	79.6	80	3917	79	57
Yes, smoking	1237	20.4	81	1038	21	53
Drug Use						**
no drug use	4373	72	81	3489	70	58
yes, drug us	1690	28	77	1469	30	51
Suicide Thoughts						
No, suicide thoughts	5218	86	81	4537	92	56
Yes, suicide thoughts	834	14	81	416	8	56
Alcohol Consumption						*
No	3325	54.9	79	2632	53	58
Yes	2731	45.1	82	2318	47	53

[a]The variation in the number of subjects by characteristic is explained by missing data or refusal to respond.
[b]Weighted percentage of weight control use = using dieting, exercise, laxatives, vomiting, diet pills to lose weight or to keep from gaining weight in the past seven days.
[c]Underweight = from age and gender specific NCHS growth charts, < 5th percentile
[d]Average weight = from age and gender specific NCHS growth charts, > 5th percentile and <85th percentile
[e]Overweight = from age and gender specific NCHS growth charts, ≥ 85th percentile and < 95th percentile
[f]Obese = from age and gender specific NCHS growth charts, ≥95th percentile
[g]Weight control reported in weighted percentages
* $p<0.05$, ** $p<0.01$, *** $p<0.001$

To determine if adolescents reported weight control differently with another person present during the interview, a crosstabulation was run on weight control method

by whether a third person was present (**Table 4.2**). Of the total sample, 1916 (17%) respondents reported another person was there sometime during the interview. There was no significant difference for either boys or girls in reports of weight control use when another person was present. The response to "who was present" had various responses, but the most frequent choices included: mother (55%), sister (23%), brother (19%) and father (14%).

Table 4.2 Crosstabulation of weight control uses by the variable "Was a third person present in the room during the interview?" %(no.)

	Was a third person present at time of the interview?	
BOYS	**No**	**Yes**
no weight control	46% (1907)	43% (365)
yes, wt control	54% (2206)	57% (475)
(n=4953)	100% (4113)	100% (840)
GIRLS	**No**	**Yes**
no weight control	21% (1055)	19% (204)
yes, wt control	79% (3923)	81% (871)
(n=6053)	100 % (4978)	100% (1075)
x^2, boys **(p=0.20)** & girls **(p=0.42)**		

There were no significant differences in report of weight control use in youth either with or without a third person present in the room.

However, when this analysis was run for type of weight control (**Table 4.3 girls & 4.4boys**), some significant differences were found. Girls were significantly more likely to report dieting and diet pill use, when a third person was not present in the room.

Tables 4.3 Crosstabulation of weight control methods of girls by the variable "Was a third person present in the room during the interview?" weighted % (no.)

		Was a third person present at time of the interview?			
GIRLS (n=4794)		**no**	**yes**	**X^2**	**Significance**
Dieting	**No**	71% (2789)	75% (655)	8.83	p<0.01
	Yes	29% (1134)	25% (216)		
Exercise	**No**	34% (1308)	39% (328)	3.50	ns
	Yes	66% (2615)	61% (543)		
Vomiting	**No**	99% (4947)	99% (1072)	2.36	ns
	Yes	1% (33)	1% (4)		
Laxative use	**No**	99% (3904)	99% (867)	0.00	ns
	Yes	1% (19)	1% (4)		
Diet pill use	**No**	97% (3830)	99% (859)	4.21	p<0.05
	Yes	3% (93)	1% (12)		

Tables 4.4 Crosstabulation of weight control methods of boys by the variable "Was a third person present in the room during the interview?" weighted % (no.)

		Was a third person present at time of the interview?			
BOYS (n=4958)		**No**	**Yes**	**X^2**	**Significance**
Dieting	**No**	87% (1929)	89% (423)	1.01	ns
	Yes	13% (277)	11% (52)		
Exercise	**No**	37% (825)	38% (180)	1.27	ns
	Yes	63% (1381)	62% (295)		
Vomiting	**No**	99% (4106)	100% (840)	1.14	ns
	Yes	<1% (7)	0%		
Laxative use	**No**	100% (2206)	99% (474)	1.00	ns
	Yes	0%	<1% (1)		
Diet pill use	**No**	99(2197)	99% (475)	5.59	p<0.05
	Yes	<1% (9)	<1%		

Chi-square analyses showed boys were significantly more likely to report diet pill use when a third person was not present in the room. Because the number of responses to diet pill use was a very small number (n~9), the chi-square results maybe artificially inflated, meaning that no conclusions could be drawn.

A variety of weight control methods and combination of methods were used by both boys and girls. The types of weight control methods used are listed in **Table 4.5**. Any weight control methods reported by less than 1% of the adolescents are not listed as a percentage, but mentioned in the last row of the table. The majority of youth for all weight categories used exercise and/or dieting to control their weight.

Table 4.5. Weighted percentage of weight control methods used by girls and boys in Wave II of Add Health

All weight categories	Girls	Boys
Exercise	45	52
Dieting & exercise	18	9
Dieting	7	3
Other	0	2
Other &exercise	2	1
Dieting & other	1	0
Dieting exercise, & diet pill use	1	0
Underweight		
Exercise	11	11
Dieting & exercise	1	0
Dieting	2	6
Other	0	7
diet, exercise, laxative use, & diet pill use	1	
Average weight		
Exercise	48	46
Dieting & exercise	14	4
Dieting	5	1
Other	2	0
Other &exercise	2	0
Dieting & other	0	1
Dieting, exercise & diet pills	1	0
Overweight/obese		
Exercise	42	60
Dieting & exercise	25	14
Dieting	9	4
Other	3	2
Other &exercise	2	1
Dieting, exercise & other	1	1
Dieting, exercise & diet pills	1	0
Exercise & diet pills	1	0

Other weight control methods reported by <1% girls: laxatives, vomiting, and any combination of diet, exercise, laxative, diet pills and vomiting

Other weight control methods reported by <1% of boys: laxative use, diet pill use, vomiting and any combination of diet, exercise, vomiting, laxative use and diet pill use

More overweight/obese girls (25%) used diet and exercise than did average weight (14%) and underweight (18%) girls. Bivariate analyses showed weight category was significantly related to vomiting ($p<0.05$), diet pill use ($p<0.01$) and laxative use ($p<0.05$). Of girls who used dangerous weight control methods, there was a significant difference by weight categories for use. Those who were average weight were those most likely to use dieting, vomiting and diet pills with ($x^2=17.42$, $p<0.0001$) 50% average weight, 30% obese, 20% overweight, <1% underweight.

More overweight/obese boys (14%) used diet and exercise than average weight (4%) and underweight (0%) boys. Weight category was significantly related to diet pill use ($p<0.05$), exercise ($p<0.01$) and dieting ($p<0.05$), with overweight/obese, boys most likely to exhibit dangerous weight control behaviors compared to average weight or underweight boys.

Hypothesis 1
There are significant differences in frequency of weight control use among youth by weight category, grade, race and age category.

Although no significant differences were seen between grades and ages of girls for weight control use (**Table 4.6**), overweight/obese were three and five times more likely to use weight control than were average weight pubescent girls. Underweight girls were less likely to use weight control than were average weight girls. African American girls, Hispanics, and "Other" ethnic groups were less likely to use weight control than were White girls. Unlike girls, there were no differences in weight control use by ethnicity of boys. Older males were less likely to use weight control than the youngest group of boys ages 14 an below. Underweight, were less likely to use weight control, and overweight and obese boys were three and 11.0 times more likely to use weight control than average weight boys.

Table 4.6. Logistic regression analyses of demographic variables by weight control for girls and boys participating in Wave II of Add Health.

	OR[a]	95% CI		p
		Upper	Lower	
ADOLESCENT GIRLS (n=4094)				
Weight Category				
Average weight	1.0	1.00	1.00	
Underweight	0.1	0.04	.015	p<0.01
Overweight	3.6	2.50	5.23	p<0.01
Obese	5.6	3.45	9.18	p<0.01
Ethnicity				
White	1.0	1.00	1.00	
African American	0.6	0.47	0.79	p<0.01
Hispanic	0.6	0.44	0.86	p<0.01
Other	0.7	0.48	0.98	p<0.05
Age category				
<=14 years	1.0	1.00	1.00	
15-16 years	1.1	0.79	1.44	ns
>=17 years	0.8	0.53	1.28	ns
ADOLESCENT BOYS (n=3861)				
Weight control				
Average weight	1.0	1.00	1.00	
Underweight	0.2	0.07	0.37	p<0.01
Overweight	3.9	2.96	5.02	p<0.01
Obese	11.5	8.54	15.60	p<0.01
Ethnicity				
White	1.0	1.00	1.00	
African American	0.7	0.45	1.10	ns
Hispanic	1.2	0.81	1.81	ns
Other	1.4	0.91	2.14	ns
Age category				
<=14 years	1.0	1.00	1.00	
15-16 years	0.8	0.52	1.10	ns
>=17 years	0.7	0.44	0.94	p<0.05
Parent education				
< High school diploma	1.0	1.00	1.00	
High school diploma	1.2	0.66	2.17	ns
> High school diploma	1.5	0.78	2.69	ns

OR = odds ratios

[a]An OR of 1 indicates the reference value.

Hypothesis 2
Pubescent youth who use weight control methods are at a higher risk for participating in risky health behaviors of tobacco use, drug use, alcohol consumption and suicide thoughts than those pubescent adolescents who do not use weight control participate.

Hypothesis 3
There is a difference in risky health behaviors among pubescent youth using weight control classified as underweight, average weight and overweight/obese.

No significant chi-square analyses relationships were found for girls between weight control use and risky health behaviors, however alcohol use ($p<0.05$) and drug use ($p<0.01$) in boys were significantly associated with weight control (**Tables 4.7-4.8**). A chi-square analysis between "dangerous weight control methods" by risky health behaviors in girls resulted in significant relationships with suicide ($X^2 = 7.28^{**}$), alcohol use ($X^2 = 13.95^{**}$) and drug use ($X^2 = 14.79^{**}$). No significant associations were found between dangerous weight control and risky health behaviors in boys (data not shown).

Data analyses to test Hypothesis 3 showed that: 1) drug use was significantly associated ($p<0.05$) to weight control use in underweight girls, 2) alcohol use was significantly associated ($p<0.05$) to weight control in average weight girls, 3) drug use was significantly associated ($p<0.01$) with weight control in average weight boys and 4) alcohol use was significantly associated ($p<0.05$) to weight control in underweight boys. (**Tables 4.7 & 4.8**).

Table 4.7 A comparison of risky health behaviors for girls who are using and who do not use weight control.

		Weight control		
	All girls (n=6063) Yes	**Underweight** (n=161) Yes	**Average wt** (n=4115) Yes	**Overweight** (n=1663) Yes
	← **Weighted %** →			
Suicide thoughts	$X^2 = 0.0$	$X^2 = 0.09$	$X^2 = 0.48$	$X^2 = 3.40$
No	85	86	87	82
Yes	15	14	13	18
Tobacco Use	$X^2 = 0.9$	$X^2 = 0.57$	$X^2 = 0.92$	$X^2 = 0.27$
No	54	39	55	56
Yes	46	61	45	44
Drug Use	$X^2 = 2.54$	$X^2 = 3.68$*	$X^2 = 1.45$	$X^2 = 0.33$
No	71	82	71	73
Yes	29	18	29	27
Alcohol Use	$X^2 = 3.53$	$X^2 = 0.28$	$X^2 = 4.90$*	$X^2 = 0.32$
No	84	72	83	87
Yes	16	28	17	13

*p<0.05, **p<0.01

Table 4.8 A comparison of risky health behaviors for boys who are using and who do not use weight control.

		Weight control		
	All boys (n=4958) Yes	**Underweight** (n=77) Yes	**Average wt** (n=3470) Yes	**Overweight** (n=1378) Yes
	← **Weighted %** →			
Suicide thoughts	$X^2 = 0.0$	$X^2 = 2.73$	$X^2 = 0.54$	$X^2 = 0.54$
No	90	75	91	90
Yes	10	25	9	10
Tobacco Use	$X^2 = 0.0$	$X^2 = 0.13$	$X^2 = 0.20$	$X^2 = 0.05$
No	55	100	55	57
Yes	45	0	45	43
Drug Use	$X^2 = 9.49$**	$X^2 = 1.51$	$X^2 = 7.19$**	$X^2 = 1.49$
No	69	45	68	69
Yes	31	55	32	31
Alcohol Use	$X^2 = 5.26$*	$X^2 = 8.02$**	$X^2 = 2.55$	$X^2 = 1.33$
No	68	100	73	69
Yes	32	0	27	21

*p<0.05, **p<0.01

Hypothesis 4
Youth of any weight category using weight control have unhealthy eating and exercise behaviors.

Logistic regression analyses were used to look at the relationships of weight control and health eating and exercise behaviors of girls and boys. Demographic variables significant in Hypotheses 1 were controlled for in this model including parental education. Also added, were risky health behaviors of smoking, alcohol, drug use and suicide, because these variables have been shown to be positively associated with weight control in previous research studies.

Table 4.9 Logistic Regression analyses of healthy behaviors of girls using weight control as reported in Add Health Wave II (n=3689)

Healthy behaviors	Weight control			
	OR[a]	95% CI		p
		Lower	Upper	
Fruit and Vegetable Consump.				
Inadequate Intake	1.00	1.00	1.00	
Adequate Intake	1.10	0.87	1.40	ns
Milk consumption				
Inadequate milk	1.00	1.00	1.00	
Adequate intake	0.99	0.79	1.24	ns
Fast food consumption				
Too much fast food	1.00	1.00	1.00	
Adequate fast food	1.54	1.23	1.92	<0.001
Breakfast consumption				
Breakfast 5-7 times/wk	1.00	1.00	1.00	
Breakfast 1-4 times/wk	1.39	1.06	1.82	<0.05
Skipping breakfast	1.56	1.13	2.17	<0.01
Exercise behaviors				
Inadequate	1.00	1.00	1.00	
Adequate	1.59	1.26	2.02	<0.001
Race				
White	1.00	1.00	1.00	
African American	0.54	0.40	0.75	<0.001
Hispanic	0.72	0.49	1.04	ns
Other	0.65	0.43	0.97	<0.05
Age				
<= 14 years	1.00	1.00	1.00	
15-16 years	1.17	0.84	1.63	ns
17+ years	1.00	0.70	1.42	ns
Weight Category				
Average weight	1.00	1.00	1.00	
Underweight	0.10	0.06	0.20	<0.001
Overweight	3.65	2.51	5.30	<0.001
Obese	6.18	3.48	10.99	<0.001
Alcohol consumption				
No	1.00	1.00	1.00	
Yes	1.58	1.23	2.05	<0.001
Drug Use				
No	1.00	1.00	1.00	
Yes	0.60	0.45	0.81	<0.001

OR[a] – Odds ratios of 1.00 are not significant and represent the reference value.
Parental education, smoking & suicide attempts not shown; results were insignificant.

Girls using weight control ate less fast food than those not using weight control (OR=1.54) (**Table 4.9**). Girls using weight control were also significantly more likely to skip breakfast (OR=1.56) and get adequate exercise (OR=1.59). In this model, girls using weight control were less likely to be African American (OR=0.56), less likely to be underweight (OR=0.10) and more likely to have a BMI that put them into the category of overweight (OR=3.65) or obese (OR=6.18) than those not using weight control. Finally, girls using weight control were more likely to consume alcohol (OR=1.58), but less likely to use drugs (OR=0.60) than those girls not using weight control. No significant relationships were seen between smoking and weight control.

Only one healthy eating and exercise behavior showed a significant relationship with weight control use in boys (**Table 4.10**). Pubescent/postpubertal boys using weight control methods ate less fast food than those not using weight control (OR=1.90). Overweight/obese boys were also more likely to use weight control (OR=6.15, 15.04) than normal weight boys. When controlling for all other variables in the final model on eating/exercise behaviors and weight control, parental education in boys was no longer significant.

Table 4.10 Logistic Regression analyses of healthy behaviors of boys using weight control as reported by Add Health Wave II. (n= 1299)

Health behaviors	OR[a]	95% CI		p
		Lower	Upper	
Fruit and Vegetable Consumption				
Inadequate Intake	1.00	1.00	1.00	
Adequate Intake	1.03	0.74	1.43	ns
Milk consumption				
Inadequate milk	1.00	1.00	1.00	
Adequate intake	0.81	0.51	1.29	ns
Fast food consumption				
Too much fast food	1.00	1.00	1.00	
Adequate fast food	1.90	1.35	2.68	<0.001
Breakfast consumption				
Breakfast 5-7 times/wk	1.00	1.00	1.00	
Breakfast 1-4 times/wk	1.20	0.82	1.76	ns
Skipping breakfast	0.83	0.44	1.57	ns
Exercise behaviors				
Inadequate	1.00	1.00	1.00	
Adequate	0.83	0.59	1.18	ns
Race				
White	1.00	1.00	1.00	
African American	0.53	0.30	0.92	<0.05
Hispanic	1.41	0.78	2.54	ns
Other	1.25	0.58	2.72	ns
Age				
<= 14 years	1.00	1.00	1.00	
15-16 years	0.38	0.23	0.63	<0.001
17+ years	0.43	0.21	0.92	<0.05
Weight Category				
Average weight	1.00	1.00	1.00	
Underweight	0.09	0.01	0.67	<0.05
Overweight	6.15	3.88	9.76	<0.001
Obese	15.04	8.92	25.37	<0.001
Grade				
9th or below	1.00	1.00	1.00	
10th grade	1.97	1.09	3.55	<0.05
11th grade	0.98	0.55	1.74	ns
12th grade	1.44	0.55	1.74	ns
Smoking				
No	1.00	1.00	1.00	
Yes	0.82	0.55	1.23	ns

OR[a] – Odds ratios of 1.00 are not significant and represent the reference value.

Further analysis of health behavior associations with weight control in various weight categories showed an interesting difference between average weight participants and overweight/ obese participants. A composite table to compare boys and girls of average weight and overweight/obese is shown in **Table 4.11**. No results could be reported for the underweight girls and boys using weight control and how weight control relates to their health behaviors, because the sample was too small.

Table 4.11 Logistic regression analyses of use of health behaviors by average and overweight boys and girls.

	Average Weight		Overweight	
	Girls	**Boys**	**Girls**	**Boys**
	Odds Ratio Comparisons			
Fast Food Consumption (Ref: Too much fast food)	1.55 fast food <2 /wk	2.05 fast food <2/ wk	ns	ns
Breakfast Consumption (Ref: Adequate rkfst)	ns	ns	2.34 Brkfst, but inadequate amt	ns
Exercise behaviors (Ref: Inadequate exercise)	1.59adequate exercise	ns	ns	ns
Ethnicity (Ref: White)	0.54 African American	0.37 African American	ns	ns
Grade (Ref: 9th)	1.77 11th 2.62 12th	2.49 10th	0.18 11th 0.11 12th	0.38 11th 0.23 12th
Age (Ref: <=14 yr)	2.62 17+ yr	0.31 15 to16yr 0.22 17+yr	ns	ns
Alcohol (Ref: No)	1.56 yes	ns	2.20 yes	ns
Drug Use (Ref: No)	0.63 yes	ns	0.40 yes	ns

Ref. – reference value for logistic regression analyses. Variable set to 1.00 and not significant.
ns=not significant

Average weight girls using weight control were significantly more likely to exercise adequately (OR=1.55), eat less fast food (OR=1.51) and drink alcohol (OR=1.56) and less likely to use drugs (OR=0.63) and be older (OR=1.77 to 2.62) than average weight girls not using weight control. Average weight girls using were control were 1.77 and 2.62 times more likely to be older, less likely to be African American or of "other" ethnic background (OR=0.54 & 0.58 respectively) than those average weight girls not using weight control.

Results for overweight females differed somewhat from those for average weight females. Overweight females using weight control were still more likely to drink alcohol and were less likely to use drugs than those overweight females not using weight control. However overweight girls were less likely to be in older grades and 2.34 times more likely to eat some breakfast, even though it was still an inadequate amount.

Average weight boys showed significant difference only for fast food consumption and weight control. Average weight boys using weight control were 2 times more likely to eat fast food less than twice a week than average weight boys not using weight control. Average weight, African American boys, and boys in the 10^{th} grade (OR=2.49) were more likely to be using weight control than 9^{th} grade and 11-12^{th} grade average weight boys. Average weight boys age 15-16 years were less likely to be using weight control (OR=0.22-0.31) than boys older or younger and average weight.

None of the logistic regression analyses for overweight girls significantly predicted the health behaviors of those using weight control versus those not using weight control. Overweight/obese, boys using weight control were less likely to be in the 11^{th} or 12^{th} grade (OR=0.38 & 0.23) than overweight/obese boys not using weight control. Other

findings show overweight/obese boys using weight control were less likely (OR=0.59) to get adequate exercise than overweight/obese boys not using weight control.

Additional Statistics

Weight control method by risky health behaviors

Additional crosstabulation was run to look specifically at type of weight control use and how types of weight control related to risky health behaviors. The results for these analyses on girls and boys are in **Table 4.12** and **Table 4.13.**

Table 4.12 Are certain weight control methods associated with risky health behaviors in girls? (Weighted percentages) (N=6063)

%		Smoking		Drugs		Alcohol		Suicide	
		No	Yes	No	Yes	No	Yes	No	Yes
Dieting						$X^2 = 5.77$*		$X^2 = 4.50$*	
		No	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**
	No	52	48	71	29	82	18	56	14
	Yes	54	46	71	29	84	16	83	17
Exercise		$X^2 = 14.7$**							
	No	45	55	69	31	82	18	84	16
	Yes	56	44	72	28	83	17	85	15
Vomiting									
	No	52	48	71	29	83	17	85	15
	Yes	46	54	37	63	67	32	71	29
Diet pills				$X^2 = 9.98$**		$X^2 = 8.26$**		$X^2 = 4.96$*	
	No	53	47	72	28	83	17	85	15
	Yes	45	55	45	55	49	21	75	25
Laxatives									
	No	52	48	71	29	83	17	85	15
	Yes	71	29	65	35	95	5	79	21
Other									
	No	53	47	72	28	83	17	85	15
	Yes	48	52	63	37	79	21	78	22

"Dieting for weight control" in girls was significantly associated with thoughts of suicide ($p<0.05$) and alcohol use ($p<0.001$). Other significant relationships for girls included "exercise for weight control" and smoking ($p<0.01$), "vomiting for weight

control" and drug use ($p<0.01$) or alcohol use ($p<0.05$), "diet pill use for weight control" and alcohol use ($p<0.05$) or drug use ($p<0.01$).

Significant relationships for type of weight control use and risky health behaviors for boys were exercise and smoking ($p<0.001$). **Table 4.13** shows weighted percentages describing the weight control methods by type of risky health behavior.

Table 4.13 Are certain weight control methods associated with risky health behaviors in boys? (Weighted %) (N=4958)

	Smoking		Drugs		Alcohol		Suicide	
	No	Yes	No	Yes	No	Yes	No	Yes
Dieting	$X^2 = 4.90$*		ns		ns		ns	
No	50	51	69	32	69	31	91	9
Yes	59	41	64	36	59	41	86	14
Exercise	$X^2 = 7.16$**							
No	43	57	67	33	68	32	92	8
Yes	54	46	69	31	68	32	90	10
Vomiting								
No	50	50	68	32	68	32	91	9
Yes	94	6	94	6	0	100	100	0
Diet pills								
No	50	50	68	32	68	32	91	9
Yes	70	30	18	82	40	60	100	0
Laxatives								
No	50	50	68	32	68	32	91	10
Yes	0	0	100	0	0	0	100	0
Other								
No	50	50	68	32	68	32	90	10
Yes	51	49	70	30	76	24	99	1

DISCUSSION

Frequency of weight control

The high prevalence of weight control use among youth and their associated health behaviors of eating and exercise were supported by the results of this study of the Add Health database. A high percentage of youth, 74% of girls and 44% of boys, were using some method of weight control. These percentages are the highest yet reported **(Table 5.1)**. Kann et al. (1998) using the YRBS 1997 found slightly lower percentages of weight control in females (60%) and males (23%), and Story et al. (1998) using the Minnesota Adolescent Health Survey reported the lowest percentages of 27-43% of females and 8 -15% of males who were trying to control their weight.

Table 5.1 A comparison of the prevalence of weight control by adolescents from three adolescent health databases. (Weighted percentages)

	Add Health by Chmielewski et al.	YRBS by Kann et al.	Minnesota Adolescent Health Survey by Story et al.
Weight control use in girls	66	60	27-43
Weight control use in boys	33	23	15

The Add Health results confirmed the findings from Kann et al. (1998) that girls report using weight control more than do boys. However, this study went further to show that average weight and underweight girls were also significantly more likely to use weight control than were average or underweight boys. As body weight increased in the Add Health participants, so did the percent of youth using weight control. These findings were supported by results from the MAHS, which also found overweight adolescents were more likely to practice weight control than their category of "non-overweight" youth (Story et al., 1995).

Ethnicity predicted differences among youth using weight control both in Add Health as well as in other studies (Herzog & Copeland, 1985). Results from the YRBS state that White students were significantly more likely than African American students to alter eating habits to lose weight (CDC, 2000). Story et al. (1998) reported that African American girls were less likely to diet in the past year than were White girls. Results of Add Health support Story's conclusion that African Americans were significantly less likely to use weight control than were White girls (OR=0.61).

In Add Health, parental education did not predict weight control use in girls, but did predict weight control use for boys. This contradicts findings from other studies in which the higher a parent's education, the less likely adolescents were to use weight control. Parental education was reported by the parent in this study, removing the possibility of a misperception of parental educational level by the youth. This difference in reporting of parent's education might account in part for differences in findings among surveys. In the Add Health "In-Home" youth interview, only 10% of adolescents reported knowing their parent's education level.

These findings from Add Health showed a decrease in weight control use as adolescent boys got older. Dieting and weight control tends to begin during adolescence (Richards et al., 1990), and as adolescents get older the drive for thinness decreases (Eislele, Hertsgaard & Light, 1986). Thirty-two percent of 9th grade boys used weight control versus 24% of 12th grade boys. Our findings were similar to those from the YRBS for which Story et al. (1998) reported that 30% of 9th graders and 20% of 12th graders used some form of weight control. We found, however, no significant difference in prevalence of using weight control for girls by age group. Story et al. (1998) reported

on prepubertal as well as pubescent girls in the YRBS, whereas for this analysis of Add Health, we used only pubescent youth. Adolescence is a period of weight gain as both boys and girls progress through puberty (Allan, 1998). Girls gain a certain amount of fat in the early stages of puberty (Tanner, 1984), and if the entire population of girls have already started puberty and have experienced the "fat gain", this may control for the aging as it relates to weight control. Pubescent girls may all use weight control methods at the same rate no matter their age, because they all have had a change in body composition due to puberty. The weight control use by boys by age group was irregular with the highest number of boys using weight control at ages 15-16 years (40%) followed by 17 years and older (39%), than 13-14 years (35%). This pattern of weight control differs from girls and might possibly reflect later physical and mental emotional and maturation of boys versus girls. The Youth Risk Behavior Survey did not show the same pattern of weight control increase in 15-16 year old boys, which may be associated with the effects sampling method.

Weight control methods

As in other studies, adolescents in Add Health reported using a variety of methods to lose weight or to keep from gaining weight such as: restrictive eating or dieting, exercise, vomiting, diuretics, laxatives and diet pills (CDC, 2000; Story, et al., 1998; Serdula, Collins, Williamson, Anda, Pamu, Byers, 1993; French, et al., 1995; Story, Rosenwinkel, Himes, Resnick, Harris & Blum, 1991; Button et al., 1997). Comparisons of weight control methods used by youth in this study to these from other large databases are shown in **Table 5.2**. The 64% of Add Health youth who reported using exercise for weight control was similar to that reported in YRBS 1999 (58%)

(CDC, 2000). We found slightly lower percentages of youth "dieting for weight control" (23%) compared to the 30% in YRBS, but higher than the 12% reported in the MAHS.

Table 5.2 Comparison of weight control methods of youth from three different surveys.

	Add Health by Chmielewski et al. (weighted percentages)			YRBS 1999 by CDC	MAHS by Story et al.[a]	
	All N=7988	Girls N=5099	Boys N=2889	All N=16,000	Girls N=8207	Boys N=7918
Dieting	23	28	13	30	52	23
Exercise	64	65	63	58		
Diet pills	2	2	<1	6		
Vomiting	1	1	<1	4	5	2
Laxative Use	<1	<1	<1			

[a] Not nationally representative
nr=survey did not report on specified behaviors

The most striking difference in Add Health was that only 3% of girls and <1% of boys reported use of dangerous weight control methods versus 10% in the YRBS and 7% in the MAHS. Differences in data collection methods among surveys may explain some of these variations in reports of dangerous weight control behaviors. Add Health questions could be asked of youth in the presence of an additional person, besides the adolescent and the interviewer, leading to some under-reporting of dangerous weight control behaviors. Because the Add Health survey included interviewer's responses about who was present during the interview, we could determine that a third person present at any time during the interview did influence some weight control methods reported such as the use of diet pills and dieting. Add Health youth did under-report some behaviors when a third person was present. But less than 20% of the Add Health interviewers had a third person present during the interview and this additional person might not have been present during the weight control questions. On the other hand, the YRBS and MAHS

questions were asked in a school setting with other peers present. Peer influence likely could affected reporting and possibly led to some over-reporting of dangerous weight control behaviors in YRBS and MAHS. Thus, we conclude that weight control behaviors were slightly under-reported in Add Health and likely over-reported in YRBS and MAHS due to peer pressure.

No published studies to date have examined how the weight category of adolescents using weight control relates to their eating and exercise behaviors. This analysis of Add Health demonstrates the importance of controlling for weight category when examining weight control use, because traits of average weight youth that predict weight control use differed from those of overweight youth. Average weight girls using weight control were more likely to exercise adequately, eat less fast food and drink alcohol and are less likely to use drugs than average weight girls not using weight control. Although overweight females using weight control were still more likely to drink alcohol and less likely to use drugs than those overweight females not using weight control, they were more likely to eat some breakfast, even though it was still inadequate. Average weight boys using weight control were two times more likely to eat fast food less than two times a week compared to average weight boys not using weight control. Also boys in the 10^{th} grade were 2.5 times more likely to be using weight control than 9^{th} grade and $11\text{-}12^{th}$ grade average weight boys.

Weight control and risky behaviors

Cigarette smoking in boys was significantly associated with "exercise for weight control" in Add Health which supports previous findings by Tomeo et al. (1990). Unlike other studies, however, Add Health girls who used weight control were not more likely to

smoke (Tomeo et al., 1990; Story et al., 1998). Dieting for weight control in girls of Add Health was significantly associated with thoughts of suicide, as also found by Neumark-Sztainer in 1999 & Story et al. in 1994. Add Health also found that girls "dieting for weight control" were more likely to consume alcohol than were those not using weight control. Story et al. (1994) also reported MAHS youth who drank were more likely to use weight control methods.

Weight control and eating/exercise behaviors

Twenty-eight percent of youth in Add Health reported eating the adequate amount of fruits and vegetables the previous day, just slightly higher than the 23% in YRBS. This Add Health survey was conducted spring and summer when fruits and vegetables should be readily available. This seasonal effect on the survey data should actually reduce the bias towards low intake of fruits and vegetables, because fruits and vegetables would have been less available in winter months. The 52% prevalence of adequate exercise used for weight control by Add Health participants was less than 65% reported in YRBS. In Add Health adolescents using weight control also reported an increase in physical activity (French et al., 1995). Story et al. (1999) showed that girls categorized as extreme dieters were less likely to eat fruits and vegetables than were moderate dieters or nondieters, and were more likely than more moderate dieters. Add Health researchers, however, found no significant relations for fruit and vegetable intake and weight control use. Story also reported moderate dieters ate two or more servings of fatty foods than nondieters. Add Health reported girls using weight control ate less fast food than those girls not using weight control, but we did not examine youth by category of weight control extremes as did Story.

Breakfast has been shown to be negatively affected by youth using weight control. Shisslak reported in 1996 that 14% of youth skipped breakfast for weight control, which was supported by the findings from Add Health.

Strengths & limitations

A strength of this study is that it is representative of non-institutionalized US adolescents enrolled in regular schools and these results can be applied to the US population. The new NCHS 2000 growth charts were also used in this study to correctly identify boys and girls as underweight, average weight and overweight. Weight control behaviors by the new weight categories is also described in the results of the study.

Questions concerning weight loss behaviors and thoughts on body weight were asked verbally, which was a limitation of this study when another person was present during 20% of the In-Home interviews. The use of dangerous weight control methods was likely reported at a lower frequency than actual occurrence. This bias was clearly demonstrated for use of weight control methods when crosstabulations were run on frequency of use by whether or not the interviewer recorded that a parent was present during the questioning. However, this limitation is in part a strength, because 80% of the interviews were private and not answered in classroom or gym settings as were the YRBS and MAHS.

Another limitation of using the Add Health data is the lack of detail on some questions of interest or in how the questions were asked. Further analysis to determine the type of exercise and amount of exercise for weight control use is desired to clarify whether the high percent reported for "exercise for weight control" was a positive or negative health behavior. Weight control behaviors of parents has also been associated

with weight control behaviors in other family members, but no variables existed in Add Health to assess this relationship. Finally, food consumption was possibly over-reported because of the way each nutrition question was phrased, which is unlike the NHANES survey in which more standard nutrition assessment method was used, 24 hour recalls.

SUMMARY

This study provides evidence that adolescents were in fact using weight control, and the methods of weight control were sometimes dangerous, especially when examined by weight category and gender. The high prevalence of use of weight control may be due to the increasing prevalence of obesity in all age groups, and the media portrayal of a thin ideal body image, but this cannot be confirmed by the Add Health survey. The results show that not just overweight, young white girls were using weight control methods, therefore, hypothesis one was rejected. Overweight adolescents reported the highest percentage of weight control use, but average weight and underweight youth also reported high percentages of use. White girls were more likely than any other ethnic group to use weight control, but Hispanic boys were more likely than White boys to use weight control. Average weight adolescents using weight control tended to be older and used the most dangerous methods, whereas overweight adolescents using weight control were younger students.

Hypothesis two stated that youth using weight control were at a higher risk to participate in risky health behaviors of tobacco use, drug use, alcohol consumption and suicide thoughts. This hypothesis was not completely supported by the results of the study. Adolescents using weight control were more likely to consume alcohol, but less likely to use other drugs. Different types of weight control use were significantly associated with the different risky health behaviors. For girls, exercise was positively associated with tobacco use, diet pill use was positively associated with alcohol use and suicide thoughts and negatively associated with drug use. For boys, dieting and exercise were both positively associated with tobacco use.

Hypothesis three was to evaluate relationships between risky health behaviors and weight control use for adolescents of different weight categories. Average weight girls were more likely to consume alcohol when using weight control, and underweight girls were less likely to use drugs when using weight control. Average weight boys using weight control were less likely to use drugs, and underweight boys using weight control were more likely to consume alcohol.

Finally, the last hypothesis questioned the eating and exercise behaviors of adolescents using weight control by looking at the consumption patterns of breakfast, fast food, fruits and vegetables, a variety of food, milk and the patterns of exercise. Girls using weight control were more likely to eat less fast food and get adequate exercise. They were also more likely to eat an inadequate breakfast or skip breakfast all together. No significant relationships were found between the rest of the eating behavior variables. The data show, however, that no matter if girls did or did not use weight control, only 28% of girls ate the minimally recommended five or more servings of fruits and vegetables a day, 14% had no servings of dairy the previous day and only 50% ate breakfast five or more times a week. These girls consumed a good variety of foods with 90% of the girls eating at least one serving from each of the five food groups the previous day. Boys were significantly more likely to eat less fast food when using weight control. No other eating or exercise variables were significant for boys. The data did show that 29% of the boys ate the recommended five servings of fruits and vegetables the previous day, regardless of weight control use. Nine percent of boys skipped dairy foods the previous day and 12% skipped breakfast. A high percentage of boys (93%) consumed a good variety of foods the previous day.

The above eating and exercise results were for a combination of boys and girls of all weight categories. When separating the youth by weight category, different eating and exercise behaviors were observed. Only average weight boys and girls were less likely to eat fast food. When separating average weight girls from the original model, no significant findings were demonstrated between weight control use and breakfast consumption, however average weight girls were the only group to report a significant relationship between weight control use and adequate exercise. Overweight girls were the only weight category to show a significant relationship between weight control use and breakfast consumption, although their breakfast consumption was still reported as inadequate.

Weight control is not just seen in White, overweight girls, but was demonstrated by this study in every age group, ethnic group and by those in every weight category. Health and unhealthy eating and exercise behaviors differed among adolescents categorized as under-, average and overweight and using weight control. These results indicate that adolescents were not balancing eating and exercise behaviors to control weight as suggested by HP2010.

IMPLICATIONS

The healthy guidelines state that a balance of eating and exercise will aid in decreasing the prevalence of obesity in adolescence. Adolescents were using weight control, and the weight control use was associated with both positive and negative eating behaviors, which do not represent the recommendations of the healthy guidelines. Adolescents should be encouraged to continue the reduction of eating fast food or selecting the healthy options that fast food restaurants offer, and keeping an increased amount of exercise, as long as it is not excessive. Adolescents also require further counseling on the importance of fruit and vegetables consumption and on the effects of skipping breakfast and school performance.

Health professionals should to be aware of the high percentage of underweight girls and boys using weight control. Not all adolescents will report their weight control behaviors in front of someone related to or close to them. This is important to know, because adolescents, especially those of average weight, were using dangerous methods to control their weight. Weight control use was also found to be positively associated with such risky health behaviors as alcohol consumption and suicide attempts and negatively associated with drug use. This study could not determine if the nondangerous weight control methods of diet and exercise were in fact "safe", because of the lack of detailed items in Add Health. Another question on the extent of "dieting or exercise to control weight" might show that the behaviors associated with risky health behaviors were in fact dangerous.

Even though obesity is increasing, the focus on obesity and the healthy guidelines in place do not seem to foster the correct health behaviors in adolescents. Adolescents using weight control may in fact be compromising their health status because of the eating behaviors associated with weight control use.

APPENDICES

APPENDIX A

QUESTIONS FROM ADD HEALTH USED TO CREATE VARIABLES

Questions

Parental education

What was the last grade completed?

1.	6.
2.	7.
3.	8.
4.	9.
5.	10.

Eating behaviors

Think about everything you had to each and drink yesterday. This includes snacks as well as your regular meals.

1. Did you drink _____?
2. Yesterday did you eat...
3. In the last seven days, on how many days did you eat...
   a. at a fast food type place – McDonalds, Kentucky Fried Chicken, Pizza Hut, Taco Bell etc.?
   b. breakfast?
4. Do you currently take vitamins or minerals?

Exercise behaviors

1. How many times did you exercise in the past week?

Weight control behaviors

1. During the past seven days, which of the following things did you do in order to lost weight or to keep from gaining weight?
   a. dieted
   b. exercised
   c. made yourself vomit
   d. took diet pills
   e. took laxatives
   f. other
   g. none

Risky health behaviors

Intro: Some teenagers have experimented with cigarette smoking, drinking alcohol and drug use. The questions that follow ask about your experience with these things. Remember, your answers will not be linked to you.

1. Do you smoke regularly? Yes or no
2. Have you tried or do you use drug X? Yes or no
   a. cocaine, inhalants, injected drugs, marijuana, LSD, PCP, ecstasy, ice, speed, heroin and others
3. How many times in the past year did you consume alcohol?
4. During the past 12 months, did you ever seriously think about committing suicide?

APPENDIX B

CHI-SQUARE ANALYSES OF DEMOGRAPHIC CHARACTERISTICS

Table 4.1b Chi-square analyses of demographic characteristics for girls and boys participating in Wave II of Add Health (N=13,570)

Demographic characteristics	Chi-square	P value*
ADOLESCENT GIRLS		
Weight category	125.62	<0.001
Age category	3.56	0.17
Ethnicity	12.62	<0.01
Grade	4.50	0.22
Parent education	11.11	0.28
ADOLESCENT BOYS		
Weight category	228.47	<0.001
Age category	20.65	<0.001
Ethnicity	15.39	<0.01
Grade	9.75	<0.05
Parent education	16.73	<0.05

***Significant criteria x^2 p<0.05**

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